Abstracts from the 10th International Congress on Twin Studies

001F ESTABLISHMENT OF A NEW POPULATION-BASED TWIN REGISTRY IN WASHINGTON STATE

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Objectives. To establish a population-based twin registry in Washington state (USA) using driver’s license applications.

Method. Data have been obtained from the Washington State Department of Licensing to identify twins. Washington asks all new drivers license applicants if they are a member of a twin pair. This question was included because twin pairs were being issued the same drivers license number when the system was implemented more than 20 years ago. However, computerized records of who is a twin pair are only maintained for 90 days before being archived to microfilm. A prospective and retrospective registry of twins is being identified.

Results. Over the past 2 years, the investigators have obtained full access to driver’s license records. Close to 10,000 individual twins have been identified from prospective data (approximately 100 new twins are added per week); ~half are female, 42% are 20 years old or younger and 17% are born abroad, representing 103 countries. Based on a systematic random sample of microfilm reels we estimate that there are ~80,000 individual twins in the retrospective data who received a license in Washington state since 1980. More than 70% (~56,000) of the twins have active drivers licenses in Washington with current name and address information.

Conclusions. These results indicate that it is feasible to construct a large twin registry in Washington. Field work is currently underway to contact a sample of twin pairs and obtain zygosity and health data.

002P GENETIC & ENVIRONMENTAL EFFECTS ON THE INTER-RELATIONSHIP OF LYMPHOCYTE SUBSET LEVELS

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Host genetic factors play a significant role in determining resistance and susceptibility to immune related diseases. We have previously shown that genetic factors account for 30-70% of the variation in absolute numbers of CD4+ and CD8+ T and CD19+ B-lymphocytes, 3 major effector populations of the adaptive arm of the immune system. Here we used multivariate genetic modeling procedures to test whether: (a) pleiotropic genetic and environmental factors have independent effects on the co-variation of CD4+, CD8+ and CD19+ lymphocytes, or (b) both genes and environment contribute to the variation of an unmeasured intermediate variable, which in turn controls the variation in these T and B lymphocyte subpopulations. Blood samples from 84 identical and 181 fraternal adult female caucasoid twins, ascertained from the St Thomas’ UK twin registry, were analysed cytofluorographically.

This is a follow up study of twins within the Stockholm area, including 32 families and their twins attending grade nine. The twins have been followed from birth onwards up to 16 years of age. The main purpose of this study is to assess the mental and cognitive development at different ages, and relate these to the teachers’ ratings of the twins’ adaptation to the school situation. Another aim is to see how the twins who were born prenatally are developing during the school ages. As described in earlier reports, the twins are more susceptible to lower birth weight, shorter gestation periods and birth complications. A third aim has been to gain a deeper insight into the relationships between twins and the development of their identities. Different ability tests have been used, as well as questionnaires about interests, attitudes toward school, and leisure activities. A psychological writing test including small figurers for the twins to continue has been used to examine another part of their relations to each other. In summary, it is harder for twins compared to singletons to develop independence and a positive identity, as they have to emancipate themselves both from their parents and their co-twin. Prematurity and low birth weight continued to have some relation to cognitive development from birth onwards.

004P ACTIVITIES IN THE LAST 3 YEARS OF JATM

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JATM was started in 1968 with only 23 mothers of twins. Now we have 3000 members all around Japan. In 1999, we petitioned the Ministry of Health and Welfare to help our activity on administrative basis. Finally the booklet “Bringing up Twins” has been published and distributed nationwide to local health centers in 2000. Senior Supporting Team in JATM was set up in 1999 to help me. It has 20 supporters and they started to study and train with me. They participated with the meetings of branches and gave a lot of advices for young parents. We sent our second newsletter written in English last December to 20 clubs in foreign countries for the first time in 3 years. I would like to publish it every 3 years. It has been 7 years since we have started “Twin Hot Line” phone service in April 1994. Nowadays, 41 club members take part in “Twin Hot Line”. And 11 members are waiting for clients’ calls in turn once a week in the main office. We sometimes have some training sessions to improve ourselves.

005F PARENTING MULTIPLE BIRTHS: A GROUNDED THEORY

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For Canadian children and youth, fathers appear to hold a lower position of influence and importance than mothers in children’s lives (Vanier Institute of the Family 1996). Prematurity and relate these to the teachers’ ratings of the twins’ adaptation to the school situation. Another aim is to see how the twins who were born prenatally are developing during the school ages. As described in earlier reports, the twins are more susceptible to lower birth weight, shorter gestation periods and birth complications. A third aim has been to gain a deeper insight into the relationships between twins and the development of their identities. Different ability tests have been used, as well as questionnaires about interests, attitudes toward school, and leisure activities. A psychological writing test including small figurers for the twins to continue has been used to examine another part of their relations to each other. In summary, it is harder for twins compared to singletons to develop independence and a positive identity, as they have to emancipate themselves both from their parents and their co-twin. Prematurity and low birth weight continued to have some relation to cognitive development from birth onwards.

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elicited fathers’ perceptions of their father-infant(s) relationships, their fathering selves, and supportive and non-supportive environment. In addition, 28 of the terminations were performed during the 1st trimester. The median gestational age at termination was 11.4 weeks. 2 women miscarried (7.1%) while the median gestational age at delivery was 36.6 weeks. 4 women delivered before 34 weeks (14.2%) and 3 out of them (10.7%) delivered before 30 weeks. There were also 52 terminations in the 2nd trimester. The median gestational age at termination was 18.6 weeks. 2 of our patients miscarried (3.9%). The median gestational age at delivery was 35.9 weeks (28%) delivered before 34 weeks, while 6 out of them (12%) delivered before 30 weeks.

**Conclusion.** Selective termination in twin pregnancies discordant for homozygous beta thalassaemia is associated with a favorable outcome of the unaffected twin. However, the preterm delivery rate before 34 and 30 weeks’ gestation is high, when the termination is performed in the second trimester.

**008P AMINOCENTESIS IN NATURAL AND IVF TWIN PREGNANCIES**

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**Objective.** The aim of our study was to investigate if amniocentesis carries a higher risk in twin pregnancies conceived after in vitro fertilization (IVF), than in naturally conceived twins.

**Methods.** The study group consisted of 308 normally conceived twin pregnancies and of 145 twin pregnancies conceived following IVF. Amniocentesis was performed between 16–19 weeks’ gestation. Pregnancy loss which had undergone multifetal pregnancy reduction were excluded from the study. The main outcome variables were pregnancy loss and preterm delivery rate.

**Results.** The median maternal age was not significantly different between the two groups (35.9 vs 36.4 years in naturally and IVF conceived pregnancies). Pregnancy loss occurred in 3.6% of naturally conceived pregnancies and in 4.1% of IVF ones. Preterm delivery rate (< 32 weeks) was 6.4 and 14.4% in the two groups, respectively, while that of very early preterm deliveries (< 28 weeks) was 6.5 and 0.7%, respectively.

**Conclusions.** Twin pregnancies resulting after IVF are not at a higher risk of pregnancy loss following amniocentesis, compared to normally conceived twins. However the risk of early preterm delivery (<32 weeks), as well as that of very early preterm delivery (< 28 weeks) is significantly higher.

**007S GENETIC STRUCTURE OF WORKING MEMORY AND ITS RELATIONSHIP TO BRAIN FUNCTION**

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Working memory (WM) is defined as active maintenance (storage) and executive functions of short-term memory. In this study, genetic structure of these two different functions (storage and executive) in two different modalities (spatial and verbal) was investigated by the twin method. One hundred and forty-two pairs of nonzozygotic and 92 pairs of dizygoic Japanese twins took spatial and verbal working memory tasks, and MZ and DZ twins among them took the higher-order spatial and verbal cognitive tests. Spatial storage (Ss), spatial executive (Se), verbal storage (Vs), and verbal executive (Ve) were measured as WM parameters, and spatial cognitive ability (SC) and verbal cognitive ability (VC) scores were constructed from the standardized Japanese Intelligence test (Kyuodi N). Univariate genetic analysis showed that all WM parameters and higher-order cognitive ability scores were affected by additive genetic and nonshared environmental effects. Multivariate genetic analysis indicated that there is one common genetic factor with modality-specific genetic factors underlying WM parameters. The results also suggest that WM parameters were genetically related to higher-order cognitive abilities. Preliminary finding on the relationship between WM and Event Related Potential (ERP) components (P300 and Slow Wave) in the Delayed Response Task will be discussed.

**008F SELECTIVE TERMINATION IN TWIN PREGNANCIES Discordant for homozygous beta thalassaemia**

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**Objective.** To study the perinatal outcome of twin pregnancies discordant for homozygous beta thalassaemia, following selective termination of the affected twin.

**Methods.** We conducted a retrospective study of 70 cases of twin pregnancies discordant for homozygous beta thalassaemia.

**Results.** 28 of the terminations were performed during the 1st trimester. The median gestational age at termination was 11.4 weeks. 2 women miscarried (7.1%), while the median gestational age at delivery was 36.6 weeks. 4 women delivered before 34 weeks (14.2%) and 3 out of them (10.7%) delivered before 30 weeks. There were also 52 terminations in the 2nd trimester. The median gestational age at termination was 18.6 weeks. 2 of our patients miscarried (3.9%). The median gestational age at delivery was 35.9 weeks (28%) delivered before 34 weeks, while 6 out of them (12%) delivered before 30 weeks.

**Conclusion.** Selective termination in twin pregnancies discordant for homozygous beta thalassaemia is associated with a favorable outcome of the unaffected twin. However, the preterm delivery rate before 34 and 30 weeks’ gestation is high, when the termination is performed in the second trimester.

**01F DISTINGUISHING CAUSAL FROM NON-CAUSAL ASSOCIATIONS USING RANDOM EFFECTS REGRESSION MODELS FOR TWIN DATA**

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**Objectives.** To use random effect regression models to examine the association of service in Vietnam with post-traumatic stress disorder (PTSD) and alcoholism.

**Methods.** Data were derived from psychiatric interviews conducted with ~3,000 twin pairs in the Vietnam Era Twin Registry. Following Kendler et al. (Arch Gen Psychiat 1990; 50, 36–43) three alternative random effect models were fit to the data to distinguish causal (environmental) from non-causal (genetic) hypotheses: model 1 tests the general association between Vietnam service and the outcomes; model 2 examines if the model fit is improved by including separate parameters for between and within twin pair effects; and, model 3 examines if the association is different within DZ and MZ twins.

**Results.** When a single effect parameter is estimated there is a significant association of Vietnam service with both PTSD (OR = 3.2, 95% CI 2.6–3.9) and alcoholism (OR = 1.3, 95% CI 1.2–1.5). For PTSD, separation of Vietnam service and alcoholism is significantly higher.

**Conclusion.** Using random effects regression models these analyses suggest that PTSD is causally linked to service in Vietnam while the Vietnam-alcoholism association is a non-causal association due to confounding by shared genetic effects.

**011F TWIN INFANT SLEEPING ARRANGEMENTS AND IMPLICATIONS FOR SIDS**

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There is a 42% increased risk of SIDS for twin infants compared to singletons, and the greatest reduction in singleton cot-deaths has occurred via interventions in infant care practices. Current advice to parents regarding...
reducing the risk of SIDS recommends that babies should sleep in a supine position with their feet to the foot of the crib. The 'feet-to-foot' advice was designed to minimise the risk of an infant slipping under the bedcovers, and subsequently overheating or suffocating, and is geared towards singleton infants sleeping alone. Parents of many twins (due to preference or circumstance) ‘co-bed’ their infants but little advice exists about the safest way to do so. This paper reports on a study designed to explore the sleeping arrangements and night-time care-giving strategies employed by parents with twin infants. We use qualitative and quantitative data generated via sleep logs compiled for a seven-day period in each of the infants’ first month and third month, combined with semi-structured interviews regarding sleeping lifestyle and beliefs of twin parents at the end of the first and third months, to explore the various sleeping arrangements and their permutations employed by parents for their twin infants. Parents who co-bed from choice cite better infant sleep, and thus more parental sleep, as a motivating factor, however there are concerns regarding compression of one infant by another when placed side-by-side, or entanglement/overheating in each other’s covers when placed end-to-end. Some parents devise barriers (cushions, rolled up towels) to separate their infants, but these might introduce hazards of their own in to the sleep environment. The pros and cons of twin infant co-bedding are explored.

012F PARENTING STRESS AMONG PARENTS OF TWINS: IVF VS. SPONTANEOUS

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Parenting stress was assessed by direct questioning of 56 Polish mothers of twins delivered within the last 24 months (9mo-6, range: 1-23). Mothers were 30 ± 5 yrs old (range: 29-40), mostly nulliparous, 28.6% conceived by ART, had 13.2 ± 4 years of education, and mainly (94.7%) of average low to average high economic status. GA at birth was 35.6 ± 2.4 wks (range: 28-40), BW of twin A was 2442 g ± 602 (range: 1108-3820) and of twin B was 2420 g ± 648 (range: 1020-4140), NICU admission was 20/56 and 24/56 for twin A and B, respectively. The short form Parenting Stress Index (Abidin RR) was calculated for each mother. A score of > 90 was considered significantly severe. We found that 8/15 ART and 10/15 spontaneous conception had a score > 90 (p = .11). Comparison of individual twin BW, economic status, level of education, gestational age, and twin age at time of assessment were not different. We conclude that in this sample of Polish mothers, severe parenting stress was found in half of the mothers following ART conceptions, twice as much as in the spontaneous group. Parenting stress in this group seems to be un influenced by mode of conception as well as the other tested variables.

013P TYPE A BEHAVIOR IN MALE TWIN PAIRS: THE VIETNAM ERA TWIN REGISTRY

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We examined genetic and environmental influences on Type A behavior using data collected from members of the Vietnam Era Twin (VET) Registry. The Registry comprises male twin pairs who served in the U.S. military between 1965 and 1975. A 1990 survey mailed to the twins contained items from the Framingham Type A Scale. Data was received from over 1500 MZ and 1100 DZ pairs. We found that a model including environmental influences on Type A behavior (2.4 wks; range 28–40), BW of twin A was 2442 g ± 602 (range: 1108-3820) and of BW of twin B was 2420 g ± 648 (range: 1020-4140), NICU admission was 20/56 and 24/56 for twin A and B, respectively. The short form Parenting Stress Index (Abidin RR) was calculated for each mother. A score of > 90 was considered significantly severe. We found that 8/15 ART and 10/15 spontaneous conception had a score > 90 (p = .11). Comparison of individual twin BW, economic status, level of education, gestational age, and twin age at time of assessment were not different. We conclude that in this sample of Polish mothers, severe parenting stress was found in half of the mothers following ART conceptions, twice as much as in the spontaneous group. Parenting stress in this group seems to be un influenced by mode of conception as well as the other tested variables.

014P ABNORMAL AMNIOTIC FLUID VOLUME IN TWIN GESTATIONS IS ASSOCIATED WITH HIGHER RATES OF PERIPARTUM COMPlications

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Objective. Assess the effects of poly and oligohydramnion in twin gestation on rates of peripartum complications.

Study design. Study population were 917 women with twin gestation and 4430 singleton fetus in vertex presentation. 47 women had polyhydramnion (AFI > 24) and 22 women had oligohydramnion (AFI < 5). The remaining 848 served as controls. We compared the rates of preterm births, 5 minutes Apgar score < 7, labour dystocia, fetal distress, abruptio placentae, post partum hemorrhage, vacuum deliveries and cesarean sections (CS) rates in the three groups with ANOVA, χ² analysis and Fisher’s exact test when appropriate. Multivariate analysis was done to evaluate the effect of abnormal amniotic fluid volume on CS rate.

Results. Polyhydramnions was associated with shorter pregnancy duration than control group (33.8° vs 36°, p < 0.01), increased rate of low Apgar score at 1min — (20.5% vs. 4.6% p < 0.01) and CS (48.9% vs. 31.6% p = 0.02). Oligohydramnions was associated with increased rate of CS (72.7% vs. 31.6% p < 0.01). No significant changes were found in the rates of other peripartum complications. Multivariate analysis revealed that poly and oligohydramnion are independent risk factors for CS in twin gestation (RR = 2.28; p = 0.01 and RR = 6.75; p = 0.002).

Conclusions. Polyh and oligohydramnion are risk factors for CS in twins. Polyhydramnion is also associated with higher rates of perterm births and low Apgar scores at 1 minute.

015S THE BIOLOGICAL AND SOCIAL ORIGINS OF CORONARY HEART DISEASE

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Epidemiologic studies provide a substantial body of evidence that people who had low birthweight, or who were thin or short at birth, or who failed to grow in infancy, have increased rates of coronary heart disease, stroke, non-insulin dependent diabetes and hypertension. This has led to the fetal origins hypothesis, which proposes that these diseases originate through adaptations which the fetus and infant make when they are undernourished. These adaptations include diversion of oxygenated blood away from the trunk to favour the brain, alterations in the hormonal systems which regulate growth and maturation, importantly insulin and cortisol, and alterations in body composition. The adaptations permanently change the structure and function of the body. The path of growth through childhood modifies the risk of disease associated with small body size at birth. The highest death rates from coronary heart disease among men occur in those who were thin at birth and at one year but whose weight gain accelerated in childhood so that they had an above average body mass index. Death from coronary heart disease may therefore be a consequence of poor prenatal or infant nutrition followed by improved postnatal nutrition. Other patterns of fetal and childhood growth are associated with the later development of stroke, non-insulin dependent diabetes and hypertension and the patterns differ between the two sexes. Common to them all is a period of reduced early growth followed by a period of accelerated growth.

The persisting changes in the body’s structure and function that are associated with reduced early growth alter the body’s responses to adverse biological and social influences in later life. For example, people who were small at birth are more prone to developing Type 2 diabetes or coronary heart disease if they become overweight in adult life. A number of maternal influences which programme the fetus have now been identified. They include the mother’s body composition before and during pregnancy and her diet in pregnancy. A new public health agenda for the prevention of chronic disease is emerging. Simple calculations show that quite modest improvements in fetal and infant growth would lead to substantial fall in disease rates.

016S MULTIPLE EXPOSURE: AN INNOVATIVE APPROACH TO THE ANTENATAL CARE OF MULTIPLE PREGNANCY

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Based on a multidisciplinary model of care, the Antenatal Care of Multiple Pregnancy Centre (ANCOMP) was established to meet the complex needs and special concerns of women and families experiencing a multiple pregnancy. ANCOMP offers a multidisciplinary standard of care that will best meet the obstetrical and psychosocial needs of the woman and her family. Women have access to expertise from perinatologists, neonatologists, perinatal ultrasonographers, dieticians, social workers and parents of multiples. Along with the Clinical Nurse Specialist, each woman is assigned an antenatal care team. Teen care needs and referrals are made appropriately. Close links with community support groups such as Multiple Births Canada are maintained and all families are encouraged to attend prenatal classes specifically for parents expecting multiples.

Abstracts
017S A TWIN STUDY OF LOW BACK SYMPTOMS
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Background. Low back pain problems are among the most common and costly musculoskeletal problems facing the developed countries of the world. Yet, little is known about their etiology or underlying pathology. Recent evidence suggests that disc degeneration and failure, commonly suspected as underlying culprits, are substantially influenced by genetic factors. To quantify the genetic effects on back symptoms we conducted a twin study.

Methodology. Detailed interviews of low back pain history and exposure to suspected environmental risk factors were conducted of 147 MZ and 153 DZ male twin pairs, 35 to 69 years of age, drawn from the popula-
tion-based Finnish Twin Cohort. Different back symptoms were assessed for genetic vs. environmental effects through standard model-
fitting techniques in the structural equation model-fitting program Mx.

Results. For current back pain, additive genetic effects (AE model, AIC = 7.55) accounted for 37% (95% CI 10–61%) of variance in liability, while for frequency of back pain in the past 12 months, genetic effects accounted for 30% (13–36%) of phenotypic variance. The best model for lifetime back pain lasting more than one day was a CE model with 21% (0–43%) of liability accounted for by shared environmental effects. The largest genetic component was observed for average disability score (41%, 95% CI 24–57%), but for most other measures the genetic compo-
ment was modest (<30% in an AE model).

Conclusion. Among middle aged male twin pairs, genetic effects on various measures of back pain appear to be moderate.

018S TWIN STUDIES IN METABOLIC DISEASE: TYPE 2 DIABETES AND THE METABOLIC SYNDROME
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Results obtained by using the Danish Twin Register which is population
based, in studies of the pathophysiology to type 2 diabetes and it’s etho-
logical determinism: insulin resistance and betacell function will be
discussed. Together with that, the genetic influence on the variation
in the three components of the metabolic syndrome will be discussed.

Major findings. (a) The genetic component in development of type 2
diabetes is lower than previously published; (b) only about 25% of the
variation in insulin resistance is genetically determined; (c) about 50%
of the variation in betacell function is genetically determined; (d) the
components in the metabolic syndrome is determined by both genetic
and environmental factors. The gender seems to be a very important vari-
able in studies of genetic traits which has not been taken into
consideration in most “gene hunting” studies. Furthermore, it will be
discussed how intrauterine nutrition can influence the results obtained
in twin studies. In conclusion, twin studies together with the candida-
gene approach clearly indicate that investigations of the pathophysiology
of type 2 diabetes and the metabolic syndrome should focus more
on environmental factors.

019F THE UNIVERSAL DILEMMA: THE EDUCATIONAL NEEDS OF TWINS
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Whether to place twins/triplets together or apart in the classroom
continues to be one of the greatest challenges facing multiple birth families
and educators. This session examines educator assumptions concerning
multiples and classroom placement, reviews the current research on this
topic and provides ways all involved parties can better meet the needs
of this growing population of students. After extensive research with mul-
tiple birth families and educators at the pre-school through high school
level, the National Organization of Mothers of Twins Clubs, Inc. created
our Multiple Birth Education Kit. This unique resource offers innova-
tive materials crucial to providing quality education and making equitable
decisions for multiple birth children and their families. This presentation
will review a variety of issues surrounding placement decisions. In addi-
tion, NOMBOTC has developed unique interactive materials for use with
educators and other support personnel to offer hands-on experience and
solutions to the most common dilemmas faced with multiple birth chil-
dren. By accessing the latest research and these original techniques, educators
and parents will be able to network together to enhance the education
of twins and higher order multiple birth children. NOMBOTC offers new
insights and perspectives on this universal dilemma.

020P GRANDMULTIPARITY IN TWIN GESTATION: IS IT REALLY A PROBLEM?
Zahi Ben-Aroya, Jur Bar-David, Mordechai Hallak, Michael Friger, Miriam Katz and Moshe Mazor.
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Objective. To determine whether grandmultiparity in women with twin
gestation exposes the parturient to higher rates of peripartum complications.

Study design. Between the years 1989–1998, 917 parturients with twin
gestation delivered in our institution. The study group consisted of the
161 grandmultiparous women (parity ≥ 5). The control group consisted of
the remaining 756 women with parity < 6. We compared the rates of
placental abruption, meconium stained amniotic fluid, Apgar scores,
uterine rupture, birth canal lacerations, vacuum deliveries and cesarean sections rate in two these groups by using χ2 analysis and Fisher’s exact test if needed.

Results. No significant increase in the rates of uterine rupture (0% vs.
0%), meconium stained amniotic fluid (7.5% vs. 6.3%), placental abrup-
tion (2.5% vs. 1.6%), IPFD (1.2% vs. 0.3%), PPH (1.2% vs. 0.7%); birth
canal lacerations (1.2% vs. 0.5%), fetal distress (4.3% vs. 7.3%), Apgar
scores of less than 7 after 5 minutes (1.3% vs. 0.3%), vacuum deliveries
(2.5% vs. 3.4%) and cesarean sections rate (31.1% vs. 34%) were shown
between the study and the control groups, respectively.

Conclusions. Grandmultiparity in twin gestation was not associated with
increased risk of peripartum complications. Therefore grandmultiparity
should not be considered a significant risk factor in twin pregnancies
when modern facilities are available.

021P RIPENING OF UTERINE CERVIX IN PARTURIENTS WITH TWIN GESTATION: PGE vs. FOLEY CATHETER
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Correspondence address: Dept. of Obstetrics & Gynaecology, Soroka University Medical Center, Beer-Sheva, ISRAEL.

Objective. To compare the success and complication rates of pro-
staglandin-E(1), PGE and Foley catheter for the ripening of uterine cervix
in parturients with twin gestation.

Study design. Study population consisted of parturients with twin gesta-
tion and leading fetus in vertex presentation that underwent ripening
of uterine cervix using PGE, (n = 17) or Foley catheter (n = 24) as part of the labor induction process. Controls were 870 women with
no induction of labor. We compared the rates of placental abruption, fetal
distress, intrapartum fetal deaths (IPFD), uterine rupture, Apgar scores,
labor dystocia, birth canal lacerations, vacuum deliveries and CS rates
in the three groups using ANOVA, χ2 analysis and Fisher’s exact test when
appropriate.

Results. A significant increase in the rate of labor dystocia during
1st stage was observed in the Foley group as compare to controls (12.5%
vs. 2% p = 0.01). No such changes were shown in the PGE, group
as compare to the control group. A higher rate of CS was noted in the
Foley group as compared to the PGE, group (45.8% vs. 11.8% p = 0.04).
No differences were found between the PGE, group and Foley group
as compared to the control group in the rates of other modalities checked.

Conclusions. Both PGE, and Foley catheter were safe for the ripening
of uterine cervix in parturients with twin gestation. PGE, was superior
to Foley catheter as less labor dystocia and cesarean sections were
proven.

022P THE USE OF OXYTOCIN FOR AUGMENTATION OF LABOR IN TWIN PREGNANCIES: IS IT SAFE?
Zahi Ben-Aroya, Jur Bar-David, Mordechai Hallak, Michael Friger, Miriam Katz and Moshe Mazor.
Correspondence address: Dept. of Obstetrics & Gynaecology, Soroka University Medical Center, Beer-Sheva, ISRAEL.

Objective. Determine whether the use of oxytocin for the augmentation
of labor in women with twin gestation increases the risk of peripartum complications.

Study design. Among the 917 women with twin gestation who delivered
in our institution, 60 had intravenous oxytocin for augmentation of labor.
The control group were the remaining 857 partuerients. We compared
the rates of other modalities checked. No differences were demonstrated.

Conclusion. Both PGE and Foley catheter were safe for the ripening
of uterine cervix in parturients with twin gestation. PGE, was superior
to Foley catheter as less labor dystocia and cesarean sections were
proven.
Results. No significant increase in the rates of uterine rupture (0% vs. 0%), meconium stained amniotic fluid (6.7% vs. 5%), placental abruption (4.8% vs. 1.9%), IPHD (0% vs. 0%), PPROM (0% vs. 0.8%), birth canal lacerations (1.6% vs. 0.9%), fetal distress (6.7% vs. 6.8%), Apgar scores of less than 7 after 5 minutes (0% vs. 0.5%), vacuum deliveries (6.7% vs. 3%) and cesarean section rate (23.3% vs. 34.2%) were demonstrated between the oxytocin augmented and the control groups, respectively.

Conclusions. The use of oxytocin for the augmentation of labor in twin pregnancy, with twin gestation was found to be relatively safe with no significant increase in peripartum complications.

02SF RISK FACTORS FOR CESAREAN SECTION IN TWIN GESTATIONS

Zahi Ben-Aroya, Juraj Bar-David, Mordechai Hallak, Michael Friger, Fernanda Press, Miriam Katz and Moshe Mazor

Correspondence address: Dept. of Obstetrics & Gynecology, Soroka University Medical Center, Beer-Sheva, ISRAEL.

Objective. To determine the independent risk factors for cesarean section (CS) for parturients with twin gestation.

Study design. Between the years 1989–1998, 917 parturients with twin gestation, with leading fetus in vertex presentation, delivered in our institution. We assessed the effect of maternal age, parity, gestational age, fetal weight, ripening of uterine cervix using Foley catheter or PGE2, amniotomy, preterm rupture of membranes, oxytocin augmentation of labor, epidural analgesia, pregnancy induced hypertension (PIH) and cerebral anoma in pregnancy, on CS rate. Multivariate analysis was performed to evaluate the factors mostly and independently affecting the need for CS.

Results. The factors found to significantly affect CS rate are shown in the Table below.

Conclusions. Oligo and polyhydramnion, epidural analgesia, GDM and PIH are all independent risk factors for CS in twin gestations.

Risk factors for CS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Relative Risk</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oligohydramnion</td>
<td>6.75</td>
<td>0.002</td>
</tr>
<tr>
<td>Epideral analgesia</td>
<td>5.38</td>
<td>0.001</td>
</tr>
<tr>
<td>Gestational Diabetes</td>
<td>3.78</td>
<td>0.008</td>
</tr>
<tr>
<td>PIH</td>
<td>2.89</td>
<td>0.001</td>
</tr>
<tr>
<td>Polyhydramnion</td>
<td>2.28</td>
<td>0.018</td>
</tr>
</tbody>
</table>

02FS THE IMPACT OF THE INCREASING NUMBER OF MULTIPLE BIRTHS ON THE INDICATORS OF PREGNANCY OUTCOME

Béatrice Blondel, Michael D Kogan, Greg R Alexander, Michael S Kramer, Shi Wu Wen

Correspondence address: INSERM U149, 16 avenue Paul Vaillant Couturiers, 94807 Villejuif cedex, France

The increasing incidence of multiple births in most developed countries substantially affects the indicators of pregnancy outcome in the overall population, as twins and triplets are at higher risk of mortality, preterm delivery, low birthweight, congenital anomalies and cerebral palsy compared with singletons. The contribution of twins and triplets to the rise or the stabilization of the overall rates of preterm delivery was assessed in Canada, France and the USA in the 1980s and 1990s using data from vital statistics and national samples of births. Because of their larger number, twins contributed much more than triplets to the numbers of preterm deliveries. For example in Canada in 1995–97, 14 % of deliveries before 37 weeks were attributable to twins and 1 % to triplets. Between 1981–83 and 1995–97 the proportion of preterm deliveries attributable to twins increased from 13.5% to 18.7% in France and from 6% to 10% in the USA. These results suggest that the indicators of pregnancy outcome should be analysed separately for singletons and multiples. Furthermore any medical practice which would reduce the rate of twin pregnancy or the rate of adverse pregnancy outcome among twins may have an impact on the indicators of pregnancy outcome in most developed countries.

02SG MECHANISM OF NATURAL DIZYGOTIC TWINS

Charles E Boklage

Correspondence address: East Carolina Univ School of Medicine, Greenville NC 27858-4354 USA boklage@mail.euc.edu

It is a basic belief of twin biology that dizygotic co-twins are conceived by fertilization of independently ovulated oocytes, and that they therefore have, as a group, the same distribution of genetic relationships as among non-twin sub-pairs. However, after 30 years studying the literatures of human embryogenesis, twinning, and genetic twin studies, I cannot tell you where to find any evidence to support this belief. We have instead steadily accumulated significant evidence that dizygotic twins differ from singletons in their development at least as much as monzygotic twins do, and generally in the same ways. Those differences are concentrated in embryogenetic determination of structures dependent upon midline fusion of asymmetric half-structures, notably brain, face and heart — hard to explain if embryogenesis of DZ twins must begin with independent and ordinary oocytes. Several reports have documented significantly excessive dizygotic co-twin matching for markers near centromeres, and a high frequency of chimerism between dizygotic co-twins
has recently come to light, extremely unlikely under an hypothesis of double ovulation. We have in progress a genome scan, with 390 markers covering the genome at an average interval of 10 cm, in 66 families of naturally conceived dizygotic twins or triplets. Here, double ovulation with ordinary sib-sib segregation is not assumed as common knowledge, but is the null hypothesis to be effectively tested for the first time against concrete physical evidence. We expect to determine directly whether genotypic variation between dizygotic co-twins is the same as that between non-twin siblings, and will report to Congress the results of this first direct test of that standard assertion.

Bereavement results not only from death but also from separate adoption in infancy or the effective loss of the twinship through distance, conflict or emotional separation (whether following a new partnership) or through disability or disfigurement. It is only by listening to parents and twins themselves that we shall unravel and understand these complex issues.

From early pregnancy into childhood, higher multiples have much higher rates of mortality, whether from spontaneous abortion, the ‘vanishing twin’ syndrome, fetal or infant death (the perinatal mortality rate of triplets is about 9 times that of singleborns). Many parents must cope with the death of one baby whilst the siblings remain critically ill or later become disabled. Babies born after years of infertility are especially precocious but the loss is often underestimated when there is a surviving child. For parents who choose a fetal reduction, whether for medical or social reasons, pain and grief are inevitable and need to be fully acknowledged. The couple needs information* and support both while deciding and afterwards in dealing with their too often unrecognized bereavement and possible guilt.

Little is known about the long term feelings of the parents or of the surviving children. Most parents say they made the right decision but also that there were insufficient reasons to make it. There are, however, high levels of emotional disturbance in the surviving babies. Parents are often anxious about what, if anything, to tell the survivors and how they might react. Anger and blame towards the parents are possible but so are complex feelings of survivor guilt and of the arbitrariness of fate. Long term follow up studies of the parents but especially of the children are clearly needed.

In this study twins born preterm were remeasured for weight and length at the equivalent of 37 weeks gestation and for length at 40 weeks gestation. We have in progress a genome scan, with 390 markers covering the genome at an average interval of 10 cM, in 66 families of naturally conceived dizygotic twins or triplets. Here, double ovulation with ordinary sib-sib segregation is not assumed as common knowledge, but is the null hypothesis to be effectively tested for the first time against concrete physical evidence. We expect to determine directly whether genotypic variation between dizygotic co-twins is the same as that between non-twin siblings, and will report to Congress the results of this first direct test of that standard assertion.

028S A STUDY OF ASTHMA AND ALLERGIES IN 5-YEAR-OLD DUTCH TWINS

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Correspondence address: Dept of Biological Psychology, Vrije Universiteit, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands

We looked at twin resemblances for asthma and allergies in a population-based sample of 3600 young twin pairs born in The Netherlands. The parents of these twins participate in a longitudinal survey study of growth and development of their children. Around the 5th birthday of the twins, parents receive a questionnaire that contains questions about wheezing and coughing as judged by the parents in the last 12 months. Parents are also asked if a doctor ever diagnosed asthma, allergies, hayfever, eczema, bronchitis or pneumonia in their children. Results show relatively low associations between the different symptoms. For all symptoms combined the correlation between monozygotic twins was 0.60 (p<0.0001) and in dizygotic twins the correlations are usually half the MZ correlations. There are no differences in correlations between male and female twins and the correlations in opposite-sex twins are similar to those in DZ same-sex twins.

These data thus suggest:

• strong genetic influences on the liability to asthma and allergies,
• no sex differences in genetic architecture and
• no influence of shared environmental factors in 5-year-old children.

029S GENETIC AND ENVIRONMENTAL INFLUENCE ON SOCIAL ATTITUDES, VALUES, INTERESTS AND PERSONALITY

Thomas J. Bouchard, Jr.
Correspondence address: Psychology Department, University of Minnesota, Minneapolis, MN 55455

Most human individual differences have their analogs in primates and other mammals. Thus cognitive abilities, motor skills, and even personality have been studied in lower organisms. It is more difficult to conceive of social attitudes outside the context of culture. Religiousness, Conservatism, Authoritarianism appear on their face to be uniquely human traits and exclusively influenced by environmental factors — largely familiar. Initially, behavior geneticists claimed these measures were not influenced by genetic factors. They were misled by studies carried out on young twins. Recent behavior genetic studies have shown that social attitudes are very significantly influenced by genetic factors and this finding cannot be “explained” by nuisance variables such as personality or intelligence. Attitudes also demonstrate much higher assortative mating coefficients and different age curves than personality. These measures are also associated with health related behavior and reproductive fitness, raising the question of their possible status as “adaptive traits”. The findings in this domain and their implications for future behavior genetic research will be discussed.

030S THE BROKEN TWINSHIP

Elizabeth Bryan
Correspondence address: The Multiple Births Foundation, Queen Charlotte’s and Chelsea Hospital, Du Cane Rd, London W12 0HS. e Bryan@higgins7.co.uk

The unique relationship of twins can be broken in many ways. The effects on the survivor and on the parents can be profound and are still not fully appreciated or even understood. For every pair of twins born there are many singletons conceived with a ‘vanishing twin’. The physical and emotional impact of this and especially of the first trimester reduction of a multifetal pregnancy needs further investigation. The perinatal mortality of twins is five fold that of singletons and of triplets is ninefold. Parental responses are complicated by simultaneity of growth and development of their children. Around the 5th birthday of the twins, parents receive a questionnaire that contains questions about wheezing and coughing as judged by the parents in the last 12 months. Parents are also asked if a doctor ever diagnosed asthma, allergies, hayfever, eczema, bronchitis or pneumonia in their children. Results show relatively low associations between the different symptoms. For all symptoms combined the correlation between monozygotic twins was 0.60 (p<0.0001) and in dizygotic twins the correlations are usually half the MZ correlations. There are no differences in correlations between male and female twins and the correlations in opposite-sex twins are similar to those in DZ same-sex twins.

These data thus suggest:

• strong genetic influences on the liability to asthma and allergies,
• no sex differences in genetic architecture and
• no influence of shared environmental factors in 5-year-old children.

031S LOSS IN HIGHER MULTIPLE PREGNANCY AND MULTIFETAL REDUCTION

Elizabeth Bryan
Correspondence address: The Multiple Births Foundation, Queen Charlotte’s and Chelsea Hospital, London W12 0HS. e Bryan@higgins7.co.uk

From early pregnancy into childhood, higher multiples have much higher rates of mortality, whether from spontaneous abortion, the ‘vanishing twin’ syndrome, fetal or infant death (the perinatal mortality rate of triplets is about 9 times that of singleborns). Many parents must cope with the death of one baby whilst the siblings remain critically ill or later become disabled. Babies born after years of infertility are especially precocious but the loss is often underestimated when there is a surviving child. For parents who choose a fetal reduction, whether for medical or social reasons, pain and grief are inevitable and need to be fully acknowledged. The couple needs information* and support both while deciding and afterwards in dealing with their too often unrecognized bereavement and possible guilt.

Little is known about the long term feelings of the parents or of the surviving children. Most parents say they made the right decision but also that there were insufficient reasons to make it. There are, however, high levels of emotional disturbance in the surviving babies. Parents are often anxious about what, if anything, to tell the survivors and how they might react. Anger and blame towards the parents are possible but so are complex feelings of survivor guilt and of the arbitrariness of fate. Long term follow up studies of the parents but especially of the children are clearly needed.


032S A TWIN STUDY OF CHRONIC FATIGUE

Dedra Buchwald, Richard Herrell, Suzanne Ashton, Megan Belcourt, Karen Schmaling, Patrick Sullivan, Michael Neslie, Jack Goldberg
Correspondence address: Harborview Medical Center, 1259 9th Avenue, Seattle, WA 98104, USA

Objective. The etiology of chronic fatigue syndrome (CFS) is unknown but genetic influences may be important in its expression.

Methods. A classical twin study using 146 female-female twin pairs, of whom at least one member reported ≥ 6 months of fatigue, completed a questionnaire on CFS symptoms. Twins were classified using 3 increasingly stringent definitions: 1) chronic fatigue for ≥ 6 months, 2) chronic fatigue according to the 1994 CDC CFS criteria not explained by medical conditions, and 3) chronic fatigue not explained by the medical or psychiatric exclusionary criteria of the CFS case definition. Pairwise and proband concordance rates in monozygotic and dizygotic twins were calculated for each definition of fatigue.

Results. The concordance rate for each definition of chronic fatigue is higher in monozygotic than dizygotic twins. For chronic fatigue not explained by the medical or psychiatric exclusionary criteria of the CFS case definition the concordance rates were 55% in monozygotic twins and 19% in dizygotic twins (p = 0.042). The estimated heritability in liability was 19% (95% CI 0–56) for chronic fatigue ≥ 6 months, 30% (95% CI 0–81) for chronic fatigue not explained by medical conditions, and 51% (95% CI 7–96) for a CFS-like illness not explained by medical or psychiatric conditions.

Conclusion. These results provide evidence for the familial aggregation of fatigue and suggest that genes may play a role in the etiology of CFS.

033S THE EARLY POSTNATAL GROWTH IN PRETERM TWIN BABIES

John Buckler
Correspondence address: University Department of Paediatrics, Leeds General Infirmary, West Yorkshire LS2 9NS, UK

Twin are of low birth weight not only because they are more often born preterm, but also for any duration of gestation they are born with lower birth weights than singletons.

In this study twins born preterm were remeasured for weight and length when they had reached ages equivalent to 37 weeks and 40 weeks gestation. Their actual gestational ages ranged from 28 weeks for weights and 32 weeks for lengths up to 38 weeks. Exuterine growth was also employed as it would have been had the twins continued within the uterus for longer. The twins were heavier at the equivalent of 37 weeks gestation and for length at 40 weeks irrespective of how preterm the babies had been born. At the equivalent of 40 weeks, the twins were heavier by about 200g than if they were born full term but no longer.
had remained in utero until that time. This shows that from the point of view of early growth in weight and length twins are at no disadvantage from being born preterm, and the commonly held assumption that postnatal growth of preterm babies approximately parallels what would have occurred if they had remained in utero is correct for twins.

**034S GROWTH AND DEVELOPMENT OF TWINS**

John Buckler
Correspondence address: University Department of Paediatrics, Leeds General Infirmary, West Yorkshire LS2 9NS

The weight, length/height and occipito-frontal circumference (OFC) of twins were measured serially from birth to 4 years. By one year boy and girl twins catch up singletons in weight remaining similar up to 2.5 years but subsequently twins tend to be lighter than singletons. The length/height of boy twins are similar to singletons from an early stage but female twins are slightly taller. OFC values of twins are smaller than singletons, particularly for girls. Measurements have also been undertaken on older twin pairs but mostly on one occasion only, through childhood. Data are presented as standard deviation scores (SDS) (sexes combined).

<table>
<thead>
<tr>
<th>Group (No.)</th>
<th>Weight</th>
<th>Height</th>
<th>OFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total &gt; 2 yr (1897)</td>
<td>-0.19</td>
<td>-0.09</td>
<td>-0.43</td>
</tr>
<tr>
<td>BW &gt; 10% (196)</td>
<td>+0.09</td>
<td>+0.04</td>
<td>-0.23</td>
</tr>
<tr>
<td>BW 5–10% (140)</td>
<td>-0.50</td>
<td>-0.33</td>
<td>-0.77</td>
</tr>
<tr>
<td>BW &lt; 5% (182)</td>
<td>-0.74</td>
<td>-0.47</td>
<td>-1.04</td>
</tr>
<tr>
<td>Age 2–5 yr (1313)</td>
<td>-0.09</td>
<td>-0.07</td>
<td>-0.41</td>
</tr>
<tr>
<td>Age 5–10 yr (424)</td>
<td>-0.11</td>
<td>-0.10</td>
<td>-0.55</td>
</tr>
<tr>
<td>Age &gt; 10 yr (312)</td>
<td>-0.57</td>
<td>-0.25</td>
<td>-0.42</td>
</tr>
<tr>
<td>Twins with siblings (816)</td>
<td>-0.27</td>
<td>-0.17</td>
<td></td>
</tr>
<tr>
<td>Siblings</td>
<td>+0.14</td>
<td>+0.14</td>
<td></td>
</tr>
<tr>
<td>Mid-parental</td>
<td>+0.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusions. The overall deficit in measurements of twins, which is greatest for OFC and least for height, is largely accounted for by those twins born light for dates. Deficits are least in the youngest age group & appear to increase through childhood.

**035S HUMAN CLONES: WHICH SIDE ARE YOU ON?**

John Burn and Judith Goodship
Correspondence address: Institute of Human Genetics, Newcastle UK

Monzygotic twins are natural clones and have long been recognised to have special problems associated with being “a malformation to whom Nature was kind”. Monzygotic twins are naturally sensitive to heart malformed- tion. As an asymmetric organ, the heart is extremely sensitive to the deformations of laterality. The increased incidence of isomerism sequence in the right half of conjoined human thoracopagus twins and the physical clues of disturbed laterality among twins discordant for heart defects led us to speculate that disturbance of the left right gradient associated with MZ twinning might be a mechanism leading to malformation. Levin et al supported this by showing in the chick that the product of the gene nodal could cross from the right side of one twin and convert the left side of its conjoined neighbour into a right side, thus making the right half of the pair isomeric. The last few years has seen an explosion of knowledge about the pathways leading to the determination of laterality. The gene isolated by the Newcastle group in collaboration with colleagues in USA and Japan is an early player; when defective the body plan is reversed. Loss of LR dynein can make laterality random while “a malformation to whom Nature was kind”. The inv gene isolated by the Newcastle group in collaboration with colleagues in USA and Japan is an early player; when defective the body plan is reversed. Loss of LR dynein can make laterality random while

036P DISEASE CONCORDANCE AND GENETIC SUSCEPTIBILITY TO TYPE 1 DIABETES IN ITALIAN TWINS

Raffaella Buzzetti, Paolo Pozzilli, Frida Leonetti, Umberto Di Mario, Rodolfo Cotichini, M. Antonia Stazi.
Correspondence address: Dept. Science Cliniche, Univ. of Rome “La Sapienza”, Italy.

The identification of twins affected by Type 1 diabetes in a particular geographical area has important implications for disease pathogenesis. The incidence of Type 1 diabetes varies between 8 x 100,000 < 1 years of age in continental Italy and 35 x 100,000 < 15 years of age in Sar dinia. In addition, one third of patients are diagnosed above the age of 15 years and approximately 10% are included in the group so called “Late Adulthood Type 1 Diabetes”s (LADA). Overall Type 1 diabetes should include approximately 10–15% of all cases of diabetes in Italy. In the Lazio region (central part of Italy including its capital Rome), the incidence of Type 1 diabetes is low compared to Sardinia and similar to the rest of continental Italy. According to the Italian Twin Registry, there are about 120,000 potential twin living in the Lazio region (5,800,000 inhabitants): considering a prevalence of Type 1 diabetes of 0.2%, we can assume approximately 240 diabetic twins living in this region. Linking the Italian Twin Registry with the outpatient diabetic clinic database of the Lazio region (diabetes care including syringes, glucometers, etc. — is free of charge in Italy, provided the patient is registered with the National Health Service) we will be able to identify all twins among the diabetes patients. The aim of our project is to calculate the concordance rates for Type 1 diabetes in MZ and DZ twins and to characterise twins according to age of disease onset and clinical features.

**037F A POPULATION BASED STUDY OF MULTIPLE SCLEROSIS IN TWINS FROM CONTINENTAL ITALY AND SARDINIA**

Stefania Cannononi and Rodolfo Cotichini for the Italian Twin Study Group
Correspondence address: Department of Neurological Sciences, University of Rome “La Sapienza”.

Concordance rate studies in monzygotic vs. dizygotic twins provide a measure of the relative importance of environmental and genetic factors in the pathogenesis of multifactorial diseases. We took advantage of two unique opportunities that exist in Italy for such a study in Multiple Sclerosis (MS): the existence of the world’s largest twin registry and the presence of populations with different genetic background from continental Italy and Sardinia. We took advantage of two unique opportunities that exist in Italy for such a study in Multiple Sclerosis (MS): the existence of the world’s largest twin registry and the presence of populations with different genetic background from continental Italy and Sardinia. We identified 1,060 monozygotic (530 MZ male, 530 MZ female) and 1,010 dizygotic (505 DZ male, 505 DZ female) twin pairs from the Italian Twin Registry. Concordance rates for Type 1 diabetes in MZ and DZ twins and to characterise twins according to age of disease onset and clinical features.

038S COMBINED LINKAGE AND ASSOCIATION ANALYSIS IN GENE DISCOVERY

Lon Cardon
Correspondence address: Wellcome Trust Centre for Human Genetics, Oxford, UK

Success in identification of genetic loci for complex multifactorial traits has been limited, despite considerable efforts in positional cloning and candidate gene studies. A number of possible reasons have been described to explain these limited findings. In the linkage domain, the most likely explanation may simply involve insufficient power to detect genes of small effect and experimental error in genotyping and pedigree relationships. Association studies may also suffer from these limitations, but a number of additional factors are also clearly important. At particular interest at the moment are patterns of linkage disequilibrium across the genome. In the absence of understanding how LD operates across the genome. In the absence of understanding how LD operates

039S THE PAEDIATRICIAN’S VIEW ON THE EPIDEMIC

Manuel R. Carrapato
Correspondence address: Hospital S. Sebastian, Feira, Portugal

Assisted reproductive technologies (ART) although also increasing in Portugal, are fairly well-controlled, contrary to some other western...
countries, somewhat limiting the effects of the "epidemic". Firstly, med-
ically-induced ovulation is only prescribed by obstetricians in recognised
centres, thus curtailing the "over-the-counter" dispensing witnessed
in some countries; the same applies to all other ARTs. At present,
the number of embryos is, by consensus, limited to 2/3, hence the days
of very high-order pregnancies are over or are becoming very rare.
Nevertheless, paediatricians are still faced with an increasing number of
multiple births, a new area of medical and social problems. Peri-neonatal
mortality and morbidity due to prematurity, IUGR, the complications in
the surviving neonate following the intra-uterine death of his/her
partner(s), the feto-fetal transfusion syndrome, the neurosensory seque-
lae, etc. are still real problems, well-known medical burdens. On the social
side, when faced with higher-order deliveries, it is not unusual,
to be short of places with one or more of the neonates being subjected
to transferral elsewhere, giving rise to obvious parental inconvenience
and distress. A similar situation occurs when surgical complications, for
example, separate splitting multiples between different hospitals. Sometimes
many miles apart. Bereavement and family counselling
are additional and complicated matters not always handled with skill
and sensitivity. Furthermore, how many paediatric clinics are there
specialised in the follow-up of multiples from infancy to adolescence
and what can these children and their families expect from us,
the Paediatricians? Finally, what are the financial implications and can
we, as a society, afford them?

040S PERI-NEONATAL STEROIDS IN MULTIPLES

RG Carrapato
Correspondence address: Hospital São Sebastião, Portugal

Since the early works of Liggins & Cols. 30 years ago showing that
Betamethasone given to reduced neonatal deaths and RDS in very pre-
term infants and no deaths from HMD and IVH, the routine use of steroids
was gradually established for the induction of fetal lung matura-

041F A NEW MZ-ONLY DESIGN: X CHROMOSOME INACTIVATION AND THE FEMALE SURVIVAL ADVANTAGE
Kaare Christensen, James W.Vuapel, Karen Helene Ørstavik.
Correspondence address: Institute of Public Health, Epidemiology, Sds. Boulevard 23A, DK 2300 Copenhagen, Denmark

Traditionally, studies of monozygotic twins alone cannot be used for addressing the influence of genetic factors. However, we have
recently shown that studies of elderly female MZ twin pairs provide evidence
that X-linked genetic factors are affecting cell proliferation/survival. Females mosaic for two cell populations, usually with an approximate 50:50 distribution. A skewing of this distrib-

042P MULTIMETHOD ASSESSMENT OF THE TWIN RELATIONSHIP
Francesca M. Cimino, Laura A. Baker, Jennifer K. Johnson, Adrian Raine
Correspondence address: University of Southern California, Department of Psychology, 3620 S. McClinton Ave #501, Los Angeles, CA 90089-1061

Twin studies provide a unique opportunity to understand the nature of sibling relationships. The present study utilized both parent and child
reports of the negative and positive aspects of each twin’s behavior toward the other. Observational data were also obtained
from a 10-minute videotape interaction of the twins performing a contrived task.
These methods yielded multiple measures of warmth, conflict, rivalry, and
dominance of each twin. Correlations among child and adult reports, maternal
reports, and observational data are examined to evaluate the extent of agreement across different methods. Correlational
patterns between monozygotic and dizygotic twin pairs, as well as between same-
sex and opposite sex pairs, to evaluate the extent to which zyosity and
gender influence the twin relationship.

044P EFFECTS OF PRENATAL EXPOSURE TO TESTOSTERONE ON COGNITIVE PERFORMANCE AND BEHAVIOUR: A TWIN STUDY
Correspondence address: Department of Child and Adolescent Psychiatry, University Medical Center Utrecht, P.O. Box 85500, 3508 GA Utrecht, The Netherlands.

Research has shown women and men differ on various cognitive and behav-

ioral aspects. The answer to which mechanism is responsible for these
differences is a complicated one. Although for many years research on
gender differences in humans has been dominated by social-role theories,
there is increasing support for the notion that prenatal exposure to gonadal
hormones has clear effects not only on physical differences between males
and females, but also on gender differences in cognition and behaviour. In
animal research it has been shown that exposure to gonadal hormones
is influenced by intrauterine position and that foetuses that are located
between two male foetuses are exposed to higher levels of testosterone than foetuses
that are situated between two female or one female and one male foetus.
In our study we examined the presumed prenatal influence of various exposure
levels of testosterone on gender differences. 84 girls from opposite-sex (OS) and 60 girls
from same-sex (SS) twin pairs are compared on various cogni-
tive, behavioural and physical aspects at the age of 10. It is expected that OS
girls and SS girls differ in performance on these various gender sensitive
tasks, and that OS girls in particular show a pattern of performance away
from the typical female pattern as a result of prenatal exposure to higher
levels of testosterone. The poster will present the results and discuss the
implications of the findings.

045F  MULTIPLE BIRTH FAMILIES: THEIR NEEDS AND EXPERIENCES
Hilary Collins
Correspondence address: Tamba in Northern Ireland, 216 Belmont Road, Belfast BT5 2JL, UK.
The poster will summarise the key findings of a survey carried out by
Hilary Collins, NI Co-ordinator in the Northern Health and Social Services Board (NHSS) area. Tamba received a non-recurrent donation of £5000 from the NHSS Board to provide early and regular support to children and their families in the board area, shaped by an assessment of their needs. The funding was used to carry out a survey to gather the primary information on the needs and experiences of families with multiple birth children aged 0–5 years. This survey was the first time Tamba had had the opportunity to contact families outside the membership with children up to five years in an attempt to elicit and document their views. The survey incorporated both qualitative and quantitative methods of data collection, with the information obtained from focus groups forming the basis of the questionnaire. Health Visitors forwarded the questionnaire to 3,444 families whose case notes had been reviewed for analysis using SPSS software. The findings showed a lack of information available to families about a multiple pregnancy. Other issues raised included a lack of understanding from health professionals about the unique difficulties faced by families with multiples, and lack of statutory help in families faced financial burdens and stress associated with having a multiple family.

046F  A RETROSPECTIVE POPULATION BASED STUDY OF TWIN BIRTH WEIGHT DISCORDANCE
Christine E. Conner and Doris M. Campbell
Correspondence address: Dept of Obstetrics, Aberdeen Maternity Hospital, Aberdeen AB25 2ZL, UK.
Twin birth weight discordance is usually defined as birth weight difference of greater than 20% of the larger twin’s birth weight. No accepted cut off exists and it would be useful to identify the discordancy threshold at which a significant difference in perinatal outcome occurs. Aberdeen Maternity Hospital (AMH) is in a unique position being the only obstetric centre for a large area where all twins deliver. Additionally, Aberdeen Maternity and Neonatal Databank, contains information on obstetric events in women attending AMH from 1949. The aims were to identify factors predisposing towards twin growth discordancy and the effects of different degrees of discordancy on perinatal outcome. A questionnaire – up to 24 weeks pregnancy – from 1949–1998, were retrieved. Percentage birth weight discordancy calculated and analysed in quintiles (<10% to ≥40%) using SPSS. Of the 2552 twin sets identified, 71 were excluded. No predisposing maternal or obstetric factors were identified and no differences in fetal sex, zygosity or chorionicity were evident within the different discordancy categories. Percentages with low Apgars increased significantly from a birth weight discordancy of ≥20% (twin 1 p < 0.05; twin 2 p < 0.01), Perinatal mortality (PMN) rate for twin 1 increased significantly from a birth weight discordancy of ≥30% (p < 0.05) whilst for twin 2 this was significantly increased from a discordancy of ≥20% (p < 0.001). Using multivariate analysis, birth weight discordancy was the major factor influencing PMN in either twin becoming significant at a discordancy of ≥20% (p < 0.001). A suitable definition for significant birth weight discordancy is an intra-twin birth weight difference of ≥20%.

047F  STATUS EPILEPTICUS IN A VIRGINIA TWIN SAMPL E
Linda A. Corey and John M. Pelloid, Virginia Commonwealth
Correspondence address: University, Richmond, Virginia U.S.A.
Twin studies provide an extremely efficient means of determining if genetic factors contribute to disease susceptibility, particularly in the case of monozygotic (MZ) and dizygotic (DZ) twin pairs. Using twins discordant for smoking (one smoking and the other does not), we can more confidently attribute the difference to adult smoking behavior. Twins are recruited from the California Twin Program. Smoking history is obtained from questionnaires previously filled out by the twins and updated during the telephone interview. Blood specimens are obtained from twins by their physicians and mailed to us via overnight courier. Peripheral blood mononuclear cells are isolated from the whole blood, cultured and stimulated with PHA. The supernatant is collected and commercial ELISA assays are performed. To date, we have collected specimens from 168 individuals (84 pairs) and have ELISA results for IL-4 from 65 pairs. Preliminary results suggest that smokers have higher levels of interleukin-4 (IL-4), IL-5 and interleukin-13 (IL-13). The results of one study suggest that smokers have higher levels of interleukin-4 (IL-4), IL-5 and interleukin-13 (IL-13) in MZ compared to non-smokers, implying that tobacco smoke works through the immune system to provoke asthma. However, the study did not adjust for gender, age, and age. We have proposed to repeat the study as a natural experiment in identical twins discordant for smoking (one smokes and the other does not), comparing their IL-4, IL-5 and IL-13 levels. Because the twins are matched on age, race, gender, genetics and early environment-mentor’s experiences, if we do find a difference in their cytokine levels, we can more confidently attribute the difference to adult smoking behavior. Twins are recruited from the California Twin Program. Smoking history is obtained from questionnaires previously filled out by the twins and updated during the telephone interview. Blood specimens are obtained from twins by their physicians and mailed to us via overnight courier. Peripheral blood mononuclear cells are isolated from the whole blood, and stimulated with PHA. The supernatant is collected and commercial ELISA assays are performed. To date, we have collected specimens from 168 individuals (84 pairs) and have ELISA results for IL-4 from 65 pairs. Preliminary results suggest that smokers have higher levels of IL-4 and IL-5 compared to non-smokers, implying that tobacco smoke works through the immune system to provoke asthma. However, the study did not adjust for gender, age, race, and smoking behavior. Twins are recruited from the California Twin Program. Smoking history is obtained from questionnaires previously filled out by the twins and updated during the telephone interview. Blood specimens are obtained from twins by their physicians and mailed to us via overnight courier. Peripheral blood mononuclear cells are isolated from the whole blood, and stimulated with PHA. The supernatant is collected and commercial ELISA assays are performed. To date, we have collected specimens from 168 individuals (84 pairs) and have ELISA results for IL-4 from 65 pairs. Preliminary results suggest that smokers have higher levels of IL-4 and IL-5 compared to non-smokers, implying that tobacco smoke works through the immune system to provoke asthma. However, the study did not adjust for gender, age, race, and smoking behavior. Twins are recruited from the California Twin Program. Smoking history is obtained from questionnaires previously filled out by the twins and updated during the telephone interview. Blood specimens are obtained from twins by their physicians and mailed to us via overnight courier. Peripheral blood mononuclear cells are isolated from the whole blood, and stimulated with PHA. The supernatant is collected and commercial ELISA assays are performed. To date, we have collected specimens from 168 individuals (84 pairs) and have ELISA results for IL-4 from 65 pairs. Preliminary results suggest that smokers have higher levels of IL-4 and IL-5 compared to non-smokers, implying that tobacco smoke works through the immune system to provoc
of Hun-Hunahpu and Vucub-Hunahpu and revived them, after which they rose up to the sky to become the Sun and the Moon.

Conclusions. Twins are a central and recurring theme in Maya mythology and represent one of the earliest religious beliefs of mankind.

Throughout history the origin of twins has provoked intense interest and speculation and it is only relatively recently that scientific research has clarified their development. It is medically important to establish chorionicity — so monochorionic twins can be closely monitored for conditions such as twin to twin transfusion syndrome (TTTS). Chorionicity should be determined routinely in the first trimester of pregnancy, besides the medical reasons there still appears to be an under-derestimation of the need for parents and children themselves to know their chorionicity. Parents are still being told in some cases that if their twins are dichorionic, then the babies cannot be identical. In fact one third of monochorionic twins are dichorionic. Until the development of DNA testing the examination of certain markers in the blood could give a result of up to 99% accuracy of monochorionicity, but now the new DNA testing procedures are more reliable and trustworthy, though the technical know-how is increasingly widely available. All the parents who contacted the Multiple Births Foundation (MBF) for chorionicity testing were asked what information they had received regarding chorionicity and monochorionicity, and particularly whether they were told that their dichorionic twins were not identical. The MBF promotes the need for professional education regarding chorionicity determination and is seeking to establish the availability of routine testing in all maternity units.

To expand the National Twin Registry of Sri Lanka to a population based register, we examined the feasibility of tracing older twins by inspecting birth records and recruiting them by postal invitation and in-person contact.

Methods. Birth records at a divisional secretariat reported from 2 maternity hospitals between the years of 1954–1970 were scrutinised randomly to identify twins. These 2 hospitals had the highest twin delivery rates for the whole country. We identified 310 twin pairs and a postal questionnaire was sent. Research assistants visited a cohort of non-respondents (71%) in the postal survey.

Results. 620 twins were identified after perusing 20,700 birth records. Estimated twining rate was 14.98 twin births for 1000 registered births.

In a sample of 17-year-old Dutch twins, we observed an inverse relation which are decades old.

054P ZYGOSITY DETERMINATION: WHY IS IT SO IMPORTANT?

Margie Davies
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Throughout history the origin of twins has provoked intense interest and speculation and it is only relatively recently that scientific research has clarified their development. It is medically important to establish chorionicity — so monochorionic twins can be closely monitored for conditions such as twin to twin transfusion syndrome (TTTS). Chorionicity should be determined routinely in the first trimester of pregnancy, besides the medical reasons there still appears to be an under-derestimation of the need for parents and children themselves to know their chorionicity. Parents are still being told in some cases that if their twins are dichorionic, then the babies cannot be identical. In fact one third of monochorionic twins are dichorionic. Until the development of DNA testing the examination of certain markers in the blood could give a result of up to 99% accuracy of monochorionicity, but now the new DNA testing procedures are more reliable and trustworthy, though the technical know-how is increasingly widely available. All the parents who contacted the Multiple Births Foundation (MBF) for chorionicity testing were asked what information they had received regarding chorionicity and monochorionicity, and particularly whether they were told that their dichorionic twins were not identical. The MBF promotes the need for professional education regarding chorionicity determination and is seeking to establish the availability of routine testing in all maternity units.

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Results. 620 twins were identified after perusing 20,700 birth records. Estimated twining rate was 14.98 twin births for 1000 registered births for a year. In the postal survey, 37 (12%) responded and 62 letters were returned (20%), as twins were no longer in the postal address. Both were living in 20 pairs, one each in 15 pairs, and both dead in 2 pairs. In the field visits, 42 (59.2%) addresses were located. Information was available on 16-twin pairs. Both were living in 8 pairs, one each in 4 pairs, and both dead in 4 pairs. At least one twin was traced in 10 pairs (14%). Both postal and field survey gave a low yield. This finding is different from tracing younger twins born between 1985–1997 by using the same methods. Migration, urbanization and development in the country may have affected tracing older twins’ from the birth record addresses, which are decades old.

In a sample of 17-year-old Dutch twins, we observed an inverse relation which are decades old.
and memory function, during which blood pressure was also assessed. 

The original sample of 320 twins 185 subjects participated again. 

First results show substantial tracking for systolic blood pressure (correlations over time between 0.3–0.4) and for diastolic blood pressure (correlations over time between 0.4 and 0.5). We will look at the tracking data for blood pressure as a function of birth weight and address the question if the stability in blood pressure is caused by long-lasting effects of birth weight.

056F RATES OF HOSPITAL ADMISSION FOR CHILDHOOD ASTHMA AMONG AUSTRALIAN TWINS AND SINGLETONS.

Nicholas de Klerk, Janice Hansen, Maxine Croft. 
Correspondence address: TVW Telethon Institute for Child Health Research, 100 Roberts Road, Subiaco, WA 6008, Australia.

Background. A recent observational study in Scotland indicated a reduced rate of admission to hospital for asthma in children who were twins. Other studies have supported this finding, interpreted as demonstrating the protective effect of large families on allergic disease.

Aims. To estimate the relative hospital admission rate for twin births compared with singleton births.

Methods. Data came from the Maternal and Child Health Research Database of Western Australia (WA) which includes physical and sociodemographic characteristics of all mothers giving birth in WA from 1980 to 1995 (and beyond), with information about pregnancy complications, perinatal deaths, all causes of gestational wellbeing (to 20 weeks of gestation onwards), and details on hospital in-patient morbidity for all children who attend WA hospitals. Cox regression was used to estimate relative first admission rates for asthma as coded on the hospital record, in terms of mothers’ age, parity, and multiplicity and the calendar year of birth.

Results. Contrary to the Scottish findings, there was a 14% (95% CI 5–22%) increase in rate of admissions among twins, which increased to 25% (95% CI 14–36%) after adjustment for year, race (Indigenous or not), sex, birth order, and maternal age. Analysis including multiple admissions gave similar results. Rates of admission also increased steadily with increasing family size.

Conclusions. These findings are totally dissimilar to those found in Scotland, where however, admission rates to hospital for asthma in this age group are over 3 times lower than in WA.

057F EVIDENCE FOR SHARED GENES BETWEEN INSULIN RESISTANCE AND HAEMOSTASIS

Marlies de Lange1, Robert AS Ariens2, Peter J Grant3, Tim D Spector1 and Harold Snieder2

Correspondence address: ‘Twin Research & Genetic Epidemiology Unit, St Thomas’ Hospital, London, UK; ‘Academic Unit of Molecular Vascular Medicine, General Infirmary, Leeds, UK.

A number of components of the haemostatic system are associated both with risk of coronary heart disease and the insulin resistance syndrome. The extent to which genetic and environment genetic differences contribute to this association is unknown. The aim of this study was to identify the contribution of common genes or common environment to the association of insulin resistance (IR) with levels of fibrinogen, plasminogen activator inhibitor (PAI) and tissue plasminogen activator (tPA). A total of 110 monozygotic and 301 dizygotic Caucasian female twin pairs, aged 18–74 participated in this study. IR was calculated according to the HOMA model (fasting insulin x glucose/22.5). Multivariate genetic model fitting techniques were carried out using the structural equation package Mx. The phenotypic correlation of IR with fibrinogen, PAI and tPA were 0.29, 0.36 and 0.29, respectively. A Cholesky decomposition model explaining the (joint) variance of IR, fibrinogen, PAI and tPA with additive genetic and unique environmental components fitted the data best. The genetic correlation of IR with fibrinogen, PAI and tPA was 0.39, 0.42 and 0.32 respectively. Environmental correlations were 0.19, 0.27 and 0.26.

The association between IR and haemostatic factors is due to effects of shared genes and shared environment, which will help to identify key pathologic processes involved in IR.

058P THE GENETICS OF TUNE DEAFNESS: DON’T BLAME THE PIANO TEACHER

Marlies de Lange1, Dennis Drayna2, Ani Manichaikul2, Harold Snieder2, Tim Spector1

Correspondence address: ‘Twin Research & Genetic Epidemiology Unit, St Thomas’ Hospital, London, UK; ‘National Institute on Deafness and Other Communication Disorders, National Institutes of Health, Rockville, Maryland, USA.

Background. We all know someone who cannot carry a tune, but acts like a Prima Donna. Previous studies suggested that about 1 in 20 people are tune deaf and there is considerable variation. This twin study investi- gates the genetic and environmental contributions to differences in musical pitch perception abilities.

Methods. A Distorted Tunes Test (DTT) was administered to a total of 136 MZ and 148 DZ Caucasian female twin pairs aged 18 to 74. The twins were asked to judge whether 26 simple popular melodies contained notes with incorrect pitch. Contingency tables were produced for the MZ and DZ twins using the number of correctly classified tunes (scores ranged widely from 9 to 26). Genetic model fitting techniques using the structural equation modelling package Mx were applied to obtain estimates of the genetic and environmental factors.

Results. Tetrachoric correlations were estimated at 0.67 for MZ and 0.44 for DZ twins. Subsequent model fitting showed that the best fit to the data included an additive genetic and a unique environmental component. The heritability was estimated at 71% (95% CI: 61% – 78%). There was no effect of shared environment.

Conclusion. Variation in musical pitch recognition is primarily due to highly heritable differences in auditory function.

059S MONOZYGOTIC TWINNING RATE AFTER OVULATION INDUCTION

Catherine A. Derom, Robert M. Derom, Robert F Vliezeit

Correspondence address: Center for Human Genetics, Kapucijnenvoer 33 B1, B-8000 Leuven, Belgium.

While more and more authors have no doubt that the monozygotic twinning frequency is increased in association with artificial reproduction technology (ART), many questions about this unexpected phenomenon remain unanswered. The magnitude of the increase varies substantially according to the nature of the samples studied and the type of ART (ovarian stimulation alone, IVF and related procedures, timing of the transfer etc.). Most of the studies in the literature rely on hospital-based data and on chorionicity rather than on zygosity. This latter may underestimate the incidence of zygotic splitting as one third of pairs are dichorionic in spontaneous monozygotic twin pregnancies.

This study reports on the monozygotic twinning rate after different assisted reproductive treatment modalities and different drugs to induce the ovulation in a population-based registry of multiples with known zygotomy and chorionicity. Since 1964 the East Flanders Prospective Twin Survey collects data on all the multiples born in the province of East-Flanders, Belgium. Between 1976 and 2000 1346 twin pairs and 127 triplet sets were born after ART. Basic perinatal data, placentation and zygotomy were recorded at birth. Of the 1346 twin pairs 83% are dicygotic, 4% monochorionic and 13% dichorionic with still unknown zygotomy. Of the 127 triplet sets, 83% are trigzygotic, 11% dizygotic, 1% monzygotic and 5% trichorionic with unknown zygosity. Additional tests are being performed to assess the zygotomy of those pairs with no reliable zygosity information.

060P STANDARDIZED POPULATION-BASED VITAL STATISTICS OF TWIN BIRTHS

Robert Derom, John Kiely, Louis Keith, Elizabeth Bryan

Correspondence address: International Society for Twin Studies (ISTS), c/o Queensland Institute of Medical Research, 100 Herston Road, Brisbane 4029, Australia.

Both multiple births associations and scientists interested in multiple pregnancies are eager to compare basic perinatal twin data from different countries or regions. To enhance the collection of comparable data the following simple protocol is proposed:

I. Country or region

II. Short description of population

1. Number of inhabitants

2. Setting

3. Total number of births

Singletons

Twins

Higher order multiple births

III. Perinatal basic data on twin maternities

1. Origin of (provider of) the data

2. Prevalence of twin maternities

3. Numbers of same- and opposite-sex pairs

4. MZ/DZ proportions according to Weinberg’s rule

5. Fetal and early neonatal deaths (separately for SS or OS pairs?)

IV. Correspondence (address, fax and telephone; email; website) :

The data should be collected in a uniform way, that is by using terms and definitions recommended by WHO and FIGO (Fédération Internationale de Gynécologie et Obstétrique).
Recent statistics from different sources will be presented. The idea is to extend the number of participating centres and institutions in the future and to publish yearly the results in Twin Research, the official journal of ISTS.

061P EARLY REPORT ON THE AVAILABILITY OF ISLAND WIDE TWIN DATA IN THE CENTRAL REGISTRATION DEPARTMENT

Nimali de Silva, Atlhula Sumathipala, Dewika JS Fernando, Nihal Abeynigha, Sisira H Siribaddana, DARK Dayarane, Deepthi De Silva, Narada Warnaarsurya
Correspondence address: National Twin Registry, Department of Medicine, Sri Jayewardenepura University, Nugegoda, Sri Lanka.

Population based twin registers are not common outside Scandinavia, particularly in the developing world. Sri Lanka has a 98% accuracy of birth registration. However only since 1992 these records have been computerized at the Central Birth Registration Department including the details of the twins births. These details are complete only up to 1997. We scrutinised those computerized records for the year 1992, to look into the feasibility of being deterministic in one’s sexual identification as male or female. Aspects of how these twins interacted and compared and contrasted themselves with each other and with peers provides insight as to some factors in the development of sexual identity. Comparison is made as to how others, for example, transsexual and intersexed persons, twin or not, and typical singletons, come to understand their identity. Consideration is given to various factors that have been purported to thwart the salient and supposedly “overwhelming and deterministic” forces of rearing are also discussed. Such factors include: material and paternal influences in siblings and peers, secrecy as to original sex, indoctrination and brow beating.

062S SEX REASSIGNMENT IN MZ MALE TWINS (THE JOHN/JOAN CASE) AND WHAT THIS MIGHT TELL US ABOUT SEXUAL IDENTITY

Milton Diamond
Correspondence address: University of Hawaii, John A. Burns School of Medicine, 1951 East-West Road, Honolulu, HI 96822, USA.

The so-called John/Joan case has provoked new challenges to the salience of rearing as being deterministic in one’s sexual identification as male or female. Aspects of how these twins interacted and compared and contrasted themselves with each other and with peers provides insight as to some factors in the development of sexual identity. Consideration is made as to how others, for example, transsexual and intersexed persons, twin or not, and typical singletons, come to understand their identity. Consideration is given to various factors that have been purported to thwart the salient and supposedly “overwhelming and deterministic” forces of rearing are also discussed. Such factors include: material and paternal influences in siblings and peers, secrecy as to original sex, indoctrination and brow beating.

063S TWINS: WHAT THEY MIGHT TEACH US ABOUT THE DEVELOPMENT OF SEXUAL IDENTITY

Milton Diamond
Correspondence address: University of Hawaii, John A. Burns School of Medicine, 1951 East-West Road, Honolulu, HI 96822, USA.

The question of how individual’s come to know that they are male or female do not come through several cycles with either their parents or nurses given the nod as to supremacy. From the 1950s to the 1990s the greatest input was attributed to environmental factors, particularly upbringing, as being the most crucial influence in teaching the child it is either a boy or a girl destined to grow to be a man or woman. The later half of the 1990s, however, has dramatically shifted the thinking to give greater weight to intrinsic biological forces as being deterministic.

One of the most important cases in this debate has been that of the so-called John/Joan twin. Here was an XY individual raised as a girl from birth. Registration only since 1992 these records have been computerized at the Central Birth Registration Department including the details of the twins births. These details are complete only up to 1997. We scrutinised those computerized records for the year 1992, to look into the feasibility of being deterministic in one’s sexual identification as male or female. Aspects of how these twins interacted and compared and contrasted themselves with each other and with peers provides insight as to some factors in the development of sexual identity. Consideration is made as to how others, for example, transsexual and intersexed persons, twin or not, and typical singletons, come to understand their identity. Consideration is given to various factors that have been purported to thwart the salient and supposedly “overwhelming and deterministic” forces of rearing are also discussed. Such factors include: material and paternal influences in siblings and peers, secrecy as to original sex, indoctrination and brow beating.

064S GENE ENVIRONMENT INTERACTION IN ALCOHOL USE AND ABUSE: DATA FROM FINNISH TWIN STUDIES

Danielle M. Dick, Richard J. Viken, Jaakko Kaprio, Lea Pulkkinen, & Richard J. Rose
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Behavior genetic studies were heavily criticized in the past for their failure to include environmental measures; this criticism is no longer warranted, as genetically-informative studies are increasingly including environmental measures, and advances in biometrical modelling allow for the incorporation of specific environmental variables. With data from two population-based studies of Finnish twin adolescents, we have been exploring the effect of a variety of environmental influences on alcohol use/abuse and related phenotypes, and the interaction of these environments with genetic influences. In successive analyses, we illustrate the impact of various environmental factors, including socio-regional and community-level influences, home environment, and peer influences. Each of these environmental variables also illustrates a different way that the environment can interact with genetic factors. We document the presence of community-level environmental influences and demonstrate socio-regional moderation of influences on alcohol use, with the importance of genetic and environmental influences varying more than five-fold between environmental extremes. Parental monitoring and home atmosphere contribute additively to adolescent behavior problems, while peers’ alcohol use exhibits a more complex, interactive relationship with self-reported alcohol use. Thus, in a series of quantitative genetic analyses, we explore various environments involved in alcohol use and related phenotypes, and the manner in which these environments act and interact with genetic predispositions.
of language, but early delays in expressive language structure are tran-
sient. Data from cross sectional and longitudinal case studies will be
reported. Longitudinal data from one set of quintuplets suggest some spe-
cific difficulty in the development of receptive vocabulary. The results
are interpreted in terms of the special language learning environments
created by different MBC set sizes.

067P EXTRA RISK OF TRANSFERRING 3 EMBRYOS
Michael Dooley, Anne Jones, Nicola Monks, Anthony Price, Jo Rice, Fran Rook
Correspondence address: Fertility Unit, Winterbourne Hospital, Hertingfordbury Road,
Dobcross, Herts, DL2 1DR

At the Fertility Centre our policy is to transfer 2 embryos. Our rate
for elective transfer of 2 embryos is 67% compared with a national rate
of 48.6%. In deciding when to replace 3 embryos we use an individu-
alised approach taking into consideration the patient's age, number
of embryos available, number of unsuccessful attempts, whether the cycle
is frozen or fresh and quality of the embryos. It is important prior to any
procedure that full counselling, including risk implication, occurs.

Mr & Mrs JL (born 1972) presented in 1997 with a 3-year history
of unexplained primary subfertility as a couple. They were treated
in several units with cycles of Clomiphene stimulation, one IUI with
superoxeration, with 2 good follicles, and one IVF attempt with 16
oocytes, 15 embryos and an unsuccessful 2 embryo transfer. They went
on to a frozen embryo transfer with 6 embryos being thawed and 3
replaced, 2 at an 8 cell stage and one at a 4 cell stage. A pregnancy test
was negative. They had spontaneous bleeding, 4 weeks later and at 7 weeks gestation 4 x sacs were seen
in the uterine cavity. Additional counselling took place and a second
opinion given re selectivetion. After nuchal translucency scanning
and a chorionic vili sampling on one fetus the couple decided to continue with pregancy. This case demonstrates the need to fully inform
conjoined couples not only about the potential risks of continuation of all the embrbyos replaced but also the risk of monzygotic twinning of the embroyos.

068S WHAT WOULD IT MEAN TO THINK OF CONJOINED TWINS AS INDIVIDUALS? ETHICAL PROBLEMS IN THE MANAGEMENT OF CONJOINED TWINS
Alice Domurat Dreger & Lyman Briggs
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Not unlike twins born separate, conjoined twins are subject to single-
ton’s misunderstandings and mythologies about the relationships between
the twins’ anatomies and their identities. Today singletons, especially sur-
geons, often presume that conjoined twins are “born to be separated.” Indeed, surgery to separate twins (like surgery to assign sex in intersexed
newborns) is called “reconstructive,” as if the surgery were merely restor-
ing the children to a state they once enjoyed. In fact, the surgery actively
affects their co-twins without breast cancer. We also substantiated the impor-
tance of gestational age where those with long gestational age had
exception the payment of benefits, and other financial support, if any, made
in Hansard — the daily report of parliamentary proceedings.

Edinburgh Twins Club managed a face to face interview with their MP,
a petition of multiple birth families through Twins and Multiple Births
Council to the House of Commons and presented to parliament
on the importance of gestational age where those with long gestational age had
in order to study perinatal exposures and breast cancer. In one, in same-
sexed twins, a within-pair comparison revealed that mean birth weight
and ponderal index were significantly higher among cases compared
to their co-twins without breast cancer. We also substantiated the impor-
tance of gestational age where those with long gestational age had
a higher incidence of breast cancer compared to those with a lower.

In a second approach, opposite-sexed twins were studied in order
to assess the importance of birth weight. In this study, there was a 12-fold
increase in risk of breast cancer for female twins with the highest birth
weight compared with those with the lowest, indicating that opposite-
sexed twin pairs constitute a special biological domain of interest.

In conclusion, twin studies of breast cancer indicate that the intra-
erine milieu is of importance for the risk of breast cancer.

070F GENETIC AND ENVIRONMENTAL INFLUENCES ON INDIVIDUAL DIFFERENCES IN DEVELOPMENT OF COGNITIVE STYLES IN CHILDREN FROM 6 TO 18 YEARS
Marina Ergoova & Nadejda Zryananova
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The aim of this study is to analyze the impact of genetic and environmen-
tal factors on two cognitive styles — field dependence–independence (FD) and impulsivity–reflexivity (I-R). The sample consisted of 94 pairs ofMZ and DZ twins. Subjects were tested between: at 6 years (the last
pre-school year), 7 years (the beginning of school education), 10 years
(transition to middle school), 13 years and 16 years. This study is a part
of Moscow longitudinal study of twins, started in 1989.

Instruments. Embedded Figures Test and Matching Familiar Figures Test, WISC and WAIS. The results showed rather stable role of FD in the
structure of cognitive abilities: correlational analysis and analysis of vari-
aves (ANOVA) indicated that IQ was connected with FD, but not with
I-R. Heritability of IQ appears to increase from 6 to 16 years. Genetic
influences on FD are moderate and are growing from 6 to 16 ages.
Heritability of I-R is low at 6 and 7 years and is growing from 10 to 16
years. Age-to-age genetic correlations between IQ and FD and I-R appear
to be continuous, demonstrating the same developmental path of
development and different mechanisms of regulation of FD and I-R.

071S UNDERSTANDING CANCER DEVELOPMENT BY USING TWIN STUDIES
Anders Elborn
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The intra uterine hormonal milieu has been proposed to be of importance
for the risk of cancer, especially breast cancer. Breast cancer in twins
are therefore of interest, as they are associated with high pregnancy
hormone levels. However, longitudinal studies of twins have (with the
exception of early onset of breast cancer) revealed that twins do not differ
in cancer risk from that of singletons. These findings do not necessarily
rebut the hypothesis of importance of the intra uterine hormonal age.
Twin pregnancies are characterized by short gestational age, leading
to difficulties to assess the cumulative exposure to pregnancy hormones.
By the use of the Swedish Twin Registry, Cancer Registry and almost
complete hospital archives two studies have so far been undertaken
in order to study perinatal exposures and breast cancer. In one, in same-
sexed twins, a within-pair comparison revealed that mean birth weight
and ponderal index were significantly higher among cases compared
to their co-twins without breast cancer. We also substantiated the impor-
tance of gestational age where those with long gestational age had
a higher incidence of breast cancer compared to those with a lower.

In a second approach, opposite-sexed twins were studied in order
to assess the importance of birth weight. In this study, there was a 12-fold
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weight compared with those with the lowest, indicating that opposite-
sexed twin pairs constitute a special biological domain of interest.

In conclusion, twin studies of breast cancer indicate that the intra-
erine milieu is of importance for the risk of breast cancer.

072F TAMBA FINANCIAL NEEDS CAMPAIGN FOR FAMILIES OF TWO OR MORE CHILDREN BORN OF A SINGLE PREGNANCY
Jane Ellison
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Changes in the differential level of family allowances paid to elderly chil-
dren, as against later siblings, in the 1998 budget and the government’s in-
sistence that the needs of the family were high on their agenda sparked
a petition of multiple birth families through Twins and Multiple Births
Association — Tamba. Members contacted local MPs for their support.
Edinburgh Twins Club managed a face to face interview with their MP,
Alastair Darling the Minister for Social Services. A response of 4359 sig-
natures was taken to the House of Commons and presented to parliament
on 27th April 1999. No acknowledgement was received, except in
Hansard — the daily report of parliamentary proceedings.

Undaunted, Tamba surveyed its membership to discover what signifi-
cance the payment of benefits, and other financial support, if any, made
upon multiple birth families. This resulted in an excellent response —
800 families with more still arriving. The results have been roughly
analysed and good data achieved to show how a multiple birth arrival
impacts upon any family and the real financial burden it can present,
especially for low income families. A multiple birth family’s costs are
considerably more significant than a family where children are born

at different intervals. Capital outlay is very high if a change in living accommodation and transport are necessary. Equipment costs can be far more than double those for a single child, and day to day consumables must also be brought into the equation.

**073P DO GENETIC FACTORS CONTRIBUTE TO VARIATION IN INSULIN AND GLUCOSE LEVELS?***


**Aim.** To determine if genetic factors influence variation in plasma insulin and glucose levels in males and females.

**Design.** Plasma glucose and insulin levels were measured after a 12 hour fast, at 30 and 120 mins following oral glucose ingestion, in a population-based sample of twins. MZ and DZ twins aged 18–44 years were entered into the study, we were able to trace 393 (2.2%) and 330 (2.0%) MZ pairs and DZ pairs, respectively, from the Danish Twin Register. Body mass index (BMI) and waist-to-hip ratio (wh-ratio) were also measured. MZ and DZ correlations in log-transformed measures, adjusting for age, BMI and wh-ratio, were estimated by maximum likelihood separately for each sex.

**Results.** At fasting, 30 and 120 mins, correlations in insulin levels were stable at 0.32, 0.46 and 0.48 in MZ males, but decreased from 0.26 to 0.11 to 0.02 in DZ males. Similarly, for females these correlations were 0.52, 0.44 and 0.44 in MZ pairs and decreased from 0.49 to 0.29 to 0.09 in DZ pairs. Standard errors were about 0.10. In both sexes, therefore, the MZ and DZ correlations were not different at fasting. By 120 mins they were different (p < 0.02), but the DZ correlations were small and different from zero. For glucose levels, the male correlations were 0.10, 0.37 and 0.46 in MZ pairs, and 0.18, 0.25 and 0.20 in DZ pairs, only differing at 120 mins (p < 0.02). For females, they were 0.58, 0.52 and 0.50 in MZ pairs and -0.06, -0.02, 0.02 in DZ pairs (all p < 0.02), but none of the latter differed from 0.

**Discussion.** There was no evidence for genetic variation in fasting levels in either sex. Given stable MZ correlations, genetic factors may influence response to oral glucose, but would involve non-additive effects and gene-gene interactions.

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**074F SECULAR AND SPATIAL DIFFERENCES IN TWINNING RATES IN SWEDEN, 1750–1970***

Aldur W Eriksson & Johan Fellman

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To elucidate the causes and mechanisms of twinning and higher multifetal maternities, we have taken advantage of the statistical sources of Sweden, where multiple population continuous statistics are the oldest available. Rates of multiple maternities were highest during the last three decades of the 18th century, even during the years of privation, when natality decreased by 20–30%. These are the highest rates recorded for decades of the 18th century, even during the years of privation, when

**Results.** From 1836 until 1855 the twinning rate in Sweden was only 13.6 per 1000, although, showing great regional differences being around 20 per 1000 in the county of Gotland (an island) and around 12 per 1000 in the county of Älvsborg in western Sweden. The marked differences in twinning rate between these two counties are not explained by differences in the age distribution of the mothers. In the second half of the 19th century the twinning rate in the countryside in the county of Stockholm was around 20 but in the city of Stockholm only about 14 per 1000. The decreasing trend observable in many regions during the first part of the 20th century up to the 1970’s resulted in convergence towards relatively similar levels of around 10–12 per 1000. In Sweden after the 1930’s there was a marked decrease in the twinning rate, which by the 1960’s had reached only about half of what it had been two centuries earlier. The corresponding rates for triplets and quadruplet maternities were only about 25 per cent.

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**075P ASTHMA AND RESPIRATORY SYMPTOMS IN ITALIAN SCHOOLCHILDREN TWINS: A STRUCTURAL EQUATION MODELLING APPROACH***

Corrado Fagnani, Rodolfo Cotichini, M.Grazia Calvani, Carla Rossi, M. Antonia Stazi and the SIDRIA group

Correspondence address: Istituto Superiore di Sanità, Rome, Italy.

The Italian database of the ISAAC Project (International Studies on Asthma and Allergies in Childhood, the SIDRIA collaborative study, was reanalysed in order to estimate the life-time prevalence and the concordance of asthma and rhinitis in the enrolled twin pairs. Among the 18,737 children 6–7 years old and the 21,846 adolescents 13–14 years old entering into the study, we were able to trace 393 (2.2%) and 330 (2.0%) twins respectively. The analysis has only been performed in 286 twin pairs distinguished between 202 same-sex (SS) pairs and 84 different-sex (DS) pairs. Information on zygosity was not available at this stage of the analysis. Based on the interviews to the parents the prevalence of asthma was 8.3% in twins versus 8.9% in singletons, and 7.9% in twins versus 10.4% in singletons in rhinitis. The probandwise concordance was respectively 0.47 for same-sex pairs and 0.13 for different-sex pairs in asthma, 0.30 and 0.18 in rhinitis. A structural equation model was fitted separately to same-sex and different-sex pair. Variables considered in the model were: history of asthma and rhinitis in parents, smoking in parents, early respiratory infections, number of siblings, pet animals, road traffic, socio-economic status. Based on genetic modeling, inherited genetic factors accounted for 11% in SS and for 3% in DS pairs of the liability in the inter-individual variation in the risk of overall asthma, while non genetic factors shared by twins accounted for 82% in SS and 71% in DS pairs and unique environmental factors for 7% in SS and 25% in DS pair.

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**076F TWINS — THE PARTICULAR ISSUES FOR CHILDREN BORN AS A RESULT OF DONOR-ASSISTED CONCEPTION***

Julia Feast

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Approximately 7,500 children are born each year as a result of all forms of licensed fertility treatment in the UK. Of these, 2,500 are born following treatments involving donated gametes and embryos. In 1998/9, 75 live multiple birth sets were born resulting in 146 babies in all. For many of these children, the facts surrounding their conception and genetic make up will remain secret. Unlike adopted children, those born as a result of donated gametes have no rights of access to information about their genetic parent(s). We have learned from adopted people how crucially important it is to have accurate and detailed information about their origins if they are to make sense of themselves. Knowing who we are and where we come from and what makes us tick helps build a strong sense of self and identity.

Parents of twins are informed about the imprecise of treating their children as individuals and not as a pair or as one unit, so that each child could develop his or her own unique identity and personality. Parenting twins (or higher multiples) resulting from donor-assisted conception will therefore bring further additional tasks to the nurturing and child-rearing process, as often the genetic make-up of one or both parents is unknown.

This presentation will therefore explore the particular issues and dilemmas for parents of multiples following donor-assisted conception, and look at ways to help them enhance their children’s unique identities and personalities.

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**077P IMPACT OF MAGNETIC RESONANCE IMAGING OF THE FETAL BRAIN IN TWIN PREGNANCIES***

Vickie A Feldstein, Erin M Simon, Geoffrey A Machin, Nathaniel A Chuang, Roman Sydorak, Jody Farrell, Craig T Albanese, Michael R Harrison

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Magnetic resonance (MR) imaging enhances detection of fetal brain abnormalities which may be occult by ultrasound (US). There are high risks of brain injury in survivors of complicated twin pregnancies. We investigated whether fetal MR imaging provided additional information and hence affected management. Thirty-four pregnant women were studied. Gestational age at time of MR exam ranged from 18 to 31 weeks. Thirty-eight MR exams were performed on 60 living fetuses, targeting intracranial anatomy. Indications included twin transfusion syndrome(19), previous intervention(6), anomaly by US(5), and co-twin demise(1). Using commercially available equipment, modern ultrafast sequences were performed. T1- and T2-weighted MR images were acquired.

Compared with US, MR findings differed significantly in 9 cases and minor differences were seen in 12. In 6, a significant change in management was prompted based on MR findings. In 14, there was no change in management but increased diagnostic confidence was achieved. This included 4 evaluated prior to therapeutic procedure, 5 following co-twin demise, and 3 following intervention. In complicated twin pregnancies, MR imaging can be used to supplement or confirm US findings and may directly affect management.

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**078P ON THE STANDARDISATION OF THE TWINNING RATE***

Johan Fellman & Aldur W. Eriksson

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In many studies the twinning rate has been standardised according to maternal age. The direct standardisation method requires highly informative data for the target population. The indirect standardisation method is used when the data for the target population are not informative enough or when the target population is so small that the age-specific

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twining rates are subject to large random fluctuations that render the estimates inaccurate result. The only data that the indirect method requires are the distribution of the general population and the total twinning rate. We earlier introduced an alternative technique for standardisation of the twinning rate, which required even less data about the target population, only the total twinning rate and the maternal mean age. In this study we present the traditional indirect and direct standardisation methods based on data from both groups. Furthermore, we introduce a new direct standardisation method and develop our standardisation methods so that they take into account both maternal age and parity. We have applied these standardisation methods to data for Finland, 1953-1964. The effect of maternal age is similar irrespective of the standardisation method but the effect of parity is strongest with the direct methods. This may be a consequence of the fact that parity strongly increases the twinning rates of unmarried mothers, probably due to their higher reproductive capacity. There are clear differences in the distribution of maternal age and parity between married and unmarried mothers and, consequently, the standardisation according to both maternal age and parity gives reliable results.

078S  TWO'S COMPANY, THREE'S A CROWD
Nicholas Fisk
Abstract not available

080P  TAMBA COMMUNICATIONS REVIEW
Helen Forbes & Judi Linney
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In 1998 the Twins & Multiple Births Association (Tamba) undertook the first stage of a Communications Review, as part of an overall restructure. Direct communications to members — seen by many as the ‘face’ of Tamba and a source of information and support to parents — were Twin, Triplets & More a magazine for members and Tamba Today, a newsletter, both published three times a year. A postal questionnaire, comprising both closed and open-ended questions, was returned by 310 members. Popular articles were those on child development, parents’ experiences, letters and information about older multiples. Respondents also identified research findings and twins in school as subjects they would like to read more about. Tamba was the main source of information and adverts and offers were criticised as irrelevant and out of date. Key Tamba personnel identified the need for an editorial team and more structure to the magazine to avoid repetition. The review recommended the merger of the two publications, with a Tamba news page in each issue to replace Tamba Today, and regular pages for the specialist support groups. A working party led by Helen Forbes was set up to implement the recommendations. These included the arrangement of a new, more flexible meeting timetable, the establishment of a 5-strong editorial team and a much more critical editorial line. A two-year forward plan for contents was mapped out. The first issue of the relaunched magazine appeared in July 1999. This successful process of review will be illustrated on a poster by sample covers and pages from the magazine and the original questionnaire.

081P  THE HERITABILITY OF HAND GRIP STRENGTH — A STUDY OF 1624 DANISH TWIN PAIRS AGED 45-96
Henrik Frederiksen, David Gaist, Axel Skytte, James W. Vaupel, Matt McGue & Kaaire Christensen
Correspondence address: The Danish Twin Registry, University of Southern Denmark
In gerontology it is a prevailing assumption that the accumulation of environmental exposures during a long life determines health and physical abilities at older ages. Evolutionary biologists have, on the other hand, argued that less selective pressure against deleterious mutations first expressed late in life compared to mutations expressed early in life predicts an increase in genetic variance among the oldest individuals. Moreover, the distribution of disease was found to change over time. The aim of this study was to collect information and points of view to help parents of higher multiples in making decisions about their children’s school and pre-school choices. It could also be of value to teachers who may only meet triplets or higher multiples once or twice in their whole career. 135 questionnaires were completed, by parents whose children’s ages ranged from 4 months to 19 years, with the majority aged under 5 years. Many of their concerns were similar to those of parents of twins but much more intense. Teachers need to be aware of the higher incidence of premature birth and special educational needs. Voluntary groups for mothers with their babies and toddlers were greatly valued by the majority of parents who attended, for their own well-being as much as for their children’s sake. They also found that other parents attending the sessions were a valuable source of information about the next stages in educating their children. The main reasons given for not attending were logistical problems in travelling to the group and concerns about keeping three or more children safe in a large room. Any help in overcoming these problems would be of long-term benefit to the families. Above the age of 3 years, the main priority was to provide for the needs of each individual child. At school, this means that each child must be easily identified and treated as an individual. At home, the need to give sufficient attention and help with homework was difficult for most parents to achieve.

083P  HIGHER MULTIPLES IN SCHOOL AND PRESCHOOL
Diane Galloway
Correspondence address: Tamba, Harnott House, 309 Chester Road, Little Sutton, Ellesmere Port, UK, CH65 1QR
The aim of this survey was to collect information and points of view to help parents of higher multiples in making decisions about their children. As the success of the review was not universally appreciated, a new, more flexible meeting timetable, the establishment of a 5-strong editorial team and a much more critical editorial line. A two-year forward plan for contents was mapped out. The first issue of the relaunched magazine appeared in July 1999. This successful process of review will be illustrated on a poster by sample covers and pages from the magazine and the original questionnaire.

084P  DIZYGOTIC TWINS IN A MONOCHORIONIC PLACENTA
Norman A Ginsberg, J. Svetlana Rechitsky, Yuri Verilnsky
Correspondence address: ‘Illinois Masonic Medical Center, ’ Northwestern University, 1520 Eastwood Highland Park, Illinois, 60035
Description of Case. A 35-year-old white female 611041 conceived with clomiphene ovulation induction. At 5-7/2 weeks of gestation a single intrauterine gestational ring was seen. At 6-7/2 weeks, 2 fetuses and 2 yolk sacs were seen within a single chorionic membrane. At 8 weeks the two amniotic membranes were noted. CVS was performed at 11 weeks with twin 46, XY karyotype. Amniocentesis at 20 weeks was discordant for sex but otherwise normal. Amniocentesis revealed TWIN A, to be 46, XY and the results of TWIN B were 46, XX with FISH analysis revealed that 4% of the cells were XY.

Proof of Diagnosis. DNA was extracted and 7 separate VNTRs were analyzed from TWIN A, TWIN B, and the mother. Analysis proved the twins were dizygotic without maternal contamination. Histology of the placenta confirmed that it was monochorionic and diamniotic.
Relevance. Despite classic ultrasound findings and histology of the placenta, a monochorionic, diamniotic pregnancy may still be dizygotic. Prenatal diagnosis should be performed on each twin even when there is a high suspicion that the twins are monozygotic.

085P GENETIC EPIDEMIOLOGY OF ALZHEIMER DISEASE IN ITALIAN TWINS

Francesca Giubilato, Mirella Sepe Monti, Simona Giampalai, Marco Ferseneco, Luigi Ferrucci, Lia Iaccovillo, Marina Patrizia, Roberta Pacifici, Rodolfo Cotichini, Giovanni Ristori, Stefania Cannoni, Valeria Patrizarca, Sonia Brescianinari, M. Antonia Staff.

Corresponding address: Dept of Neurosciences, Univ. of Rome “La Sapienza”, Italy

The Italian Ministry of Health promoted a comprehensive research program on Alzheimer disease, with one of the focuses being the interactions between genetic, environmental and behavioural risk factors. In this program, we have proposed a project with the intent to estimate the above-mentioned risk factors by using a twin population.

Our project will consist of two different approaches: first, in two Italian regions, Lazio and Tuscany, all cases of dementia in twins will be detected by matching the national twin registry to the national Alzheimer registry, established for monitoring the pharmacological treatment of the disease (5,000 patients affected by mild to moderate dementia are estimated). The concordance rates will be calculated according to zygosity. Second, in two areas of the previous regions, all members of the twin registry over 60 will be screened for dementia every two years using a telephone interview. All subjects affected by dementia, enrolled with the two approaches, will be referred to a neurologically clinic. Type of dementia and degree of neuro-psychological deficits will be assessed. All affected twins and their co-twins will undergo laboratory tests for genetic analysis and determination of markers of brain atrophy. Environmental and behavioral risk factors will also be recorded. The findings of these two approaches will be compared to estimate the relative efficiency of both approaches.

086P FETAL AND INFANT DEATH IN TWIN PREGNANCY: CONSEQUENCE FOR THE SURVIVOR

Svetlana V. Glinskiana, Peter O.D. Pharaoh, Chris Wright, Judith Rankin

Corresponding address: Regional Maternity Survey Office, Dept. of Epidemiology and Public Health, School of Health Sciences, The Medical School, University of Newcastle, Newcastle upon Tyne, NE2 4HH, UK

Aim. To determine the long-term neurological morbidity for the surviving twin after a fetal or infant death of the co-twin.

Methods. Data on twin pregnancies delivered between 1981–92, with an antepartum or infant death, were identified from the Northern Perinatal Mortality Survey. Information on the long-term neurological morbidity of infant survivors of a deceased co-twin was obtained from a questionnaire completed by the community paediatrician and/or general practitioner.

Results. There were 111 traceable children who survived infancy after a fetal death of a co-twin (group I) and 142 from live born twin pairs in which one twin died in infancy (group II). Response rates were 87% and 92% respectively. The cerebral palsy (CP) prevalence in group I was 93 (95% CI 43–169) per 1000 survivors compared with 45 (95% CI 1–228) per 1000 survivors in group II. The CP prevalence was more common in like-sexed (LS) pairs (870) with a prevalence of 114 (95% CI 51–213) per 1000 survivors compared with 45 (95% CI 1–228) per 1000 in unlike-sexed (ULS) pairs (1/22). In group II, the CP prevalence was 154 (95% CI 84–223) per 1000 infant survivors in LS pairs and 77 (9–251) per 1000 in ULS pairs. For twins born after 32 weeks of gestation, the CP rates for group I were twice as high compared with group II survivors. At an earlier gestation, the CP rates were higher for group II survivors.

Conclusion. The CP prevalence is substantially increased in the surviving twin after a fetal death of the co-twin when compared with the general twin population. The CP prevalence is also high in the surviving twins in the infant-death/survivor group but mainly associated with prematurity.

087F CONGENITAL ABNORMALITIES IN TWINS, NORTHERN REGION OF ENGLAND 1998–1999

Svetlana V. Glinskiana, Chris Wright.

On behalf of the Northern Congenital Abnormality Survey and the Multiple Pregnancy Registry (MPR) Steering Group.

Corresponding address: Regional Maternity Survey Office, Dept. of Epidemiology and Public Health, University of Newcastle, Newcastle upon Tyne, NE2 4HH, UK

Aim. To determine the prevalence of congenital anomalies in twins and to describe the types and clinical outcomes in anomaly-affected twin pregnancies.

Design. All twin pregnancies with a confirmed postnatal diagnosis of a major congenital abnormality, born in 1998–99 to mothers resident in the former Northern Region of England, were identified from the population-based MPR. The MPR collects data on all multiple pregnancies within the region, whether they resulted in a spontaneous abortion, termination of pregnancy or birth.

Results. A total of 926 twin pregnancies were recorded during 1998–1999. Sixty nine pregnancies were complicated by an anomaly, involving 83 individuals (4.5% of 1852 twins). The prevalence of anomalies was higher in monochorionic (8.3%) than in dichorionic twins (3.1%) (OR = 2.8, 95% CI 1.6–4.9). Cardiovascular (17 individuals), renal (15) and chromosomal (11) anomalies were the most frequent. In five pregnancies, the anomalies were complications of monochorionic twinning: 4 sets of conjoined twins and 1 acardiac twin. Out of 69 twin pregnancies (7 pregnancies (14 fetuses) were terminated, one was a selective reduction; of 62 live born twins, 52 (84%) were alive at one year.

Discussion. The prospective MPR is a valuable source of data on multiple pregnancies, which can be used for the detailed investigation of congenital anomalies including follow-up studies.

088P MULTIPLE PREGNANCY REGISTER IN THE NORTH OF ENGLAND: 1998–99 RESULTS

Svetlana V. Glinskiana, Chris Wright, Judith Rankin, Marjorie Renwick

Corresponding address: Regional Maternity Survey Office, Dept. of Epidemiology and Public Health, School of Health Sciences, The Medical School, University of Newcastle, Newcastle upon Tyne, NE2 4HH, UK

The twinning rate in the Northern Region of England has increased since 1991, with the perinatal mortality rate (PMR) 5.5 times that in singletons. A regional prospective Multiple Preganancies Register (MPR) was established in January 1998, with the aim of extending information on multiple pregnancies and to enable research into higher mortality and morbidity in twins. A multiple pregnancy is notified to the MPR from the first ultrasound examination irrespective of whether the pregnancy remained in a spontaneous conception or following assisted conception of pregnancy or birth.

A total of 926 twin pregnancies were recorded in the MPR during 1998–1999, giving a twinning rate of 14.8 per 1000 pregnancies. The twinning rate at birth was 13.0 per 1000 pregnancies (809/62441) compared with 9.8 in 1990 and 12.0 in 1994. Twin pregnancies were detected before 13 weeks of gestation in 61% of cases. The PMR was 40.6 per 1000 twin births: 68.3 for monochorionic twins and 34.0 for dichorionic (OR = 2.1, 95% CI 1.1–3.8). Chorionicity was determined in 82% of twin maternities. Monochorionic twins were at a particular increased risk than dichorionic for a stillbirth: 54.0 vs 11.6 per 1000 (OR = 4.8, 95% CI 2.2–10.9). In 48 (5.2%) twin pregnancies both fetuses died spontaneously in utero before 24 weeks of gestation. In 39 (4.2%) pregnancies one twin was a livebirth after a fetal death of the co-twin before 24 weeks of gestation. The prospective MPR is not only important for observation of trends in multiple births rates and mortality, but also for randomised controlled trials and long-term follow-up studies.

089F CONCORDANCE FOR MAJOR DEPRESSIVE DISORDER CONTROLLING FOR BIRTH WEIGHT DIFFERENCES IN THE MISSOURI ADOLESCENT FEMALE TWIN STUDY

Anne L. Gliwinski and Andrew C. Heath

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Introduction. Studies have reported an association of twin birth weight discordance (BWD) and discordance for variables such as fetal biometric parameters. We were interested in also examining the relationship between BWD and discordance for Major Depressive Disorder (MDD) in an adolescent twin sample.

Method. We analyzed data from 3584 Missouri female adolescent twins (MOAFTS) including 55% MZ and 45% DZ twins. The subjects were interviewed with the polydiagnostic Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) which includes a section on MDD. Parents gave detailed gestation information including twins’ birth weights.

Results. Birth weight distributions in the MOAFTS were consistent with recent published norms. BWD was classified as 1 (0–2 %), 2 (2 to 15%) or 3 (15+ %). Controlling for zygosity, MZ twins were significantly correlated with BWD.

Discussion. With standard genetic analysis the variance for liability for MDD is explained by about half genetic and half unique environmental factors. Twin BWD could be a crude marker of discordance for unique in-utero environmental factors and lead to greater discordance for MDD in adolescence. This is congruent with current concepts of brain development governed by epigenetic events within a genetic framework. Birth weight data from birth records will soon become available for replication of these results.
3. ADHD and other specific learning difficulties such as dyslexia — result in a disproportionately high number of adverse outcomes. Twin pregnancies account for about 2% of live births but themselves. Twin studies showing increased rates of language delay, ADHD and smaller twin had a hematocrit of 65%, blood group O–Rh(+) and decreased beat to beat variability. We performed an amniocentesis to larger twin for ensuring fetal lung maturity, presumptive to run a class for parents expecting twins. This has never been done before in Iceland. The need for a specially designed class for these parents seems to be great, as the response we got, from parents, was overwhelming. Since it started in 1988, the Multiple Births Foundation (MBF) has been approached by many parents of multiples with problems, often longstanding, that could have been resolved much sooner had their professional carers appreciated their special needs and known how to respond. A recent survey of the Telephone Advisory Service showed 40% of calls concerned routine management problems such as sleep, feeding, toilet training and biting. Similarly, at the Twins Clinic, many referrals are related to communication, behaviour and discipline problems. Because it is not available locally, couples often seek information to prepare them for multiple parenthood through the MBF prenatal meetings. Since 1988, the MBF has been publishing a series of Guidelines for Professionals that has therefore been used in the MBF (1997–2001) and part funded by the European Union. These titles, Facts about Multiple Births; Multiple Pregnancy; Bereavement; Special Needs; The First Five Years and Beyond, are aimed at a wide spectrum of professionals from infertility specialists to paediatricians, midwives, community health workers, social workers and teachers. The books, which concentrate on management and social issues specific to multiple birth families, are divided into sections. Each of these provides a background to the topic (with references to research) and recommendations on how best to respond. Although the Guidelines relate to the health care in the UK, they are designed for the easy translation and adaptation for individual countries.

095F ICELAND: SETTING UP AN ANTENATAL CLASS FOR PARENTS EXPECTING TWINS
Karitas Halldorsdottir, Unnur B. Fridriksdottir
Correspondence address: Skolagerdi 63, 200 Kopavogur, Iceland

As midwifery students part of our education involves setting up and running an antenatal class for multiples. Since we are both mothers of twins we decided to run a class for parents expecting twins. This has never been done before in Iceland. The need for a specially designed class for these parents seems to be great, as the response we got, from parents, was overwhelming. Since it started in 1988, the Multiple Births Foundation (MBF) has been approached by many parents of multiples with problems, often longstanding, that could have been resolved much sooner had their professional carers appreciated their special needs and known how to respond. A recent survey of the Telephone Advisory Service showed 40% of calls concerned routine management problems such as sleep, feeding, toilet training and biting. Similarly, at the Twins Clinic, many referrals are related to communication, behaviour and discipline problems. Because it is not available locally, couples often seek information to prepare them for multiple parenthood through the MBF prenatal meetings. Since 1988, the MBF has been publishing a series of Guidelines for Professionals that has therefore been used in the MBF (1997–2001) and part funded by the European Union. These titles, Facts about Multiple Births; Multiple Pregnancy; Bereavement; Special Needs; The First Five Years and Beyond, are aimed at a wide spectrum of professionals from infertility specialists to paediatricians, midwives, community health workers, social workers and teachers. The books, which concentrate on management and social issues specific to multiple birth families, are divided into sections. Each of these provides a background to the topic (with research) and recommendations on how best to respond. Although the Guidelines relate to the health care in the UK, they are designed for the easy translation and adaptation for individual countries.

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093F STABILITY AND CHANGE IN PERCEIVED AUTONOMY DURING EARLY ADOLESCENCE: CITY VERSUS KIBBUTZ

Katharina Halldardottir, Unnur B. Fridriksdottir
Correspondence address: Skolagerdi 63, 200 Kopavogur, Iceland

As midwifery students part of our education involves setting up and running an antenatal class for multiples. Since we are both mothers of twins we decided to run a class for parents expecting twins. This has never been done before in Iceland. The need for a specially designed class for these parents seems to be great, as the response we got, from parents, was overwhelming. Since it started in 1988, the Multiple Births Foundation (MBF) has been approached by many parents of multiples with problems, often longstanding, that could have been resolved much sooner had their professional carers appreciated their special needs and known how to respond. A recent survey of the Telephone Advisory Service showed 40% of calls concerned routine management problems such as sleep, feeding, toilet training and biting. Similarly, at the Twins Clinic, many referrals are related to communication, behaviour and discipline problems. Because it is not available locally, couples often seek information to prepare them for multiple parenthood through the MBF prenatal meetings. Since 1988, the MBF has been publishing a series of Guidelines for Professionals that has therefore been used in the MBF (1997–2001) and part funded by the European Union. These titles, Facts about Multiple Births; Multiple Pregnancy; Bereavement; Special Needs; The First Five Years and Beyond, are aimed at a wide spectrum of professionals from infertility specialists to paediatricians, midwives, community health workers, social workers and teachers. The books, which concentrate on management and social issues specific to multiple birth families, are divided into sections. Each of these provides a background to the topic (with references to research) and recommendations on how best to respond. Although the Guidelines relate to the health care in the UK, they are designed for the easy translation and adaptation for individual countries.

092P MANAGEMENT OF A DICHRONIC TWIN DISCORDANT FOR INTRAUTERINE GROWTH RESTRICTION

Ahmet Gul, Halli Aslan, Ceyhun Numangolu, Ahmet Guliklik
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A primigravid woman was referred to maternal–fetal unit of SSK Bakirkoy Maternity Hospital with the diagnosis of 32 weeks twin gestation discordant for intrauterine growth restriction (IUGR) in October 15, 2000. BPD, FL, AC of larger twin were 32, 31, 32 weeks with normal biochemistry, urine analysis and bilateral uterine artery doppler velocimetry. In the following week, the twin with growth discrepancy and one with fetal distress, became non-reactive with spontaneous fetal heart rate deceleration without therapy were normal. Admission non-stress test (NST) of both fetuses was normal. The twin with growth discrepancy had a hematocrit of 65%, blood group O–Rh(+) and produced odds ratios of 1.2 and 1.1 for the middle and high tertiles. The implication from such findings, if replicated, to cast doubt on the validity of generalising from twin disability studies to the general population, and the exiting prospect of early intervention.

091S DISABILITY IN TWINS

Paul Gringras
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The term ‘disability’ encompasses a wide spectrum of neurodevelopmental disorders from those with a predominately motor component such as cerebral palsy, to those which affect cognition and acquisition of school skills such as dyslexia. While many of these issues much has been learnt from twin studies, far less has been learnt about the twins themselves. Twin pregnancies account for about 2% of live births but result in a disproportionately high number of adverse outcomes.

This talk will discuss:
1. Cerebral Palsy in twins, importance of chorionicity and the ‘vanishing twin’ hypothesis.
2. The role of newer non-invasive intrauterine cerebral studies in understanding underlying mechanisms of brain damage in twins.
3. ADHD and other specific learning difficulties such as dyslexia — the lack of evidence that each exists as discrete categories, and importance of early language development in their aetiology.
4. Twin studies showing increased rates of language delay, ADHD and specific learning difficulties that could have been resolved much sooner had their professional carers appreciated their special needs and known how to respond. A recent survey of the Telephone Advisory Service showed 40% of calls concerned routine management problems such as sleep, feeding, toilet training and biting. Similarly, at the Twins Clinic, many referrals are related to communication, behaviour and discipline problems. Because it is not available locally, couples often seek information to prepare them for multiple parenthood through the MBF prenatal meetings. Since 1988, the MBF has been publishing a series of Guidelines for Professionals that has therefore been used in the MBF (1997–2001) and part funded by the European Union. These titles, Facts about Multiple Births; Multiple Pregnancy; Bereavement; Special Needs; The First Five Years and Beyond, are aimed at a wide spectrum of professionals from infertility specialists to paediatricians, midwives, community health workers, social workers and teachers. The books, which concentrate on management and social issues specific to multiple birth families, are divided into sections. Each of these provides a background to the topic (with research) and recommendations on how best to respond. Although the Guidelines relate to the health care in the UK, they are designed for the easy translation and adaptation for individual countries.

090F IS POST-TRAUMATIC STRESS A RISK FACTOR FOR CORONARY HEART DISEASE?

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Objective. Few studies have examined the long-term impact of post-traumatic stress (PTS) on the physical health of combat exposed veterans. The purpose of the current investigation is to examine the association between symptoms of PTS and coronary heart disease (CHD).

Methods. A cohort of ~4,700 male twin pairs who served in the military during the Vietnam era where surveyed to obtain data on zygosity, PTS, and CHD prevalence in 1986 and 1991. In 1999 incident cases of physician diagnosed CHD were obtained from a mailed follow-up.

Results. Unadjusted analysis revealed a pattern of increasing risk for CHD with increasing level of PTS (p = 0.001). Compared to those in the lowest PTS symptom tertile, twins in the middle tertile had 1.4 times the risk of CHD (95% CI 0.8–2.4) while those in the highest tertile had 1.8 times the risk (95% CI 1.0–3.2). The association between the PTS symptom index and CHD persisted after adjustment for sequential confounding factors. Simultaneous adjustment for major confounding factors greatly reduced the PTS-CHD association (p = 0.31) and produced odds ratios of 1.2 and 1.1 for the middle and high tertiles.

Conclusions. These findings represent the first cohort investigation of PTS and CHD in Vietnam era veterans. It remains unclear if the association between PTS and CHD is a reflection of confounding or whether PTS indirectly increases CHD through known CHD risk factors.
096P  FACTORS RELATED TO SMOKING BEHAVIOR AND EXPOSURE IN CALIFORNIA TWINS

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The California Twin Cohort consists of a population-based cohort of twins born in California who have completed a risk factor questionnaire. Currently, nearly 30,000 pairs are represented in the cohort. Information on personal smoking as well as exposure to environmental tobacco smoke was obtained. Factors related to initiation and persistence of personal smoking and exposure to parental smoking will be discussed. Prevalence analyses of 22,000 pairs has shown that within all zygosity groups those with more than a high school education were half as likely to smoke as those with lower education and those whose parents smoked were 50–60% more likely to smoke than offspring of non-smoking parents. However, the influence of the co-twin’s smoking habits, the most important factor with identical twins (both male and female) 13–16 times more likely to smoke if their twin did and fraternal twin 5 times more likely. Study was also made of the effect of the twins’ parents smoking habits and the occurrence of selected congenital abnormalities including clubfoot, congenital heart problem, cerebral palsy, cleft lip, spina bifida, and strabismus (lazy eye). Odds ratios for maternal and paternal smoking were calculated as well as probandwise concordance rates. A significantly elevated OR for parental smoking and strabismus was found (OR = 1.8, 1.4–2.3) and probandwise concordance rates were higher among MZ than DZ twins suggesting the possibility of both an environmental and genetic role in the development of this condition.

097F  HOW REPRESENTATIVE IS THE WESTERN AUSTRALIAN TWIN REGISTER?

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Objectives. To assess the representativeness of the population-based Western Australian (WA) Twin Register.

Methods. The WA Twin Register comprises data on multiple births in WA from 1980–1992 inclusive. Families that could be traced were sent questionnaires to complete, to determine the genetic and environmental contributions (if any) linking passive smoking to childhood asthma and atopy. The representativeness of the Register was assessed by comparing outcomes and exposures in multiples on the Register with those in (i) multiples not on the register, and (ii) singletons born during the same period.

Results. There was no difference between mothers participating in the study and those not participating in the study with respect to place of residence, age at first birth and race. Prevalence of doctor-diagnosed asthma in children of families on the Register was 28% compared with 29% in singletons born during the same period. Parents were more likely to respond if their multiples do not have cerebral palsy or a birth defect.

Conclusions. The WA Twin Register appears to be representative of the WA population with respect to childhood asthma and atopy. However, factors that modulate response are still evident when comparing responders with non-responders, and the WA Twin Register may not be representative with respect to any outcome which is likely to be modulated by such factors.

098P  FACTORS AFFECTING CONCORDANCE RATES FOR TYPE 1 DIABETES IN IDENTICAL TWINS

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To determine the rate and factors which influence concordance in monozygotic (MZ) twin pairs discordant for type 1 diabetes, we studied non-diabetic MZ twins of patients with type 1 diabetes from Great Britain (n = 134) and the United States (n = 53). Discordance for disease between identical twins implies a role for non-genetically determined factors but could also be influenced by a decreased load of diabetes susceptibility genes. By survival analysis of the series from UK and USA (n = 187, median follow-up 17.7 years, range 0.01–40), the combined probability of progression to diabetes was 39% (SEM 7%) at 40 years of discordance, with striking similarity between the two series. In twins of index cases diagnosed at 24 years or younger the probability of progressing to diabetes by 30 years discordance was 38%, but only 6% for the remaining twins (p = 0.004). In non-diabetic MZ twins antibodies to glutamic acid decarboxylase or IA-2 were highly predictive of IDDM (positive predictive value >86%). Antibody isotypes tended to be restricted to the IgG1 subclass. Significantly more MZ than dizygotic twin pairs were discordant for the presence of antibody combinations (33% vs 6%; p < 0.05) and the development of diabetes, (33% vs 0%; p < 0.01). In 77 MZ twin pairs (40 concordant and 37 discordant for Type 1 diabetes), the high risk HLA DQB1*0201/DQB1*0302 or the Hph I insulin genotype was found more often in the concordant twins 38 of 40 (95%) compared to discordant twins 25 of 37 (68%) (p = 0.02). Twins of diabetic patients from two different countries have remarkably similar rates of progression to diabetes with late progression to diabetes in a fraction. Progression to diabetes in non-diabetic MZ twins was related to age at diagnosis of the index twin, MHC and non-MHC gene load and the presence of antibodies.
101S MYTHS AND REALITY IN DECISIONS ABOUT MULTIPLES IN SCHOOL

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We review the literature about whether or not multiples should be in the same class. There is a major difference between literature and evidence. The first empirical study by Koch (1966) showed no evidence that separation was appropriate. Yet there have been many comments that multiples should be separated, based on anecdotal (and biased) reporting and especially on the well-publicised cases of very dependent and dysfunctional multiples, since this is the only information teachers are likely to encounter. It appears in news not science. In 1989 Australia had the first extensive survey of parents and teachers of multiples, followed with our comparable study of UK families several years later. These are remarkable similarities in multiple birth families. Based on many years experience of multiple birth families, we introduce three issues:

1. Is it more difficult to accept that one twin is disabled—we discuss this in terms of a new WA program to help parents come to terms with disability in one child
2. How does the non-disabled twin cope and what are the pressures resources are needed or perceived to be needed, given differences in coping strategies
3. Does this issue apply across all disabilities? There is a question that to what extent should families and professionals be sensitised to the needs of multiples or would this be stereotyping of possible problems?

102S THE PSYCHOSOCIAL IMPACT OF HAVING OR BEING A DISABLED TWIN

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Shere (1955) claimed it was worse to be the healthy cotwin rather than the twin with cerebral palsy. This emphasises that most studies focus on the psychological impact in multiple birth families. Given the higher rates of disability in multiples, it is vital to what extent should families and professionals be sensitised to the needs of multiples or would this be stereotyping of possible problems?

103S SECULAR CHANGE AND GENE ENVIRONMENT INTERACTION EFFECTS IN ALCOHOLISM: RESULTS FROM THE YOUNG ADULT AUSTRALIAN TWIN COHORT


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Despite secular and cross-cultural differences in rates of alcoholism, it has proved difficult to demonstrate differences in the heritability of alcoholism between different birth cohorts, or different societies. Examination of birth cohort differences within a society is complicated by factors such as differential mortality, and differential recall bias for different age-groups. Two cohorts of young Australian twins, born 1956–1964 (N = 900 twins), and 1966–1971 (N = 6264 twins) have completed diagnostic interview assessments at approximately the same age, allowing an analysis of cohort differences in drinking patterns and problems. In women, while no mean differences in consumption levels were observed, the more recent birth cohort showed greater frequency of heavy drinking, drinking to intoxication, and related problems such as blackouts and alcohol-related accidents. Lifetime histories of alcohol dependence were reported with much greater frequency by the more recent cohort (15% for DSM-IV alcohol dependence) than by the older birth cohort (9% by less stringent DSM-III-R criteria). Despite these differences, the estimated heritability of alcohol dependence remained minimally between the two cohorts, with a trend for lower heritability in the younger cohort (50%) than in the older (65%), contrary to our a priori expectation that reduced social prohibitions against drinking to intoxication by women would lead to evidence for the younger cohort in the younger cohort. (Supported by NIH grants AA11998, AA10249 & AA07728)

104P DISCORDANCY AND CATCH-UP GROWTH IN TWINS

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As part of an ongoing follow-up study of twins, 73 pairs (146 children) born between 1996–98 were measured for length (LT) or height (HT), weight (WT), and head circumference (HC). The purpose of this study was to evaluate whether intrapair differences present at birth persist through 3 years of age. Of the twins followed to date, 38 pairs were measured at 8-months, 40 pairs at 18-months, and 15 pairs at 3 years. The intrapair difference in WT at birth was 275 g: the larger 2.529 ± 81g (height zscore = −0.25 ± 0.70 SDU) and the twin lighter at birth (+0.08 ± 0.56 g; −0.86 ± 0.67 SDU). At 8-months there were significant differences in WT (+0.50 ± 0.73 SDU, p < .01) and HC (+0.43 ± 1.07 SDU, p < .05), and a borderline difference in LT (+0.30 ± 1.06 SDU). The lighter twin was still lighter (−0.30 ± 1.17 SDU vs +0.08 ± 1.30 SDU), but demonstrated more rapid catch-up growth compared to the heavier twin (+0.63 ± 1.20 SDU vs +0.35 ± 1.29 SDU, p < .01). By 18 months, the differences in HC (+0.28 ± 1.28 SDU) and HT (+0.10 ± 0.80 SDU) were much less, and only the difference in WT was still significant (+0.38 ± 0.87 SDU, p < .01). Likewise, at 3 years, the twin born lighter was +0.43 ± 0.56 SDU, p < .01, but there were no significant differences in HT, and almost complete catch-up in WT, with the twin heavier at birth averaging +0.51 ± 0.81 SDU for WT and the twin lighter at birth (+0.08 ± 0.97 SDU), both catching up about half an SDU. Thus, while relative intrapair differences in WT, appear to be stable through age 3, there is significant catch-up, with the twin smaller at birth catching up more than the larger of the pair.

105P SERUM FERRITIN AND TWIN FETAL GROWTH

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Extremes in maternal serum ferritin levels have been implicated in poor fetal growth for singletons, but their diagnostic value in twin pregnancies is not known. This study evaluated the relationships between maternal serum ferritin, maternal weight gain, and fetal growth in twin pregnancies. Serial measures of iron status, maternal weight gain, and outcomes were collected for 129 mothers of twins. Weight gain at 24 weeks (WG24) averaged 12.4 ± 5.1 kg, birthweight (BWT) 2.488 ± 0.94g at 35.5 ± 2.3 weeks. Adjusting for ethnicity and parity (mean ± SE), ferritin was 63.1 ± 10.5 g/L in the 1st trimester (11 wk), 34.6 ± 3.0 g/L in the 2nd (19 wk), and 11.3 ± 2.4 g/L in the 3rd (29 wk), below the cutoff for iron deficiency (12g/L). After gestation, WG24 was the most significant predictor of BWT (15.2 ± 5.2 kg weight gain, p < .005); 3rd trimester ferritin levels were lower with higher WG24 (−0.18 ± 0.07 g/L/pg/L, p < .01). In the 3rd trimester, ferritin levels were 16.1 ± 1.5g/L and BWT 2.344 ± 72 g for those with WG24 < 9 kg, vs serum ferritin of 9.8 ± 1.2g/L and BWT of 2.581 ± 55 g for those with WG24 > 15.9 g/kg (p < .05). In addition, BWT was lower (p < .01) with serum ferritin levels > 14.25g/L (2.421 ± 53 g), serum ferritin levels > 14.25g/L (2.421 ± 53 g), serum ferritin levels > 14.25g/L (2.421 ± 53 g). These findings indicate that while most twin mothers may have 3rd trimester serum ferritin levels consistent with iron deficiency, unlike for singletons, this may be a clinical indicator of better fetal growth, as iron stores are utilized to support fetal growth. High levels, which may still be well below ferritin values found in the 3rd trimester for singletons with good outcomes, may be an indicator of growth restriction in twin pregnancies.

106S MOLECULAR ANALYSIS OF BREAST CANCER IN MZ TWINS

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A new approach has been tested in mapping of allelic imbalance in DNA of monzygotic twins. Such allelic imbalances may be indicative of locations of tumour suppressor genes. Loss of heterozygosity (LOH) analysis was carried out on microdissected tumour and normal tissue from concor-
107S ASSISTED REPRODUCTION — COUNTING THE COST: ECONOMIC IMPLICATIONS OF MULTIPLE BIRTHS

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Although twins and high order multiple births account for a relatively small proportion of deliveries, they contribute disproportionately to the overall numbers of stillbirths, infant deaths and low birthweight babies. Children from multiple births, particularly those from triplets and higher order births, impose a greater burden on the health, education and social services, and on their parents and informal carers, than singletons. Moreover, multiple maternities also appear to be associated with higher rates of morbidity and mortality in the mother throughout pregnancy and childbirth. Consequently, questions have emerged about the economic implications of increasing multiple birth rates in many industrialised countries and the costs that can be attributed to the use of assisted conception and of drugs used for the medical management of sub-fertility. This presentation will review published and unpublished evidence regarding the economic implications of twins and higher order multiple births for the health services, for other sectors of the economy and for individuals. The presentation will discuss the assumptions upon which economic models are based and will also define a minimum set of methodological standards upon which future economic studies of multiple births should be based. In addition, the presentation will summarise the scope and scientific quality of existing evidence in order to identify gaps in our knowledge and to consider the future research agenda in this area.

108S ROMANDE ASSOCIATION OF HELP EXCHANGES AND INFORMATION CONCERNING THE TWINS, TRIPLET AND MORE

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History — Presentation — Activities. Created in 1987 by parents of twins and rapidly joined by adult twins, the association is open to anyone interested in twins and multiple births. It aims to bring quality information. The main core is the sharing of experiences by the volunteers.

The purposes of the regional representative:
- Newsletters
- Hotline for information and psychological help
- Organisation of meetings and participation in activities of similar associations.

Selling:
A) Files about specific themes like “parents-to-be of twin children or more” and “tricks for multiple birth”.
B) Pins with logo.
C) Visits to families and parents-to-be.
D) Advertisement service for material help.
E) Help to students and research workers.

It answers many questions from media without giving members personal information about members. Want to join us? Please check address and details above.

109S PSYCHIATRIC COMORBIDITY IN CHRONIC FATIGUE SYNDROME: A CO-TWIN CONTROL STUDY

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Objective. To examine the lifetime prevalence of psychiatric disorders in twin pairs discordant for chronic fatigue syndrome (CFS) and to determine symptom overlap of CFS and depression.

Methods. A sample of 68 twin pairs discordant for CFS completed a mailed questionnaire that collected information on symptoms of fatigue and depressive symptoms; subsequently the Diagnostic Interview Schedule-III-R was administered by telephone. CFS was defined according to the CDC research criteria. Levels of current depressive symptoms and lifetime psychiatric symptoms of depression were examined separately from a diagnosis of depressive disorders.

Results. Large associations were found for CFS and PTSD (OR = 10.0, CI = 1.3, 78.1), major depressive disorder (OR = 6.5, CI = 2.3, 18.6), and panic disorder (OR = 6.0, CI = 1.3, 26.8). Analysis of current level of fatigue and individual symptoms of depression indicated increased levels of distress due to symptoms not shared with depression (such as dysphoria and anhedonia), in addition to large, anticipated associations with low energy and finding everything an effort.

Conclusion. Lifetime post-traumatic stress disorder, major depressive episode, and panic disorder are much more common in persons with CFS than in their unaffected co-twins. The presence of symptoms common to CFS and major depressive episode does not entirely account for the association between CFS and other lifetime and current depressive symptoms.

110F FETAL AND INFANT MORTALITY IN TWIN PREGNANCIES AND TWIN INDIVIDUALS

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This paper reports estimates of gestation-specific fetal, neonatal and post-neonatal mortality in twins compared with singletons, considering twins as pairs and as individual. A population cohort of 171,527 birth notifications was obtained from prospectively maintained child health systems in North Thames, 1989–1991. Death data were validated by linkage with birth and death registration details. Multiple births (4234) were linked to form birth sibship for all but 124 (36) records, yielding 1989 pairs of twins.

Results. Trends in gestation-specific fetal mortality per 1000 women still pregnant (1000/bp) were compared between singleton and twin pregnancies. At all gestations risk of fetal mortality amongst twins is substantially higher and rises faster than that observed after singleton pregnancies. At 20 weeks risk of fetal loss was 2.1/1000 bp in twins compared with 0.6/1000 bp in singletons. At 37–39 weeks gestation the risk of fetal losses were 19.3/1000 bp in twins and 1.6/1000 bp in singletons. In contrast, neonatal deaths were concentrated at early gestations, and the risk of neonatal death decreased progressively in both singletons and twins with advancing gestation. Twin mortality was higher than singleton before 31 weeks. A window of advantage in survival was observed for twins (8/1000 live born) compared with singletons (12/1000 live born) between 31 and 36 weeks, most evident when considering each twin’s survival individually. This advantage appears to persist in the postneonatal period. Weeks 32–35 represent a period when singleton birth is statistically not normal, and twin birth is.

Conclusions. Overall twins are at greater risk of mortality at all gestations. The improved survival for liveborn twins at 31–36 weeks does not compensate for increased fetal losses in this period.

111S DIABETES AND SEMI-STAVARITION DURING RAT PREGNANCY AND LACTATION: CONSEQUENCES FOR THE OFFSPRING

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It is now evident that chronic diseases at adult age can be acquired during fetal life. Most epidemiological investigations focussed on the association between cardiovascular disease and low birth weight, but some studies also implicated maternal diabetes in adulthood disease of the offspring. To study the pathophysiology of the association between low birth weight and diseases in later life, animal models are used. We compared two rat models of perinatal growth restriction, diabetes mellitus (DR) and semi-starvation (SR) of the maternal rat, in the effects on their offspring. 22-days old fetuses of DR and SR showed a comparable degree of growth retardation. Postnatally, body weight increased parallel to that of control rats, but there was no catch-up growth. Offspring of DR
(O-DR) exhibit insulin resistance which involves both hepatic glucose production and peripheral glucose utilisation. Offspring of SR (O-DR), show insulin sensitivity in the liver but apparently not in the peripheral tissues. Determination of glucose metabolic index in individual tissues support these results. Mesenteric arteries from O-DR show a reduced endothelium-dependent relaxation and enhanced constriction to noradrenaline. Relaxation to acetylcholine and bradykinin is also reduced in arteries from O-DR, indicative of a reduction in NO synthesis. On the other hand relaxation to sodium nitroprusside is enhanced. This could reflect a compensatory response to tonic NO depletion. In summary then — in utero events may have lasting consequences in terms of insulin sensitivity and vascular function. Whether these may contribute to overt adult disease remains to be determined.

112F BIRTH WEIGHT, EARLY ENVIRONMENT, AND GENETICS — A STUDY OF TWINS DISCORDANT FOR ACUTE MYOCARDIAL INFARCTION

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Fetal growth is believed to be of importance in the aetiology of coronary heart disease (CHD). Epidemiological studies using birth weight as a crude marker of fetal growth suggest that low birth weight is associated with increased risk of CHD. However, these studies had limited power to examine potential confounding effects of genetic factors and of environmental influences other than fetal growth. In studies of twins, within-pair comparisons markedly reduce these potential confounding effects. This case-control study of acute myocardial infarction (AMI) was nested within the population-based Swedish Twin Registry, linked with the Cause of Death Registry and the National Discharge Registry. We retrieved birth records containing information on birth and maternal characteristics from 132 like-sexed twin pairs discordant for AMI and 118 individually-matched control twin pairs, in which neither twin experienced AMI. In comparisons between AMI cases and external matched control twins, cases had significantly lower mean birth weight (143 g, p = 0.04), birth length (0.8 cm, p = 0.04), and head circumference (0.5 cm, p = 0.03) than controls. In within-pair comparisons between AMI cases and healthy co-twins, no significant differences in birth measurements were found. The lack of an association between birth weight and AMI within twin pairs suggest that previously reported associations are confounded genetic and early environmental factors.

113P DIGITAL POSTNATAL ANGIOGRAPHY OF THE PLACENTA IN TTTS

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Aim of the study. After the pioneer work of Schatz in 1882 and of Benirschke in 1975 arteriovenous (AV) anastomoses are known to be a substrate of twin-to-twin transfusion syndrome (TTTS) in MC multiple pregnancy. We report our experience to evaluate whether placental digital angiography might add information about placental sharing, vessel distribution, type of AV shunting and the success or failure of Laser therapy.

Material and Methods. Eight cases of chronic TTTS without laser therapy, two cases with laser therapy and two cases with acute TTTS were up to now selected. After birth, the umbilical vessels of both twins were cannulated, perfused with heparin and contrast medium under control of a computerangiograph.

Results. In chronic TTTS without laser treatment, we observed two types of AV shunts characterized by either thin trans-cotedleyean anastomoses or a thin kind of “end-to-end anastomoses” seeming to pass several cotyledons, of which the pregnancies were combined with a higher rate of perinatal mortality/morbidity. In one case with complete laser treatment hydrops of the recipient resolved and no (more) anastomoses were observed, in the other case ascites reappeared after selective laser treatment. In two small AV anastomoses by computerangiography though no anastomoses were verified by the conventional color injection method. In acute TTTS, the dye rapidly traversed through villous capillaries appearing on the venous side of the co-twin and the corresponding donor arteries and recipient veins penetrated the placenta extremely close so that the anastomoses soon appeared as a continuous vessel.

Conclusions: Digital computerangiography of the placenta helps to document the anatomical substrate of TTTS and the efficiency of laser coagulation and might improve our knowledge regarding etiology, therapeutic strategies and outcome.
The covariance structure of neuroticism and agreeableness: A twin and molecular genetic analysis of the role of the serotonin transporter gene

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Personality trait domains, such as neuroticism and agreeableness are considered factorially distinct, despite a number of correlations between the domains. The genetic and environmental correlations that index the degree to which the observed relationship between the Revised NEO Personality Inventory scales of Neuroticism and Agreeableness are caused by genetic or experiential influences were estimated using data from 913 monozygotic (MZ) and 562 dizygotic (DZ) volunteer twin pairs from Canada, Germany, and Japan. The serotonin transporter gene, 5-HTTLPR, was assayed in a sample of 338 non-twin sibling pairs from the United States to determine the contribution of the serotonin transporter gene to the covariance of Neuroticism and Agreeableness scales. In all four samples genetic influences, as opposed to environmental influences, contributed to the covariance of Neuroticism and Agreeableness to an extent of accounting for 10% of the relationship between these domains. The implications of these results on models of personality structure, taxonomy, and measurement are discussed.

Genetic influence on marital status

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Previous research demonstrating differences in MZ versus DZ similarity for divorce suggests that genetic factors may play a significant role. However, there has not been a great deal of work that includes “never married,” “currently married,” “currently divorced,” and “remarried” in the same series of analyses. To address this issue, we used data collected from members of the Vietnam Era Veteran Twin Registry. The Registry comprises male twin pairs who served in the U.S. military between 1965 and 1975. In 1987, approximately 8,000 twins from the original sample were interviewed by telephone using the Diagnostic Interview Schedule to diagnose mental disorders. Our preliminary analyses indicate that there is a genetic influence on whether an individual has ever been married and there is also a genetic influence on whether an individual who has been married has ever been divorced. We will present analyses of results that assess whether the genetic and environmental factors that influence whether an individual marries are the same as the genetic and environmental factors that influence whether he ever divorces. We will also assess the role that psychopathology may play in mediating the relationship between genetic factors and marital history.

The cost-effectiveness of in-vitro fertilisation

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The issue of how many embryos to replace per cycle of in vitro fertilisation has been at the forefront of recent clinical debate. We investigated this issue in the context of cost-effectiveness. Cost-optimisation models were applied to one of the World’s largest IVF datasets (93,293 patients who underwent cycles in the United Kingdom from 1991–1998). We calculated the most cost-effective number of embryos per cycle in light of two competing variables — cycle costs and costs of live deliveries. Total savings were calculated by evaluating the consequences of transferring patients from an expensive group to a less-expensive one. Our analyses indicate the current practice of transferring more than two embryos results in an unacceptable ethical and financial burden, due to the increased risk of multi-胎. Minimising delivery costs with respect to cycle costs would yield immediate benefits.
full paediatric assessment as well as support and advice to the families of twins and multiples. Senior paediatricians and health visitors who staff the clinics are able to offer specialist advice including bereavement support. The staff liaise with other professionals locally to promote knowledge and awareness of the needs of the families of multiple births. Clinics are held monthly in Birmingham and accept open referrals, whilst in York clinics are held bi-monthly and referral by a general practitioner is required. The most common concerns relate to growth, development, emotional and behavioural problems, and general health in addition to queries about zygosity determination. The highest rate of referral is for young children aged < 5 years, in common with referral patterns generally across paediatrics.

**124F GENETIC AND ENVIRONMENTAL INFLUENCES ON ACNE IN ADOLESCENT TWINS**

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Acne is an extremely prevalent skin condition primarily affecting adolescents, but often continuing into adulthood. It consists of inflamed or non-inflamed lesions on the face and trunk, and in its severe form has been shown to be associated with psychological factors such as anxiety and poor self-esteem. Measures of acne severity on the face, chest and back were obtained from male and female adolescent Australian twins; 105 MZ and 279 DZ pairs were measured at age 12, and 139 MZ pairs and 185 DZ pairs at age 16. Significant genetic influences on facial acne were detected in males and females at all three ages considered, with univariate heritability estimates between 0.5 and 0.9 for girls, and between 0.7 and 0.8 for boys. No significant shared environmental influences were found for facial acne. Genetic factors were also found to be important for acne on the chest and back at age 14, and preliminary multivariate analyses indicate that there may be both common and specific genetic influences on acne at the three sites considered.

**125P GENES AND ENVIRONMENT IN FEBRILE SEIZURES: A POPULATION-BASED TWIN STUDY**

Marianne J. Kjeldsen, Kirsten O. Kyvik, Kaare Christensen, Mogens L. Friis

Correspondence address: The Danish Twin Registry, Institute of Public Health, University of Southern Denmark, Odense.

**Purpose.** To examine the role of genetic and environmental factors on the aetiology of febrile seizures (FS) and to estimate the degree of heritability.

**Methods.** Data on self-reported FS was collected on 34,076 twin individuals, aged 12–41 years and originating from the Danish Twin Registry. The data was analysed using the classic twin study design. Probandwise concordance rates, odds ratios and tetrachoric correlations were calculated and used to assess the degree of similarity in monozygotic (MZ) and dizygotic (DZ) twins. By model fitting different combinations of genetic effects (additive or dominant) and effects of environment (shared or non-shared) were evaluated and the heritability of FS was estimated.

**Results.** 29,179 twins responded to the questionnaire. Excluding twins with unknown zygosity, health history information on FS was obtained from both twins in 11,872 pairs. A total of 805 cases of FS were found. Probandwise concordance rates, odds ratios and tetrachoric correlations were significantly higher for MZ than for DZ twins. According to biometrical modelling, a model combining additive genetic effects and environmental effects that were specific to the individual provided the best overall fit to the data. From this model a heritability of FS of 0.69 was found. No sex difference or age-dependency in the magnitude of genetic effects was observed.

**Conclusions.** These results show a major genetic component in susceptibility to FS although a substantial part of the aetiology of FS is due to environmental factors. Further research is required to examine this in more detail.

**126P GENETIC EPIDEMIOLOGY OF ALCOHOL DEPENDENCE IN A HEAVY DRINKING NATIONAL TWIN COHORT.**

Valerie S. Knopik, Andrew C. Heath, Pamela A. F. Madden, Kathleen K. Budorick, Elliott C. Nelson, and Nicholas G. Martin

Correspondence address: Department of Psychiatry, Washington University School of Medicine, 44 N. Kingshighway, Suite 1, St. Louis, MO 63108

In order to explore risk factors for DSM-IV alcohol dependence in both men and women, diagnostic telephone interview data from young adult Australian twin pairs born 1964–1971 were analyzed using Cox models and structural equation modeling techniques. Cox regression models were fitted to interview data from a total of 2700 complete twin pairs and from 766 single members of twin pairs. Results of these analyses suggest that the risk for alcohol dependence is increased in males, in Roman Catholics, in those who report a history of major depression, panic disorder, and conduct disorder, or (in females only) a history of suicide attempt, whereas there is a decreased risk in those reporting Baptist, Methodist, or Orthodox religion, in males who report weekly church attendance, and in university-educated males. Controlling for these sociodemographic and psychiatric predictors, alcoholism rates remain significantly higher in the co-twins of alcoholic MZ compared to DZ alcoholic common conter, structural equation models fitted to observed summary statistics for each zygoty group (i.e., the numbers of concordant alcoholic, discordant, and concordant unaffected twin pairs, and of alcoholic and unaffected singleton twins) suggest that 53% of the total variance in alcoholism liability is attributable to additive genetic effects, 0% to shared environmental factors, and 47% to non-shared environmental influences. (Supported by NIH grants AA11998, AA10249, AA07580, DA12854).

**A TWIN STUDY OF GENETIC AND ENVIRONMENTAL FACTORS IN THE RELATIONSHIP BETWEEN ASTHMA AND BEHAVIOUR IN FOUR-YEAR-OLDS**

Gesina Kooppen-Schomerus, J Stevenson, R Plomin

Correspondence address: Institute of Psychiatry, King’s College London, SGP/RC, 133 Denmark Hill, London SE5 9AF, UK.

Although the genetic and environmental factors of asthma have been extensively researched, no studies on the early development of asthma in children have been reported to date. The objective of the present study was to test in a large and representative sample of young twins the hypotheses that genetic influences are substantial and shared environmental influences are modest. Furthermore, the relationship between asthma status and behaviour problems and anxiety was also analysed. The sample consisted of 4910 four-year-old twin pairs who were born in England and Wales in 1994 and 1995 who were ascertained in the Twins Early Development Study (TEDS). Data on asthma status and behavioural assessments were obtained from the twins’ parents by postal questionnaire. Multivariate analyses using model-fitting derived estimates of 68% for heritability, 13% for shared environment, and 19% for nonshared environment. Multivariate analyses found a relationship between asthma status and anxiety. Asthmatic children had significantly higher mean scores than non-asthmatic children for measures of anxiety (p < 0.001), but there were no significant differences in other areas of development such as cognition or language. Our findings show that asthma is highly heritable in 4-year-olds whereas shared environmental influences are not statistically significant. Furthermore, we found higher levels of anxiety in children with asthma. Multivariate genetic findings on asthma and anxiety will be presented.

**THE CONTEXT AND LONG-TERM IMPACTS OF MULTIPLE BIRTH LOSS**

Jean Kollantai

Correspondence address: Center for Loss in Multiple Birth, Inc., Anchorage, Alaska

As a result of our own experience with the death of a twin baby, we have worked on a fulltime basis for 13 years with more than 6,000 bereaved parents of twins, triplets or other high multiples throughout the US, Canada and other countries, of many socioeconomic, ethnic and racial backgrounds, ages and worldviews, with many situations: the death during pregnancy, at birth or after of both or all babies, of one twin, of one or more twins, selective reduction or termination, or the consideration of them, with and without later loss; pregnancy with a multiple who will or may die; the death of one or more multiples in childhood; and those with more than one multiple pregnancy and loss. Many original or early members continue as members or in touch, while new contacts arrive often at the rate of 5–7 daily, along with many others from professionals and multiple organizations. Of those who have survivors, many are the parents of one or more medically fragile or handicapped babies, some extremely so; and with technology, some surviving multiples are living for a time but dying in childhood. The presentation will summarize what can reasonably be inferred about the short- and especially the long-term impacts on parents and issues for surviving or other children, in the societal context of the boom in multiple births and in media attention, as well as ART generally and other “multi-realities”; and their implications for appropriate support to families as well as for maximum efforts to prevent loss and thereby long-term complicated grief and its potential consequences. Materials will be available.
It has been suggested that dizygotic twin pairs share two HLA haplotypes more often than ordinary siblings and thus might be more genetically alike. We tested this hypothesis in dizygotic twin pairs from the Danish Twin Registry.

Subjects and methods: A total of 114 (60 female and 54 male) same-sexed healthy twin pairs aged 18–45 years participated. Dizygosity was confirmed by means of DNA sequencing of nine polymorphic markers. HLA-A, B and Cw specificities were typed with serology, and if data were inconclusive, with DNA typing. If twin partners had the same HLA-types, they were assumed to share two haplotypes. If they had 1 HLA type in common they were assumed to share one haplotype and if they had no HLA types in common they were assumed to share zero haplotypes. Since HLA-A and B types from parents were unavailable, we could not test for identity-by-descent and thus have a risk of overestimating the number of twins sharing two haplotypes. A Chi-square test was used to compare observed numbers in each haplotype-sharing group with the expected numbers.

Results. Twenty-nine (expected 28.5) twin pairs had two, 52 (expected 57) had one, and 33 (expected 28.5) had zero HLA-types in common, p = 0.56. Conclusion. Dizygotic twin pairs are not more similar than ordinary siblings born from different pregnancies.

133S THE ENDOCRINOLOGY OF DIZYGOTIC TWINS IN THE HUMAN
Cornelis B. Lambalk

Correspondence address: Division of Reproductive Medicine of the department of Obstetrics and Gynecology and the Research Institute of Endocrinology, Reproduction and Metabolism, Vrije Universiteit, Medical Centre, Amsterdam.

Heredity, higher maternal age and increased parity are well-defined conditions associated with dizygotic twinning. An endocrine model of excessive secretion of pituitary gonadotrophic hormones explains multiple ovulation as a result of multiple follicle growth. In hereditary conditions FSH levels are elevated, leading to increase in stimulating mechanisms that regulate pituitary gonadotropin secretion while in most non-hereditary conditions, overshoot FSH secretions occurs as a result of diminished ovarian feedback. Puberty is a condition in which the hypothalamic LH/H pulse generator is reinitiated and this is typically characterized by temporary overshoot LH and FSH secretion, probably due to not yet fully operational ovarian feedback. In adult females situations can be found that mimic this peripubertal event such as while recovering from hypothalamic amenorrhea. Under these circumstances more DZ twinning can be observed. Elevated FSH levels along with ageing in premenopausal women probably underlie the age related increased risk of dizygotic twinning. The apparent paradox in the combination of age related decline in fecundity and rise in twinning risk can be explained by incidental presence in the cohort of more than one follicle, containing vital oocytes under deficient feedback mechanisms that lead to high FSH.

134F MULTIPLE PREGNANCY AND PERINATAL DEATHS AFTER ASSISTED CONCEPTION
Paul A.L. Lancaster and Tara L. Hurst

Correspondence address: AHWF National Perinatal Statistics Unit, The University of New South Wales and Sydney Children’s Hospital, Randwick, NSW 2052, Australia

The twinning rate in Australia increased by more than 60% from 9.0 per 1,000 confinements in 1977 to a peak of 14.5 per 1,000 in 1998. Among 251,650 births in 1998, assisted conception (IVF, ICSI, and GIFT, but not couples) resulted in 254,243 births (43.0 and 42.4 per 1,000) and higher order multiples (103.6 and 94.6 per 1,000) were similar. Multiple births accounted for 59.8% of perinatal deaths. In 1993-98, the perinatal death rate of singleton births was 21.0 per 1,000 combined births, but for twins 32.1 per 1,000, and for triplets and higher order multiples 150.3 per 1,000. Perinatal deaths were lower in the most recent years but the decline was more pronounced for singleton than for multiple births. In 1993-98, the perinatal death rate of singleton infants born after assisted conception (18.4 per 1,000) was twice that for all singleton births in Australia (9.1 per 1,000) but the rates for twins (43.0 and 42.4 per 1,000) and higher order multiples (103.6 and 94.6 per 1,000) were similar. Multiple births accounted for 59.8% of perinatal deaths after assisted conception compared with 12.8% in the population. Until fewer embryos are transferred in IVF cycles, multiple births will continue to be the major adverse outcome of these pregnancies.
4. The mechanism(s) of MZ-DC twinning. It is currently debated that

types of MZ twins (i.e. dichorial, DC: monochorial, MC and monoamni-

to the overall effect on the children and the families the children are

As for singleton placentas, it is important to explore the correlation

including superficial and deep anastomoses and placental sharing

Different forms of placental pathology can be the cause of discordant
twins. The first is the increased risk of preterm birth. This risk increases sig-
ificantly with the number of fetuses in utero. The median gestational age of
delivery of triplets is 32–33 weeks and for quadruplets is 30–31 weeks.

Cerebral palsy is the commonest motor disability in childhood and is more
likely to occur in multiple births than in singletons. The risk of cerebral palsy in
twins is six-fold increased and in triplets is 20 fold increased compared to
singletons. The reasons for this are multifactorial, but there are two import-

DOES IT HAVE A DIFFERENT AETIOLOGY?
Malcolm I Levine
Correspondence address: Academic Unit of Paediatrics, University of Leeds School of
Medicine, Clarendon Wing, Leeds LS2 9NS, UK
Cerebral palsy is the commonest motor disability in childhood and is more
likely to occur in multiple births than in singletons. The risk of cerebral palsy in
twins is six-fold increased and in triplets is 20 fold increased compared to
singletons. The reasons for this are multifactorial, but there are two import-

138S EXAMINING THE LEGALITY OF MANDATORY
TWIN SEPARATION
Lana Larson Dean
Correspondence address: 2953 Autumn Run Place, Orlando, Florida, USA 32822
In her presentation, Lana Larson Dean will explore the disparity among
American parents’ constitutional rights involving the education and
upbringing of their children. By reviewing past and current case law,
Ms. Dean will address the unique constitutional questions that arise when
parents are faced with mandatory separation of their twins in the class-
room. Finally, Ms. Dean will comment on the likelihood of prevailing in
a lawsuit in these circumstances and will suggest alternative means of
resolving the separation issue.

136S LOOKING BEYOND THE TECHNOLOGY: COMING WITH HIGHER ORDER MULTIPLES
Donna Launderger
Correspondence address: Multiple Births Canada, 248 Tatlock Court, Waterloo,
Ontario N2L 5Y6
In recent years, much of the focus on Assisted Reproductive Tech-
nologies (‘ART’s) has been directed to issues surrounding the rights
of people using reproductive services, genetic manipulation and surrogate
motherhood. Little attention has been given to the impact of ART’s on
the family and the children — the desired outcome of these services. There
is an urgent need to examine all ART’s issues and to look past the tech-
nology to its overall effect on the children and the families the children are
born to. As a result of the high order multiples, discussion will focus on what
it means for a parent to suddenly have several newborns added to the
family — the physical, psychological and financial pressures.

137S PLACENTAL PATHOLOGY IN DISCORDANT TWINS
Ricardo N Laurini
Correspondence address: Department of OB/GYN, University Hospital, 4200 Porto, Portogal
As multiple gestations are a priori high-risk pregnancies, all such placen-
tas must be examined and sent fresh immediately after delivery. This is essential for a number of examinations (e.g. microbiology, cytoge-
etics) including injection of chorionic vessels. All umbilical cords must be
clearly identified as to twin of origin. If a radiological examination of
the vascularisation is planned, the umbilical cords must be cannulated
immediately and perfused following a standard protocol. In our experi-
ence such a comprehensive morphological examination clearly benefits
from postnatal computerangiogram in evaluating the vascular structures
including superficial and deep anastomoses and placental sharing
(a poorly understood cause of discordancy). The morphological examina-
tion should establish the pattern of placentation and zygosity, pathology
related to monochorial placentation, as well as the types of anastomoses
also seen in singleton placentas. The histological examination must
include samples from the decidua basalis to assess the spiral arteries.
Different forms of placental pathology can be the cause of discordant
twins. As a mother of two sets of twins, Dr. Laurini will discuss
women's experiences of leading to three main
types of MZ twins (i.e. dichorial, DC: monochorial, MC and monoamni-

138S THE BIOLOGY OF MONOZYGOTIC TWINSNING:
GENERAL ASPECTS
Fernand Leroy
Correspondence address: 18, Marxv, 3090 Overijse, Belgium
The etiology of MZ twinning still eludes us. Also, in spite of some insights on the developmental mechanisms leading to the three main
types of MZ twins (i.e. dichorial, DC: monochorial, MC and monoamni-

139P SUBJECTIVE REACTIONS TO ACUTE NICOTINE:
EFFECTS OF GENDER AND FAMILY HISTORY
OF NICOTINE AND ALCOHOL CONSUMPTION
Christina N. Lessov, Pamela A. F. Madden, Erik J. Sirevaag, John W. Rohrbough,
Ovide F. Pomerleau, and Andrew C. Heath
Correspondence address: Washington University School of Medicine, St. Louis, MO
The degree of initial sensitivity to the effects of nicotine may represent a biological predictor of nicotine dependence vulnerability. In a sample
of nonsmoking (smoked less than 100 cigarettes lifetime) young adult

140S CEREBRAL PALSY IN TWINS: DOES IT HAVE A DIFFERENT AETIOLOGY?
Malcolm I Levine
Correspondence address: Academic Unit of Paediatrics, University of Leeds School of
Medicine, Clarendon Wing, Leeds LS2 9NS, UK
Cerebral palsy is the commonest motor disability in childhood and is more
likely to occur in multiple births than in singletons. The risk of cerebral palsy in
twins is six-fold increased and in triplets is 20 fold increased compared to
singletons. The reasons for this are multifactorial, but there are two import-

141P TWINS IN PSYCHOANALYTIC WORK
Vivienne J Lewin
Correspondence address: 24 Eustelle Road, London NW3 2JY
Twins face particular developmental issues that are enacted within the
transference relationship with an analyst/therapist. For each infant twin,
the evolution of a personal identity involves separation from both

Finally, two fundamental questions arise about the etiology of MZ twinning:
• Do they arise from a unique primary cause or might their causation
be of dual nature?
• Bilateral symmetry is a very general feature of animal anatomy
and MZ twinning can be looked upon as resulting from an exaggera-
tion of the underlying developmental mechanisms. Thus, how
is body symmetry genetically programmed?
to avoid these processes, leaving each infant with a sense of shared identity with the twin. A twin in analysis attempts to establish a twinship with the analyst in a psychic re-enactment of the actual twinship. This defensive winning must be address or fundamental aspects of the personality will remain inadequately known and worked with, and development towards separateness and maturity will be impeded, with an unsuccessful ending to the work. Emotional growth involves facing loss and the painful diminishing phase of life. Nevertheless, each twin will remain the survivor to establish a more secure identity. The complex twin transference will be an important focus in psychoanalytic work and will need careful and detailed attention for a successful outcome to the work.

142S HERITABILITY FOR CANCER, COMPARISON BETWEEN TWIN AND FAMILY STUDIES.
Paul Lichtenstein
Correspondence address: Department of Medical Epidemiology, Karolinska Institute, Box 281, SE-171 77 Stockholm, Sweden.

The relative importance of genes and environments for cancer susceptibility is not well understood. Twin studies have shown modest heritabilities ranging from 20%–40% of cancer susceptibility depending on site. Shared environmental effects have been of less importance and have explained from 0%–20% of susceptibility. Despite these analyses also show significant shared environmental effects, both from shared adult environments and from shared childhood environments. Compared to twin studies, the family studies show somewhat lower heritability estimates and higher shared environmental effects. The difference might be that twin studies include nonadditive genetic effects, and that family studies might underestimate heritability due to age-dependent genetic effects. We conclude that twin and family studies agree in that environmental effects have the principal role in cancer development, and that these effects are mainly shared between family members, both from shared adult environments.

143S REPRODUCTIVE MEDICINE, MULTIPLE BIRTHS AND SEQUELAE FOR THE CHILDREN.
Brian A. Lieberman
Correspondence address: Manchester Fertility Services, Russell House, Russell Road, Whalley Range, Manchester M16 8AJ.

The incidence of multiple births has increased due to medical treatments for the infertile couple. The rising incidence has been associated with increased demands on obstetric, neonatal and paediatric services. A number of complications have been described in infants delivered after multiple births. In particular, these effects are more pronounced in twins and triplets. The relative large genetic effects, accounting for around 20%–40% of susceptibility, indicated that even though susceptibility genes have been described at many cancer sites, they are likely to explain only part of the genetic effects.

144P GENETIC AND ENVIRONMENTAL INFLUENCES ON SELF-REPORTED LIFE EVENTS IN WOMEN OF THE FINNISH TWIN COHORT.
Kirs Lillberg, Pia K. Verkasalo, Jaakko Kaprio, Parikku Koskenvuo
Correspondence address: The Finnish Twin Cohort, Dept. of Public Health, PO. Box 41, FIN-00014 University of Helsinki, Finland.

Intrapersonal characteristics are specified to play a role in the occurrence and reporting of life events. We investigated the extent to which genetic factors influence self-reports of life events in the last 5 years. The study was based on 4,044 Finnish female twins pairs born before 1958 who reported about the occurrence of 21 life events in a questionnaire in 1981. We used a subsample of the twins born between 1930–1957 who reported a follow-up questionnaire in 1990. Structural equation modeling was used to estimate the genetic and environmental effects on life events of all 21 reported life events.

The median number of life events reported for the past 5 years was 4 (interquartile range 2–6). The best fitting genetic model indicating that genetic effects accounted for 29% (95% CI 13–39%) and environmental effects for 24% (94–40%) of the phenotypic variance of reports of life events. The magnitude of genetic effects was similar for younger (24–59 years) and older (60 years or more) women. We found genetic effects also for events considered to be independent of the individual’s behavior. These preliminary results indicate moderate genetic influence on self-reports of recent life events in women, thereby confirming previous findings that life events are not random. We will also assess whether the genetic and environmental factors affecting life event reporting are stable over time.

145F WHY A NATIONAL PARENTAL AND USER GROUP IS ESSENTIAL TO IMPROVE THE QUALITY OF HEALTH AND SOCIAL CARE.
Judith Linney and David Stern
Correspondence address: Twins and Multiple Births Association, 22 Woodham Park Road, Woodham, Addlestone, Surrey.

This presentation will outline a review that was undertaken to assess the views of members of a national organisation, Twins and Multiple Births Association. The key aim of the project was to examine current service provision, needs and demands, and how these were going to be met in future. The number of multiple births are rising but many statutory services do not recognise the greater health risks nor address the specific needs of families with multiples. Areas identified included physical and emotional health of parents, the financial burden, lack of nursing and home help and social isolation. Additional needs were highlighted in families where there were triplets or more, a bereavement, a lone parent, or a child with a disability. These needs were often not recognised by professional carers. Education, training and information for parents and professionals were key recommendations. Parents and users must be more involved in planning and provision of services. Through working in partnership with parents and users, professionals can improve the quality of health and social care to families with twins, triplets or more.

146S ARE DISEASE DISCORDANT IDENTICAL TWINS THE PERFECT DEVICE TO STUDY AUTOIMMUNITY?
Marco Londei
Correspondence address: Imperial College School of Medicine, Kennedy Institute of Rheumatology Division, 1 Aupportu Rd W6 9JJ, London. m.londei@ic.ac.uk.

Autoimmune diseases are strongly controlled by genetic factors, the main breakthroughs of the HLA locus. Though HLA matched ‘controls’ can be found more difficult is the task to match all the genetic factors influencing autoimmunity. A perfect ‘control’ should therefore ‘share’ the same genetic make up but differing in the clinical manifestation. If genetic factors are at the foundation of autoimmunity the environmental ones represent the triggering of the pathology. Ideal ‘controls’, therefore, should also have experienced the same environment. Individuals who respond to these provisions are identical twins as they share the same genetic make up, and normally share the same environment. Remarkably the concordance rate of autoimmune diseases in identical twins is not absolute and only a relatively small fraction is concordant. These disease ‘discordant’ identical twins thus represent the perfect group of patients and controls to study modifications of the immune system likely associated to the disease. It has to be stressed that normally identical twins have a very similar immune profile. For this purpose we have embarked in the analysis of different parameters both of the adaptive as well as of the innate immune system, in order to pinpoint difference between disease discordant identical twins. Results from these studies will be presented and their potential significance for the evolution, pathogenesis and potential therapy of the autoimmune disease discussed.

147S THE FETAL ORIGINS OF ADULT DISEASE: A TWIN APPROACH.
Ruth JF Loos, Robert Fagard; Gaston Beunen; Catherine Derom; David Phillips; Robert Vlietinck.
Correspondence address: Centre for Human Genetics, Katholieke Universiteit Leuven, Kapucijnenvoer 33 bldg. E, B-3000 Leuven, Belgium.

A large number of epidemiological studies have shown that low birthweight is associated with an increased risk of cardiovascular and metabolic disease in adult life. We have studied body composition and glucose-insulin metabolism in 424 twin pairs aged 25.8 (4.7) years, from the East Flanders Prospective Twin Survey. Twin members shared the same maternal environment, and so we can investigate the potential environment in which they were raised.

We found that earlier birthweight was associated with increased body fat and a decrease in lean body mass. These results were stronger among the dizygotic twins, and were attenuated by adjusting for socioeconomic factors, such as education level and smoking. In addition, we found that earlier birthweight was associated with increased fasting blood glucose levels in adult life, even after adjusting for age, sex, and socioeconomic status. These results indicate that low birthweight is associated with an increased risk of cardiovascular and metabolic disease in adult life.
insulin concentrations in the twin offspring. These studies suggest that maternal as well as fetoplacental influences contribute to an adverse body habitus and to an abnormal glucose-insulin metabolism in adults. Studies of twins may shed light on the relative contribution of maternal and fetoplacental influences to the programming of adult diseases.

148P  OPPOSITE-SEX TWINS

Olivia Loussad
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This research was begun in response to professional and personal interest in the disquiet of opposite-sex twins. This disquiet is substantiated by psychological theory being ultimately based in the individual. The research will explore Occurrence of Schizophrenia and other Psychiatric Illnesses by Ulla Klaing, Preben Bo Mortensen and Kirsten Ohm Kyvik (British Journal of Psychiatry 1996) 168, 688–692, founded: “The rate ratio for any psychiatric disorder in twins from opposite-sex pairs was 1.29 times higher than the rate ratio in same sex twins. Likewise, the rate ratio for schizophrenia in twins from opposite-sex pairs was 1.77 times higher than the rate ratio in same sex twins.”

The interviewing methods for this research are derived from the methods of Psychodrama and Sociometry and the theory of spontaneity invented by Jacoblevi Moreno, complementary to Action Research:
1. The twins make paintings of their experience of being a twin.
2. They make a map (Sociogram) showing what is important to them.
3. They role-reverse with significant others of their own choice to contemplate their place in the twin’s and families’ life.

The outcome of the research will not only be to compare the different work of each individual but compare the twins, and each pair to the others. Amongst the findings so far I have observed they are in caring or public roles, playing a significant, even unique role in the community, but also have difficulties with intimate relationships. They have high levels of anxiety and frustration. This presentation will show a small section of the method of work and how it illuminates the research.

149P  PRENATAL INTERVENTIONS TO IMPROVE TWIN PREGNANCIES OUTCOMES

Barbara Luke, Linda Min, Ruta Misunias, Clark Nugent
Correspondence address: University of Michigan, Ann Arbor, Michigan, USA

Twin pregnancies are at higher risk for maternal and neonatal complications. The purpose of this study was to evaluate the effect of a program of prenatal diet therapy and patient education on reducing complications and improving outcomes. This was a prospective intervention study of women who participated in a special program (PP, program pregnancies), compared with non-participants (NPP, non-program pregnancies) and delivered between 5/96–8/99. Selection criteria for PP included enrollment in the program within 25 weeks and ≥ 4 program visits; NPP had no program visits; all twin pairs were liveborn and without major anomalies. The study sample included 91 PP (182 infants) and 157 NPP (315 infants). Preliminary analyses indicated that PP mothers were less likely to experience preterm premature rupture of membranes (PPROM) (adjusted odds ratio [AOR] 0.23, 95% Confidence Intervals [CI] 0.10–0.51, p = 0.003), preterm labor (AOR 0.58, CI 0.37–0.90, p = 0.01), early preterm delivery (< 33 weeks) (AOR 0.46, CI 0.28–0.74, p = 0.001), or to have a birth weight less than 1,500 grams or a lower Apgar score at one minute (AOR 0.9, CI 0.80–1.00, p = 0.001). Programs participation resulted in higher birthweight (+225 grams per twin, p = 0.001), longer gestation (+3.75 days, p = 0.06), higher birth weight-for-gestation (zscore, +0.24, p = 0.01), shorter newborn length of stay (−10.6 days per twin pair, p = 0.001), and lower total cost at birth for the mother and twins (−$36,142, p < 0.001). These findings suggest that participation in a special prenatal program for mothers of twins was associated with significant reductions in maternal and neonatal complications and improved outcomes.

150P  THE MENTAL AND MOTOR DEVELOPMENT OF TWINS: THE ROLE OF PLACENTATION

Barbara Luke, Ruta Misunias, Barbara Burpee, Shirley Gogliotti, Elaine Anderson
Correspondence address: University of Michigan, Ann Arbor, Michigan, USA

As part of an ongoing prospective study of twins, follow-up evaluations were conducted using the Bayley Scales of Infant Development, the Infant Neurological International Battery, and the Peabody Developmental Motor Scales on 90 twins tested at 8-months, 77 twins tested at 18-months and 34 twins tested at 3-years. The prospective study was to evaluate the mental and physical development of twin children by placentalion (dichorionic, DC, vs monochorionic, MC). Logistic and linear regression modeling was used to evaluate the effects of placentation. MC twins had a significantly slower rate of fetal growth (<2.2 g/week to 20 weeks, p = 0.002; −9.8 g/week from 20–28 weeks, p < 0.001; −19.3 g/week from 28 weeks to birth, p < 0.0001), shorter gestations (−1.4 weeks, p < 0.0001), lower birthweights (−397 g, p < 0.0001), shorter birthlengths (−2.8 cm, p < 0.0001), but comparable head circumference differences compared to DC twins. At 8 months of age MC twins averaged lower mental scores (−8.4, p = 0.001) and motor scores (−13.9, p < 0.0001) and were more likely to be rated as mildly or significantly delayed (OR 7.89, CI 3.23–19.40). For children tested at 18-months and 3-years, no significant differences were found, but there was a strong tendency to be rated as mildly or significantly delayed (OR 6.41, CI 2.97–13.82). These findings suggest that MC twins are at higher risk for mental and motor delays, particularly during infancy, and highlight the importance of early childhood screening and interventions for these high-risk children.

151F  THE SPECIFICITY OF FAMILIAL RISK FOR MANIA VERSUS ALCOHOLISM

Courtney E. Lynch, Michael J. Lyons, Beth A. Jerseky, Denise A. Hines, Simon Ascher and Ming Tsuang
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Epidemiologic data have shown that bipolar disorder has a high rate of comorbidity with substance abuse. We examined data from male twin pairs to determine whether bipolar disorder and substance abuse share a common vulnerability or if having one disorder is a risk factor for developing the other disorder. Data were collected from members of the Vietnam Era Twin Registry. The Registry comprises male twin pairs who served in the U.S. military between 1965 and 1975. In 1991 approximately 8,000 twins were interviewed by telephone using the Diagnostic Interview Schedule to diagnose mental disorders. We defined mania as the presence of three or more symptoms of a manic episode and alcoholism was defined as the presence of alcohol dependence, both according to DSM-III-R criteria. Within individuals, there was a strong association between mania and alcoholism. To compare across twin pairs, twins were divided into four mutually exclusive groups: 1) no mania, no alcoholism; 2) mania, no alcoholism; 3) no mania, alcoholism; and 4) mania and alcoholism. Odds ratios were used to quantify the cross-twin associations. Mania in one twin was associated with an increased risk of mania in the co-twin, and alcoholism in one twin was associated with an elevated risk of alcoholism in the co-twin. However, mania alone in one twin was not associated with alcoholism alone in the co-twin and alcoholism alone in one twin was not associated with mania alone in the co-twin. Thus, results indicate specificity of familial risk for alcoholism versus mania.

152F  "SELF-MEDICATION" WITH NICOTINE: TWIN PAIRS DISCORDANT FOR SCHIZOPHRENIA

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Clinical observation and previous research has identified a relationship between schizophrenia and cigarette smoking. It has been suggested that nicotine use may represent “self-medication” on the part of individuals with schizophrenia: nicotine may help to normalize cognitive processes such as attention. We studied 24 pairs of male twins from the Vietnam Era Twin Registry in which twin receipt of a diagnosis of schizophrenia and his co-twin did not. These schizophrenia-discordant pairs were compared on smoking related variables to twins from approximately 3,000 pairs in which neither twin had schizophrenia. Compared to controls, the co-twins of schizophrenics were significantly more likely to have smoked. Both schizophrenic twins and their co-twins were significantly more likely to report the inability to quit smoking than controls. The co-twins of schizophrenics were significantly more likely than controls to report each of the following symptoms when they tried to quit: difficulty concentrating, nervousness, headache, and drowsiness. They did not differ significantly from controls on the following symptoms: irritability, craving, upset stomach, increased appetite, and hands shaking. There results suggest that individuals at “high-risk” for schizophrenia by virtue of sharing genes with a schizophrenic individual demonstrate a pattern consistent with the use of nicotine to remediate attentional difficulties.

153S  ONE AND ONE MAKE(S) THREE: A GROUNDED THEORY STUDY OF TWINSHIP AND THE NEEDS OF TWINS IN PSYCHOLOGICAL COUNSELLING

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The primary foci of twin research have been on twins as a biological phenomenon, the management of medical complications of twin pregnancy and birth, and by psychologists and other scientists for whom twins provide a powerful research design for the study of individual differences.
and development. Twin relationships, or twinnings, have received less research attention. Most therapeutic models are based on the experience and development of singlets. This qualitative study used an adapted form of grounded theory methodology to explore the nature of twinning and, in particular, issues of relevance in psychological counselling with twins. Fourteen participants were interviewed in depth about their understanding and experience of twinning and factors that may be important in psychological counselling. Purposive sampling was used to select participants with a rich knowledge and experience of twinning and therapeutic work. Common comparison of segments of transcribed interviews was used to describe and elaborate concepts in the data that were found to be repeated within and across participants. A core theme, ‘discernment’, was found to be a central task of twinning, and for others in relation to twins. It is the process whereby twins are ‘made separate’, and happens at many levels of meaning. Four main subcategories are subsumed by the core category, including ‘two at the same time’, ‘awareness’, ‘managing ambiguity’ and ‘defining boundaries’. Implications for psychological counselling with twins are discussed.

154S THE USE OF CLUSTER ANALYSIS IN MULTIVARIATE MODELS

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The search for genetic basis of complex disease is potentially impeded by the lack of direct correspondence between the clinically recognised manifestations of disease and the action of specific genes. The problem is illustrated in osteoarthritis (OA). The disease is defined clinically through the recognition of a collection of features identified on X-ray (joint space narrowing, osteophyte, deformity and cyst formation) in an individual. Yet quite separate genetic influences are likely to determine each of these individual components, as well as the pattern of involvement at different body sites, the timing of disease onset and the rate of progression. Studying twins provides an efficient method of identifying the existence of shared and specific genetic effects in phenotypic data. Available methodology is limited for screening phenotypes like OA that comprise potentially large sets of variables, with sparse and categorical data types. One solution is provided by multivariate scaling methods that use a distance matrix derived from the phenotypic cross-correlations of contrasting zygosities. This approach has been used to examine the underlying genetic basis of OA, thus providing a coherent model of disease for standard genetic linkage and association studies.

155P GENETIC FACTORS DETERMINE THE LIABILITY TO BACK PAIN REPORTING: RESULTS OF A POPULATION BASED MRI STUDY OF TWINS

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Objective. We examined data from a population sample of female twins to assess the extent to which genetic factors contribute to the reporting of pain and examine the relative contribution of structural changes documented on MRI, and of behavioural and other lifestyle variables.

Methods. Questionnaire data relating to the lifetime history of back pain were examined from 181 monozygotic (MZ) and 351 dizygotic (DZ) female twin pairs. Lumbar MRI scans were available in a representative sample of 81 MZ and 174 DZ twin pairs and were scored for disc degeneration. The data were analysed using structural equation modelling.

Results. The lifetime cumulative prevalence of clinically relevant high intensity pain was 18%. Contrasting MZ and DZ concordances showed a significant contribution from genetic factors, equating to a heritability of 57% (95% CI: 55%, 78%). Significant associations (p < 0.05) were observed between back pain and the extent of MRI change, GHQ score, body mass index and smoking history. Genetic factors determining MRI changes accounted for 10% of the genetic variance in back pain; 7% was explained by genes in common with GHQ score.

Conclusion. Genetic factors explain the majority of the variance in liability to back pain in the female population. These results suggest that future research into the causes of back pain should include identifying the genes that determine structural degenerative changes in the spine and behavioural responses to painful stimuli.

156F GENETIC FACTORS ACCOUNT FOR THE CO-OCCURRANCE OF RAYNAUD’S AND MIGRAINE

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Objective. The occurrence of Raynaud’s Phenomenon (RP) may be a reflection of a generalised tendency to abnormal vascular responsiveness, other manifestations of which may include migraine, angina and pulmonary hypertension. RP itself has a strong genetic basis. In this study we examine the co-occurrence of RP and migraine in a population sample of twins to assess if there is a common underlying genetic basis to these two conditions.

Methods. Questionnaires were sent to 3,652 female twins asking about digital colour changes in response to the cold and headache history. Replies were received from 1,627 identical (MZ) and 27 non-identical (DZ) pairs (mean age 48 years). RP and migraine were classified using standard clinical criteria. Variance components analysis was used to assess the genetic contribution to both traits individually and the extent to which genetic and environmental factors accounted for their association.

Results. RP ‘ever’ occurred in 11% and migraine 24%. The heritability of RP was 56% and of migraine was 41%. Subjects with RP were at 2-fold increased risk of having migraine (p < 0.05). The association could be accounted for entirely by genetic factors. Shared genetic factors accounted for only 10% of the overall genetic variance in both traits.

Conclusion. The data support a common genetic basis for the pathological changes that occur in RP and migraine.

157F PHENOTYPE OF HERITABLE BREAST CANCER ACCORDING TO THE OCCURRENCE IN TWINS

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Background. The pattern of heritable breast cancer as a class has not been well described, and the predominance phenotype is a matter of speculation. The incidence among identical twins of breast cancer cases reflects heritability as well as non-heritable cancer occurrence.

Methods. We prospectively followed the female co-twins of 6325 female twins with cancer and compared the frequency of new breast cancer cases to that expected.

Results. While co-twins of other cancer probands are at little increased risk of breast or other cancer generally, and risk to fraternal co-twins of breast cancer cases is similar to that of other siblings (SIR = 1.7, CI = 1.1–2.6), risk to identical co-twins of cases is much higher (SIR = 4.4, CI = 3.6–5.6). Moreover, the incidence rate among identical co-twins of cases maintains a constant high rate with age. Concordant diagnoses in young twin pairs cluster non-randomly over time.

Conclusions. The high and constant heritable breast cancer incidence cannot be explained by cumulative estrogen exposure. The contrast in SIR between fraternal and identical co-twins is too large to be produced by single autosomal dominant mutations, and rather suggests multiple coexisting genomic mutations. The phenotype may reflect heightened susceptibility to hormones, a defect in tumor suppression, or both. This allotype is highly penetrant and probably accounts for a substantial proportion of all cases.

158F GENETIC EPIDEMIOLOGY OF CARDIOVASCULAR REACTIVITY IN ADOLESCENCE

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Background. Previous studies of genetic factors in cardiovascular reactivity suffered from small sample size and yielded inconsistent results. Here we report results from the largest study of genetic factors in cardiovascular reactivity in adolescence.

Aims. To test whether: (i) family resemblance for cardiovascular reactivity is due to genetic or shared environmental factors; (ii) the same genetic factors contribute significantly during physical and/or mental stress.

Methods. Blood pressure data were collected at rest and during bike exercise, handgrip and arithmetic exercise in 317 white twin pairs between the ages of 9.5 and 17 from the MCV Cardiovascular Twin Study. We calculated the response of blood pressure to stress under 3 different conditions by taking the difference between maximal and resting blood pressure. Structural equation models were fitted to partition the variance in the contribution of genetic, shared and unique environmental factors.

Results. Familial resemblance was significant for blood pressure reactivity, most likely explained by additive genetic factors with heritabilities ranging between 10 and 40%. Both testing whether genetic factors...
are independent or in common for variability in blood pressure response to 3 stress situations resulted in significant loss of fit. Sex differences in the contribution of genetic and environmental factors were significant. **Discussion.** We conclude that additive genetic factors likely account for family resemblance for cardiovascular reactivity and that partly the same and partly different genetic factors account for reactivity to physical and mental stress. These results suggest that molecular genetic studies will find different genes for resting blood pressure and reactivity.

159P GENETIC AND ENVIRONMENTAL INFLUENCES ON SELF PERCEPTIONS IN CHILDHOOD AND PUBERTY

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The purpose of this study was to investigate the magnitudes of genetic and environmental influences on self-perception.

As part of ongoing longitudinal study in a Japanese twin sample (MZ and DZ, 0–15 years old, total 2,135 pairs), 381 twin pairs (215 MZ pairs, 166 DZ pairs) in childhood and puberty completed Harter’s 1985 Self-Perception Profile for Children scale. This version contains 6 subscales: Social acceptance, scholastic, physical appearance, athletic, behavior, and global self-worth. Main results were followed. First, MZ twins interclass correlations exceeded DZ twins for all subscales. Second, using genetic ACE (Additive genetic, Common environment, and non-Shared Environment) model, the results indicated significant Additive genetic influence for Scholastic, Physical appearance and Global self-worth. Social acceptance, athletic, Physical appearance and Global self-worth were influenced by Common environment, on the other hands, all subscales were influenced by non-shared Environment.

160P DOES ZYGOSITY AND SEX IN TWIN PAIRS INFLUENCE RISK OF PRE- ECLAMPSIA IN THE MOTHER?

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The number of different paternal genes is larger in dizygotic (DZ) than in monozygotic (MZ) twin pregnancies and singleton pregnancies. Based on the hypothesis that pre-eclampsia is caused by maternal reactions to paternally derived foetal genes, we expected an increased risk of pre-eclampsia in MZ twins, due to the higher number of different paternal genes.

The hypothesis was tested by comparing the risk of pre-eclampsia in 5,232 mothers carrying twins with known zygosity. These twins were part of a population based twin registry nested within the national birth registry for Norway 1967–1997. Further analysis based on data about 17,517 mothers of twins in the birth registry explored the effect of the sex of the twins on the risk of pre-eclampsia. Relative risks were estimated as odds ratios (OR) with 95% confidence intervals, adjusted for parity, maternal age, and twins’ year of birth.

Zygosity was associated to risk of pre-eclampsia. The relative risk was 1.00 (0.82–1.20) for DZ twins. However, the number of females in the twin pair tended to increase the risk of pre-eclampsia in the mother. Relative to pregnancies with two male foetuses, the risk was 1.09 (0.96–1.24) for pairs with one female, and 1.12 (0.99–1.27) for twin pairs with two females.

The increased number of different paternally derived foetal genes in MZ twins does not increase the risk of pre-eclampsia in the mother. A slightly increased risk in female twin pregnancies suggests that hormonal levels or other effects of sex chromosomes play a role in the etiology of pre-eclampsia.

161P TWINS AND LEISURE TIME PHYSICAL ACTIVITY: A UNIVARIATE STUDY

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The purpose of this study was to evaluate the magnitude of individual differences in leisure time physical activity conditional on genetic differences using the classic twin method. Total sample size is composed of 411 twin pairs of different zygosity: MZ males, n = 85; MZ females, n = 118; DZ males, n = 68; DZ females, n = 85; DZ opposite sex, n = 55. Zygosity was evaluated according to the indirect method of Peeters et al., (1998), and leisure time physical activity was assessed with the Baecke questionnaire (Baecke et al., 1982). Quantitative genetic modeling was done with Mx software (Neale, 1997). Formal testing was conducted in several alternative models for additive genes (A), common (C) and unique environment (E). The correlation pattern suggests different effects of genes and environment. The best fitting model for female-A/E male-A/E specific contributions to latent factors: χ²(10) = 6.32, p = 0.79; AIC = -13.68; RMSEA = 0.02. Major effects for each gender are as follows: males, A = 63%; E = 37%; females, A = 32%; C = 38%; E = 30%.

**Conclusions.** (1) there are significant genetic effects in variation of leisure time physical activity levels; (2) these effects are of different importance in males and in females; (3) the presence of environmental effects in females but not in males has been previously noted in family aggregation studies.

162S BLOOD FLOW CHANGES IN DISCORDANT TWINS.

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In the past two decades Doppler ultrasound assessment of high risk pregnancies has been accepted a valuable tool for evaluating fetal condition. Twin pregnancy is high risk and the perinatal mortality rate in twins is six times higher than among singletons, mainly due to prematurity. It is also three to four times higher in monochorionic compared with dichorionic twins. Approximately 2/3 of twins are dichorionic and 1/3 is monochorionic. Membranes thicker than 2 mm and the presence of the lambda sign of membrane insertion in diaminotic twins, in the first trimester, indicate dichorionicity. Fetal growth in twins is more difficult to assess than in singletons since ultrasonography charts are available only for singletons only. The presence of umbilical artery blood flow waveform changes is related to increased placental vascular resistance correlated to histopathological changes. These may be the same in singleton pregnancies with placenta insufficiency as in twins with discordant growth. Doppler studies allow a greater information important about placenta insufficiency also in mono- and dichorionic twins with discordant growth. In monochorionic twins with discordant growth and without umbilical arterial waveform changes twin to twin transfusion should be suspected. Uncontrolled as well as randomised controlled Doppler studies in twin pregnancies have shown significant decrease in perinatal deaths in the Doppler group compared with controls. We report our blood flow results and placenta morphology in dichorionic twin pregnancies with discordant growth.

163S NAVIGATING THE CULTURAL UNIVERSE OF GENETIC RESEARCH AMONG AMERICAN INDIANS.

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Recent attempts to extend the NIH Human Genome Project to include ethnic minority populations led to an outcry regarding ethical, legal, social, and political issues in genetics research among these segments of U.S. society. American Indian communities have been particularly vocal, concerned that, without local controls, the process, materials, and outcomes of this work will violate matters of culture and self-determination. Consequently, important genetic research is stalled, and awaits the resolution of such tensions. Focusing on the American Indian experience, we review the historical events that precipitated this impasse and highlight specific concerns that have emerged, with special emphasis on studies of psychopathology. Several codes of conduct and collaborative agreements negotiated between investigators and tribal communities are described as a means of illustrating the principles likely to characterize future partnerships required to advance this line of inquiry. These principles revolve around answers to questions like: What can genetic research contribute to addressing the mental health problems of greatest concern to Native people? What are the risks and benefits to individual members, as well as tribal communities in general, by participating in this research? What rights can Indian and Native people and tribal communities have over biological materials used in such research? What is the authority of tribes, as domestic dependent sovereigns, to regulate genetic research and materials? What institutions can tribes and Indian and Native communities put in place to protect themselves from the risks and to ensure that they participate fully in the benefits of genetic research?

164S DOUBLE BIND: ANOREXIA NERVOSA IN MONOZYGOTIC TWINS.

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This case study of four women patients — two pairs of monozygotic twins — considers the ways in which the experience of twinship may relate to the development of Anorexia Nervosa. It is suggested that,
whilst all infants face the task of separation-individuation from their primary care-giver, twins face a dual challenge in that they also need to negotiate a process of separation-individuation from the other twin. It is further suggested that this task presents particular difficulties for monozygotic twins. Anorexia Nervosa may represent an attempt to avoid separation by means of a retreat to a pre-adolescent state in which differences, envy and rivalry can be denied. Successful treatment will need to gain the cooperation of both twins for each patient to address her difficulties without constant reference to the other and admission to separate hospitals seems to be helpful in this.

165P THE MATCHED MULTIPLE BIRTH DATA SET: A NEW DATA FILE FROM THE U.S. NATIONAL CENTER FOR HEALTH STATISTICS
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In the United States between 1980 and 1998, the number of twin births climbed 62%, and triplet/+ births by 470%. In 1998, 30% of all very low birthweight infants, and 18% of all neonatal deaths were born in multiple deliveries. Despite their growing numbers and the substantial impact multiple births are exerting on measures of infant health, the U.S. has lacked a national data base with information on sets of multiples. This report describes the first comprehensive U.S. data file to include matched sets of births and fetal deaths in multiple deliveries. Selected results from the file are presented. "The Matched Multiple Birth Data Set" was created to fill a gap in U.S. natality and fetal death files. These files, based on birth and death certificate data, contain important data on individual events, but lack information on multiple sets; set mates are not linked together in any way. As a result, it has not been possible to examine some characteristics of the multiple set such as gender-type and birthweight differences among set mates. The new data file includes a wealth of information on sets of twin and triplets born to U.S. residents for 1995–97. The vast majority (98.8%) of all twin and triplet records were matched for a total of 152,222 sets of twins and 5,353 sets of triplets. Corresponding live and infant deaths are also included.

166S FINDING GENES FOR COMMON DISEASES
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The genomics revolution offers the opportunity to isolate genes contributing to risk of complex diseases which are known to run in families but have no simple mode of inheritance. This has been made possible by collection of disease information on very large samples of families, the availability of large numbers of genetic markers which can be typed semi-automatically, and improved statistical and computing tools for analysis. The first step is genetic linkage analysis which looks for congruent patterns of transmission of genetic markers and disease occurrence within families. Sibling pairs are particularly useful since they are common and minimise heterogeneity, and DZ twins are optimal since they share no genetic material. This has been made possible by the availability of large numbers of genetic markers which can be typed semi-automatically, and improved statistical and computing tools for analysis. The first step is genetic linkage analysis which looks for congruent patterns of transmission of genetic markers and disease occurrence within families. Sibling pairs are particularly useful since they are common and minimise heterogeneity, and DZ twins are optimal since they share no genetic material. This has been made possible by the availability of large numbers of genetic markers which can be typed semi-automatically, and improved statistical and computing tools for analysis. The first step is genetic linkage analysis which looks for congruent patterns of transmission of genetic markers and disease occurrence within families. Sibling pairs are particularly useful since they are common and minimise heterogeneity, and DZ twins are optimal since they share no genetic material.

167F THE LEARNING STYLES OF MONOZYGOTIC TWINS
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This study compared the learning styles of monozygotic twins. It included analyzing perceptual, processing, and output modes when one attempts to learn new or difficult information. The reliable Dunn, Dunn, and Price learning style inventory was employed while qualitative data was gathered using open-ended surveys and interviews. The methods enabled the researcher to gather a broad and detailed array of data on the particular learning characteristics of twin siblings. For the 117 pairs of identical twins studied patterns emerged that were consistent and supported by follow-up interviews and open-ended surveys. Data indicated that identical twin siblings do not share similar learning styles, and often develop quite different strategies when completing learning tasks. Even among the perceptual modalities of auditory, visual, tactile, and kinesthetic elements, identical twins rarely possessed the same modality preferences. Many presumptions about twin siblings and how they learn are incorrect or incomplete. The data could help parents, teachers, and school administrators understand twins as learners. Twins often reported having to cope with unique issues in their formal and informal learning experiences. Among these issues were: 1. The role of competition among twin siblings in learning situations; 2. The need for individual identity and recognition in learning situations; 3. The positive impact that twin siblings had upon each other’s educational experience, and 4. The twins who were successful as learners were able to identify and utilize their individual learning style strengths.

168F EQUITY ISSUES AND EDUCATIONAL CONCERNS OF TWIN SIBLINGS
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One hundred seventeen monozygotic twin pairs were interviewed and surveyed concerning their school and non-formal school experiences. One hundred seventeen monozygotic twin pairs were interviewed and surveyed concerning their school and non-formal school experiences. Among these issues were: 1. The role of competition among twin siblings in learning situations; 2. The need for individual identity and recognition in learning situations; 3. The positive impact that twin siblings had upon each other’s educational experience, and 4. The twins who were successful as learners were able to identify and utilize their individual learning style strengths.

169P HYPERPHENYLALANINEMIA IN MALE-MALE TWINS
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We report on a family with male-male MZ twins with hyperphenylalanine mia. Proband, MP, died at 4 mo of age. AP, 22-month old twin boys, were born to a 32-year-old mother and a 33-year-old father (mother’s 2nd pregnancy). This nonconsanguineous couple has an older healthy son 9 years aged. The mother suffers from myopia of high degree. The multiple pregnancy was complicated by a threatened miscarriage repeatedly and the delivery was performed by Cesarean section. At birth MP weight was 2750g, his length was 49cm; AP weight was 2200g, his length was 46cm. The probands were detected by routine newborn screening for hyperphenylalaninemia using dried blood spots: phenylalanine level (Phel, µmol/L) for MP was 291, 254, for AP was 27; 206 (cut-off is 122 µmol/L for newborns of St.Petersburg). The mother has 67 of Phel and the father has 73 of Phel. At the age 10 months MP weight was 9450 g, his length was 71.5cm and head circumference was 43.5cm, Phel were 170; 236. By this time AP weight was 9300g, his length was 71cm, head circumference was 44cm and Phel were 176; 303. Using HRLH method we were able to determine high Phel for AP (proband (748 µmol/L, mild PKU)). Molecular analysis was performed in the Laboratory for prenatal diagnosis of the Institute of obstetrics and gynecology named after D.O.Ott. Allele 1 of the twin-probands, their mother and father who were linked together in any way. As a result, it has not been possible to examine some characteristics of the multiple set such as gender-type and birthweight differences among set mates. The new data file includes a wealth of information on sets of twin and triplets born to U.S. residents for 1995–97. The vast majority (98.8%) of all twin and triplet records were matched for a total of 152,222 sets of twins and 5,353 sets of triplets. Corresponding live and infant deaths are also included.
motic herna (2 MZ). The prematurity rate < 32 weeks was 14/35 (40%), 8/26 (31%) of pregnancies followed at our unit, however 6/9 (66%) of education of premature twins compared to 64/71 (71%) of spontaneous triplets were born <32 weeks.

Conclusions. Chorionicity is influenced by origin of pregnancy and has a significant impact on management and outcome. The rate of prematurity might as well be influenced by prenatal care. TTTS or entanglement also occur in DC triplet pregnancies.

171P GENETIC AND ENVIRONMENTAL INFLUENCES ON LIPIDS, LIPOPROTEINS AND APOLIPOPROTEINS: EFFECTS OF THE MENOPAUSE

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Levels of lipids and (apop)lipoproteins are known to change after the menopause, but it is unknown whether the magnitude of the genetic and environmental variance components changes with the menopause and whether lipids and (apop)lipoproteins are influenced by different genes before and after the menopause. We studied 453 monozygotic and 1280 dizygotic pairs of female Caucasian twins (mean age: 48 yrs; range: 18–79) from the St. Thomas’ UK Adult Twin Registry. The mean ages of the younger and older twin were 24.7±4.9 and 59.6±4.6 yrs, respectively. LDL cholesterol, HDL cholesterol, lipid (LDL), high density lipoprotein (HDL), lipoprotein(a) [Lp(a)], apolipoprotein A-I [apoA1] and B [apoB].

Mean values were adjusted for age, menopause, fasting status and hormone-replacement therapy using multiple regression. The genetic and environmental influences on serum lipid levels were estimated in pre- and post-menopausal women separately using a 6 group analysis (pre/pre, pre/post, post/post in MZ and DZ pairs) in Mx. Total variance showed an increase in triglycerides, HDL and apob. Genetic influences on lipid and (apop)lipoprotein levels [except for apol and Lp(a)] increase after the menopause, whereas shared environmental influences in total cholesterol, LDL, HDL, apoA and apoB tend to decrease or even disappear (pre: 22%–34% vs post: 0%–23%). No influence of the menopause on Lp(a) was found. Lipids were not influenced by different genes before and after the menopause.

172P THE NAMING OF TWINS

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The naming of twin babies is an important and very difficult task for their parents. Their relatives, friends and medical staff can refer to the babies as individuals right from the start. We analyzed names of 526 random twins pairs; female-female pairs (199), male-male pairs (178) and female-male pairs (149) born in 1963, 1965, 1969 and 1970 and compared these data with those for general population using information from the book “About Russian names” by A. Suslova and A. Superanskaya (Leningrad, 1991).

Results. Thirty-nine of male names and twenty of female names were used for our twin cohort. It means that 12 of boys and 26 of girls had a chance to have the same name. The choice of names for women was more limited then that for men. The lists of the wide spread male and female names were similar for general population and for our twins group. Alexander, Sergius, Alexis, Dmitri, Andrew were registered for 17, 22% and 25% of the twins respectively. The names of the female pairs were similar for general population and for our twins group: Elena, Olga, Svetlana, Natalie, Tatiana, Marina were registered for 65, 68% and 70% of the girls. Fifteen of the different names were found among 29.2 per cent of male-male twins. Seventeen of the different names were registered for 43.7 per cent of female-female twins. Eight of different name pairs were found among 22.1 per cent of female-male twins. In addition, 13.4 per cent of female-male twins, 12.9 per cent of male-male twins and 8 per cent of female-female twins were given two-sounding names (total 11.2%).

173P THE ANGIOTENSIN CONVERTING-ENZYME (ACE) GENE POLYMORPHISM, TWINS AND PRACTICAL GENETIC COUNSELLING

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The ACE gene polymorphism (ACEGP) is due to the insertion/deletion (ID) of 286 bp of intron 16. Our aim was to determine ACE genotype and detect possible genotype-diasease association as a form of counselling of families with twins. Materials and methods: We studied 5 healthy MZ sister pairs selected among 73 families with twins pairs. For making a diagnosis of zygosity we used self-report survey methodology and information about any cases of cardiovascular disorders among relatives of twins was included in the questionnaire. ACEGP was determined by PCR with DNA extracted from buccal epithelium cells as matrix. The product of amplification was analyzed by 8% PAAG electrophoresis and visualized with ethidium bromide.

Results. All five of MZ female twins had DD genotype. We created special certificate in which a genotype of a proband was fixed, possible complications and predisposition to diseases were listed and recommendation of medicine treatment was done. The investigation of ACEGP in conjunction with the pedigree analysis creates conditions for early diagnosis, correct medicine treatment, prevention of complications as an important part of practical genetic counselling of twin cohort.
or sex should be removed from the analysis, particularly when the relationship between brain volumes and cognitive abilities is the focus of the study. These issues are illustrated with some preliminary analyses of data being collected on twin pairs aged between 7 and 16 years at the National Institute of Mental Health.

177P NEONATAL OUTCOMES OF PRETERM TWINS

**Purpose.**
The objective of the study was to compare neonatal outcomes of preterm twins and singletons.

**Material and Methods.**
Obstetrics and neonatal data were collected retrospectively and included 38062 deliveries between 1989 and 1998. Out of 538 sets of twins, 312 (58.0%) delivered before 37 weeks of gestation; compared with singletons, the preterm birth rate of twins was 11.7%. Preterm birth was defined as delivery before 37 weeks of gestation. The exclusion criteria were a gestation age less than 24 weeks or a birth weight less than 500g.

**Results.**

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>Singletons % (N = 4323)</th>
<th>Twins % (N = 601)</th>
<th>Relative risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>20.7 (1894)</td>
<td>38.1 (229)</td>
<td>1.84 (1.64–2.07)</td>
</tr>
<tr>
<td>IVH level</td>
<td>8.1 (352)</td>
<td>17.8 (107)</td>
<td>2.19 (1.79–2.67)</td>
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<tr>
<td>RDS</td>
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<td>37.4 (225)</td>
<td>1.52 (1.38–1.71)</td>
</tr>
<tr>
<td>NEC</td>
<td>6.7 (291)</td>
<td>18.3 (110)</td>
<td>2.72 (2.22–3.33)</td>
</tr>
</tbody>
</table>

**Conclusions.** Compared with singletons, twins delivered before 37 weeks of gestation contributed significantly higher rates of sepsis, respiratory distress syndrome (RDS), intraventricular haemorrhage (IVH) and necrotizing enterocolitis (NEC).

178P NO RISK OF COAGULOPATHY AFTER SINGLE INTRAUTERINE DEATH IN TWIN PREGNANCY

**Purpose.**
The aim of our study was to compare the frequency of the consumption coagulopathy in monochorionic (MC) and dichorionic (DC) pregnancies with single intrauterine death (SIUD).

**Material and Methods.**
During a 10-year period (1989–1998) we identified 26 out of 538 twin pregnancies involving SIUD. Monochorionic c placenta was found in 16 (61.5%) cases. The coagulation tests performed 2-3 times per week after SIUD diagnosis included: platelet count (PLT), fibrinogen concentration in plasma (FBG), prothrombin time (PT), thrombin time (TT) and kaolin cephalin time (KCT). The anticoagulants used were warfarin and heparin. The exclusion criteria were SIUD twins with a gestation age of less than 24 weeks or a birth weight of less than 500g.

**Results.**

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</table>

**Conclusions.** Compared with singles, twins delivered before 37 weeks of gestation contributed significantly higher rates of sepsis, respiratory distress syndrome (RDS), intraventricular haemorrhage (IVH) and necrotizing enterocolitis (NEC).
Aim. To evaluate fetal well-being in twin pregnancies using color Doppler and pulsed Doppler velocimetry of ductus venosus, inferior vena cava, pulmonary vein, caval sinus, umbilical vein, as well as umbilical artery, middle cerebral artery, ductus arteriosus and AV valves.

Methods. All twin pregnancies hospitalized at two Polish reference hospitals between August 2000 and May 2001 were included in the study. Color Doppler and pulsed Doppler velocimetry studies were performed in all fetuses. The standard flow parameters were calculated for each blood vessel tested. Antepartum conclusions were confronted with perinatal results.

Results and Conclusions. Fetal venous Doppler had a high sensitivity for detecting fetuses at risk for perinatal complications in the tested cohort. Its accuracy is often questioned but methodology can reliably be applied by experienced ultrasonographists. Venous Doppler studies permit a more accurate assessment of fetal oxygenation and appropriate decisions can be made regarding perinatal management.

183F PROJECTIONS OF POPULATION-BASED TRIPLET BIRTH RATIOS THROUGHOUT THE NEXT DECADE -- IS THE EPIDEMIC UNCONTROLLABLE?

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Triplets pregnancies are high risk for both the mother and the fetus. Their main complication is preterm delivery of a low or very low birthweight neonate who always requires prolonged stays at the NICU. Long term consequences are even more dramatic and include a three times higher risk of cerebral palsy than in singleton pregnancies. In the past 20 years, the triplet birth ratio has increased dramatically in almost all developed countries. This phenomenon is thought to be a consequence of better access to infertility treatment (both in vitro fertilization and ovulation induction) which carries an inherent risk of multiple pregnancy. Population-based TBRs from various countries have been analyzed and a projection made throughout the next decade. Results are startling — if TBR increases were to continue at the rate they have until now, triplets would comprise a third of all live births in some countries. The consequences of this potentially uncontrollable rise in triplet births for both mothers and parents are difficult to envision. Current infertility treatment practices need revision in order to control this potentially devastating epidemic.

184P EVALUATION OF VARIOUS FETAL GROWTH CURVES FOR THE ASSESSMENT OF IUGR IN TWINS.

Jarosław J. Oleszczuk, Agnieszka K. Oleszczuk, Bogumił P. Siekierski, Bozena Leszczyńska-Gorzelał, Jan Wilczynski, Louis G. Keith

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It is widely accepted that the pattern of fetal growth for twins is the same as for singleton up to 30 weeks' gestation. However, intrauterine growth of twins recedes after this yielding a hypotrophic fetus. Recent evidence suggests that growth references for twins should be the same as for singletons in the middle gestation. The present study aimed at developing and comparing, for the first time, gestational growth curves for twins using ultrasonically estimated fetal weights of all twin pregnancies with no detected congenital anomalies delivered between 1987 and 2000 in two reference hospitals in Poland. Fetal growth was then prospectively evaluated in twin pregnancies hospitalized between 2000 and 2001. Assessment was achieved using 3 growth curves — the constructed reference curve for Polish twins, the standard singleton reference curve and the reference curve for twins in the United States. Antepartum conclusions were confronted with perinatal results.

Results. The constructed fetal growth reference curve for twins provides a new, population-specific tool of growth assessment in twin pregnancies. All three curves used gave high positive predictive values for the outcome measures tested.
This study was undertaken to determine the genetic inheritance of primary osteoarthritis of the hip by comparing coincidence of disease in identical and fraternal twin pairs. 6,419 male veteran twins born between 1917 and 1927 were identified from the NAS-NRC Twin Registry, contacted by telephone, and asked whether they had a total hip replacement for arthritis rather than fracture. Twin pairs in which one twin reported a total hip replacement were contacted to complete a written questionnaire and to give permission for the recovery of medical information and appropriate x-rays. Cotwins not having a total hip replacement were invited to have a pelvic x-ray. X-rays were read separately and conjointly by an orthopedist and musculo-skeletal radiologist without knowledge of zygosity or cotwin. Data were analyzed using a 2-stage MX model for the telephone screening and x-ray data. 2,361 twin pairs provided telephone data in the survey, and x-ray diagnosis data was available for 61 probands identified by telephone survey. In the best fitting model, additive genetics accounted for 53% in the liability for self-reported hip replacement and 46% with the probability of x-ray diagnosis. Genetic influences accounted for 47% of the variance in liability for x-ray determined primary osteoarthritis (95% CI 18–86%) with unique environment accounting for the remaining 47%. Additive genetics accounted for 61% of the variance in liability for x-ray determined primary osteoarthritis (95% CI 18–86%) with unique environment accounting for the remaining 39%. Genetic effects had a significant influence on the development of primary osteoarthritis of the hip in this group of male veteran twins aged 70–80 years. Further work is indicated to isolate the gene responsible.
ID was associated with both birth defects and restricted intrauterine growth, whereas CP in the absence of ID was associated with neither. Indeed twins with CP tended to be better grown than normal surviving twins.

### 194P ERRORS IN BIRTH REGISTRATION AND CODING OF MULTIPLE BIRTHS IN NATIONAL STATISTICS

**Peter O.D. Pharoah**  
Correspondence address: Department of Public Health, University of Liverpool, Liverpool L69 3GB

**Aim.** To validate the coding and registration of gender and number of births in multiple pregnancies in national statistics.

**Methods.** Examination of birth, fetal and infant death registrations of all multiple maternities in England and Wales 1993–8.

**Results.** There were 51,792 twin, 1627 triplet and 51 higher order maternities. Of the 1926 fetal deaths among multiple maternities, 58 were registered as ‘indeterminate’ sex but were coded ‘male’ in 56 and ‘female’ in 2 instances. A fetus papyraceous was the certified cause of death in 55 instances; 19 were registered ‘male’, 19 ‘female’ but only 17 were registered as ‘indeterminate’ sex. In 13 maternities only twins were registered but mention was made on the death certificate that 9 were from triplet and 4 from quadruplet pregnancies.  

**Conclusion.** It cannot be assumed that multiple births of different registered sex are always from dizygotic conceptions. Because surviving infants from monozygotic are at greatly increased risk of death and serious morbidity compared with dizygotic conceptions, incorrect assignment and coding of sex and of the number of fetauses has important implications for parental counselling.

### 195F NEONATAL MORTALITY IN LIKE (LS) AND UNLIKE (US) SEX TWINS AND CEREBRAL PALSY (CP) IN THE CO-TWIN SURVIVOR OF AN INFANT DEATH

**Peter O.D. Pharoah**  
Correspondence address: Department of Public Health, University of Liverpool, Liverpool L69 3GB

**Aim.** To determine the risk of CP in a twin whose co-twin died in infancy.

**Methods.** Analysis of birth and death registrations for LS and US twins for England & Wales 1993–5 where both were live born. A questionnaire was sent to the general practitioner of all surviving twins to determine if the child had any disability.

**Results.** The neonatal mortality was 25.4 in LS and 18.0 per 1000 live births in US twins (mortality rate difference 7.4; 95% CI 4.7 to 10.1; \( p < 0.001 \)). This difference is attributable to LS twins being of lower birthweight. Among survivors of birthweight < 1000g, there was no significant difference in CP rates in LS and US twins (213 and 220 per 1000 respectively). In survivors of birthweight 1000–1999g the CP prevalence in LS twins was 162 and in US twins was 21 per 1000. The difference was highly significant; \( p = 0.001 \).

**Conclusion.** There are two components to the aetiology of CP in twins who are both live born. Immaturity per se predisposes to cerebral impairment. In addition, LS twins may sustain cerebral impairment that is in excess of that due to immaturity.

### 196P SUDDEN INFANT DEATH SYNDROME (SIDS) IN TWINS

**Peter O.D Pharoah, D Anand, Mary Jane Platt**  
Department of Public Health, University of Liverpool, Liverpool L69 3GB

**Aims.** To compare the incidence of SIDS in like sex (LS) and unlike sex (US) twins.

**Methods.** All twin births in England & Wales 1993–8 comprise the denominator cohort. The death certificates of those who died were provided by the Office for National Statistics. All SIDS by birthweight group, age at death and whether they were LS or US comprised the numerator.

**Results.** There were 68,124 LS livebirths with 78 SIDS, a SIDS mortality rate of 1.14 per 1000. Among 33,734 US livebirths there were 42 SIDS, a SIDS mortality of 1.25 per 1000. The LS–US difference in SIDS morbidity was not significant. SIDS from LS twins were of significantly lower birthweight than those of US twins. There was no significant difference in the age at death.

**Conclusions.** Zygosity does not appear to be of importance in twin SIDS deaths. The difference in birthweight distribution is probably because LS twins are of lower birthweight than US twins.

### 197P EPIDEMIOLOGY OF THE VANISHING TWIN

**Peter O.D Pharoah, D Anand, Mary Jane Platt, Lesley Briscoe**  
Correspondence address: Department of Public Health, University of Liverpool, Liverpool L69 3GB

**Aims.** To determine the prevalence of a multiple pregnancy at first ultrasound and in pregnancy and the outcome at time of delivery.

**Methods.** A cohort of all pregnancies with 2 or more sacs seen at first ultrasound in pregnancy (usually at 10–12 weeks gestation) at the Liverpool Women’s Hospital in 1999/2001 comprised the study sample and were followed through to delivery.

**Results.** There was a total 10,000 maternities of which 258 (26 per 1000 maternities showed 2 sacs and 10 showed 3 sacs (1.0 per 1000 maternities) at the first ultrasound examination. Of the 258 twin sacs, in 18 (7.0%) both aborted and in 70 (27.1%) one vanished so that at delivery there were 170 twin pairs (17.0 per 1000 maternities) and 70 singletons (7.0 per 1000 maternities). Of the 10 triplet sacs, in 2 all fetuses aborted and in 2 others, 1 fetus vanished and twins were delivered. Six delivered triplets.

**Conclusions.** If early loss of one fetus in a multiple pregnancy has adverse consequences such as cerebral impairment leading to cerebral palsy or learning disability, the high frequency of a vanishing fetus in a multiple pregnancy may be responsible for a considerable proportion of cerebrally impaired children.


**Peter O.D. Pharoah, Mary Jane Platt, Amelia Marshall**  
Correspondence address: Department of Public Health, University of Liverpool, Liverpool L69 3GB

**Aim.** To examine trends in the prevalence of multiple pregnancy by zygosity and to estimate the contribution assisted reproduction to monozygotic twinning.

**Methods.** National data on multiple births, 1974–99 were used and subdivided into 4 periods: 1974–80 (pre-assisted reproduction); 1982–88; 1989–91 (pre-redifinition of stillbirth) and 1993–99 (post-redifinition of stillbirth). Weinberg’s rule was applied to twin data to estimate the proportions that were mono- and dizygous. The assumption is made that the increase in both MZ and DZ twins is attributable to assisted reproduction.

**Results.** Compared with the period before assisted reproduction, the most recent period shows an increase in twin maternities of 3.81 per 1000 comprised of 3.22(95% CI 3.10–3.33; \( p < 0.0001 \)) DZ and 0.60(95% CI 0.51–0.68; \( p < 0.0001 \)) MZ twins per 1000 maternities. It is estimated that 15.7% of assisted reproduction maternities are associated with MZ division.

**Conclusion.** As MZ compared to DZ conceptions are at greatly increased risk of fetal and infant death, the effects of assisted reproduction need consideration when auditing hospital fetal and perinatal mortality rates.

### 199P VERBAL FLUENCY IN TWINS WITH SCHIZOPHRENIA: AN MRI STUDY

**Marco Picchioni, Vivienne Curtis, Cindy Fu, Xavier Chitnis, John Suckling, Robin Murray, Philip McGuire**  
Correspondence address: Division of Psychological Medicine, Institute of Psychiatry, London, UK

Abnormal prefrontal and temporal lobe activation during word generation has been widely reported in schizophrenia. We investigated genetic and non-genetic influences on these abnormalities by studying MZ twin pairs with functional MRI. Twins discordant and concordant for schizophrenia and healthy twins were compared using a paced verbal fluency paradigm. Word generation cued by letters was contrasted with repetition of the word ‘Rest’ in an AB design. Images were acquired at 1.5T using a compressed acquisition sequence to allow overt response in the absence of scanner noise. Activation maps in Talairach space were generated using established nonparametric methods. Within discordant twins, schizophrenia was associated with attenuated activation in the right inferior temporal cortex and the medial prefrontal cortex. Compared to control twins, healthy discordant twins showed reduced activation in the left inferior frontal and temporal cortex and the cingulate gyrus. These initial results suggest that the expression of schizophrenia is associated with abnormal fronto-temporal activation during word generation, but that this may also be abnormal in those at high genetic risk of the disorder.
A nationally representative sample of Finnish twins (born 1975–1979) with 702 monozygotic (MZ), 724 same-sex dizygotic (SSDZ), and 762 opposite-sex dizygotic (OSDZ) pairs. Lifetime major depression (MD), alcohol abuse, and alcohol dependence (AD) were assessed by structured interview for both parents and probands. MZ twin brothers with continuous oxaluria. Probands, NN and AN, have mild signs of pulmonary disorder. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35. High urinary oxalate excretion was found to be from early probands’ childhood. NN has all set of markers of respiratory oxalosus (G. Pospekho et al., 1997). AN has mild signs of pulmonary disorder. Both twins have some signs of progressive oxalate urolithiasis and nephrocalcinosis but NN has more severe form of renal disease. Now NN has better kidney function compared to AN. He has type II diabetes. He has more severe form of renal disease. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35. High urinary oxalate excretion was found to be from early probands’ childhood. NN has all set of markers of respiratory oxalosus (G. Pospekho et al., 1997). AN has mild signs of pulmonary disorder. Both twins have some signs of progressive oxalate urolithiasis and nephrocalcinosis but NN has more severe form of renal disease. Now NN has better kidney function compared to AN. He has type II diabetes. He has more severe form of renal disease. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35. Now NN weight is 53kg, his length is 171cm, AN weight is 58kg, his length is 170cm. Their HLA haplotypes are A2-10B13-35.
Pair resemblance was analyzed using structural equation models. Individuals with MD were at significantly increased risk for AD and for a combined diagnosis of alcohol abuse and/or dependence (AAD). History of MD in a twin significantly increased risk for cotwin AD and AAD among identical male pairs and for AAD in identical female pairs, but not among male or female fraternal pairs. Results of structural modeling indicate that comorbidity occurs because the genetic and specific environmental sources of liability to MD overlap with those underlying AD and AAD. This overlap was significant only within sex, not across sexes. In this population-based twin sample, the familial transmission of major depression and alcohol dependence was largely disorder-specific. Comorbidity appears to be due to sex-specific genetic and environmental risk factors. The factors underlying depression in women do not appear to arise from the same factors underlying alcoholism in men.

**206P** INFANT ZYGOSITY CAN BE ASSIGNED BY PARENTAL REPORT QUESTIONNAIRE DATA

Thomas S. Price, Bernard Freeman, Ian Craig, Stephen A. Petrell, Lorna Ebersole, Robert Pomin

Correspondence address: Social Genetic and Developmental Psychiatry Research Centre, Institute of Psychiatry, London, SE5 9AF, UK.

A parental report questionnaire (http://statgen.iop.kcl.ac.uk/twinzyg.html) posted to a population sample of 18-month-old twins correctly assigned zygosity in 95% of cases when validated against zygosity determined by identity of polymeric DNA markers. The questionnaire was as accurate when readministered at 3 years of age, with 96% of children being assigned the same zygosity on both occasions. The results validate the use of parental report questionnaire data to determine zygosity in infancy. An online version of the questionnaire is available. Twin Research (2000), 3(3), 129–133.

**207S GENE-BY ENVIRONMENT INTERACTION IN TWIN AND SIB-PAIR ANALYSIS.**

Shawn Purrell & Pak Sham

Correspondence address: GDBI Institute of Psychiatry, Denmark Hill, London, UK.

The trait-modiating effects of specific environmental factors can be incorporated into twin and sib-pair analysis, modeled as simple covariates. In sib-pair quantitative trait loci (QTL) analysis, this may increase power to map QTL. Gene-by-environment interaction, on the other hand, represents what gene expression will differ when exposed to different levels of an environmental factor. For example, when a child is exposed to smoking by a parent, the child may experience environmental effects that are different when exposed to smoking as compared to not exposed to smoking. In this case, the QTL may be expressed differently in the two cases. The interaction between two genetic and two environmental factors can be tested by age or by weight at time of examination. The estimated genetic effect (or vice versa) can be incorporated into twin and sib-pair analysis. Instead of representing the additive genetic variance component, for example, as a single population average, for example, $a^2$, this variance component is expressed as a function of an environmental moderator variable, $M$, which might be different for each twin. The expected additive genetic variance component is then dependent on the moderator, i.e. $(a + \beta M)^2$, assuming linear gene-by-environment interaction. That is, the genetic effect is partitioned into a mean part, $a$, and a moderator-linked part, $\beta M$. If the interaction is not of interest, then the significance of the gene-by-environment interaction can be formally tested by fixing $\beta$ to 0 in a nested model and comparing model fit. In a completely analogous manner, gene-by-environment interaction can be incorporated in QTL linkage and association models. We explore the efficacy of such models and estimate the proportion of variance due to gene-by-environment interactions, with examples from real data.

**208F FETAL GROWTH AND SYSTOLIC BLOOD PRESSURE IN SWEDISH MALE TWINS IN YOUNG ADULTHOOD.**

Finn Rasmussen, Malin Johansson, Bianca De Stavola, David A. Leon

Correspondence address: Division of Epidemiology, Institute of Environmental Medicine, Karolinska Institute, SE-171 77 Stockholm, Sweden.

The aim of this study was to test the fetal origins hypothesis of an association between fetal growth and systolic blood pressure (SBP) in adulthood. The authors studied 921 male twin pairs born in Sweden between 1973 and 1979. The outcomes assessed were SBP and the interaction between systolic blood pressure and gestational age at age 17–19 years. The results were that SBP and the interaction between systolic blood pressure and gestational age were significant at age 17–19 years. The results were adjusted for body mass index (BMI), age, height, and weight at birth.

**209P THE MBF TELEPHONE SERVICE REVEALS THE NEED FOR EDUCATING PROFESSIONALS**

Barbara J. Read, Carole A. Sweetland and Elizabeth M. Bryan

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The Multiple Births Foundation’s (MBF) Telephone Advisory Service (TAS) was established in 1994. As well as an information and advisory service for professionals, parents and adult twins, it provides a follow up to the specialist MBF paediatric Twins Clinics; consultations with other MBF professional staff; bereavement (and other) counselling. Relevant literature is available for parents and professionals. During a two-year period the MBF TAS received more than 3000 calls. This study focused on 915 calls referred to one author (BR). These 915 calls came from 420 people and involved 1022 enquiries of which 69% were identified as common problems such as sleep, behaviour, feeding and language. Appropriately trained professionals should have been able to deal with the majority of these calls in the community. 144 randomly selected clients in this group were sent questionnaires with a 59% (85/144) response rate. Of those who had sought help from genetic professionals within the community. Only four people felt that they had received helpful advice before contacting the MBF while 83% of those who had sought help reported it to be unhelpful and/or not applicable to families with multiples. We conclude that there remains a need for education and training on the needs of families with multiple birth children for professionals working in the community.

**210S BACK-NECK PAIN AND SYMPTOMS OF ANXIETY AND DEPRESSION: A POPULATION-BASED TWIN STUDY.**

Ted Reichborn-Kjennerud, Espen Røysamb, Camilla Stoltenberg, Jennifer R. Harris

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Pain in the back and the neck are associated with symptoms of anxiety and depression, but the nature of this relationship is not known. Measures of back-neck pain and symptoms of anxiety and depression were part of a self-report questionnaire sent to 3996 twin pairs. Structural equation modeling was applied to determine the extent to which back-neck pain and anxiety and depression share genetic and environmental liability factors. The phenotypic correlation between back-neck pain and anxiety and depression was 0.31. Univariate analyses revealed that individual differences in back-neck pain and symptoms of anxiety and depression were explained by genetic and non-shared environmental factors. An additive genetic and non-shared environmental model best explained variance in back-neck pain, but a model with shared and non-shared environmental factors could not be rejected. Bivariate analyses, however, showed that a model with genetic and non-shared environmental factors best explained the correlation between back-neck pain and symptoms of anxiety and depression. The correlations between genetic and non-shared environmental influences for the two phenotypes were 0.45 and 0.20 respectively. There was no evidence of sex-specific effects. These results suggest that the association between back-neck pain and symptoms of anxiety and depression is primarily due to common genetic factors. Non-shared environmental effects also contribute significantly to the correlation, but are mainly specific to each phenotype.

**211S PERINATAL ASPECTS OF THE MULTIPLE PREGNANCY EPIDEMIC.**

J Ruiz, R Aurell, JM Mallafré, JM Carrera

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Material and Methods. The spontaneous and induced (ovulation induction, inseminations or IVF) multiple pregnancies in our hospital between 1st January 1990 and 31st December 2000 are reviewed and the perinatal results such as premature labour, intrauterine growth retardation (IUGR), congenital abnormalities, antepartum haemorrhage (APH), postpartum haemorrhage (PPH), gestational diabetes, caesarean section rates, uterine atonies and perimortal mortality are studied.
Results. Of the 17706 deliveries in our hospital in the period described above 538 (3.03%) were multiple pregnancies, 481 (89.4%) were twins, 56 (10.4%) triplets and 1 (0.18%) quadruplets. Approximately, 28% of the multiple pregnancies were IVF pregnancies and 23% were result of ovulation induction cycles or artificial inseminations. The age range of our patients is between 30 and 34 years. Premature labour occurred in the 47% of twin pregnancies and in the 100% of triplets. In the last four years we had no triplet pregnancies ending before 28 weeks and the 80% of them went over 32 weeks. The 18% of twin pregnancies and the 24% of triplets had IUGR. Congenital abnormalities appeared in 2.8% of twins and 9.4% of triplets.

Conclusion. With the increase in recent years of the multiple pregnancy rates mainly due to the assisted reproduction techniques, the perinatal outcomes are improving, thus more and more women have a high risk for multiple birth and related complications, such as prematurity and perinatal mortality and morbidity. On the other hand, the reproductive medicine specialists are working towards decreasing the multiple pregnancy rates and not to use fetal reduction to solve the problem.

212P

TWINS' TRUST IN MOTHERS IN CHILDHOOD AND PUBERTY: A HUMAN BEHAVIOR GENETICS PERSPECTIVE

Atsushi Sakai (Waseda University), Masumi Sugawara (National Institute of Mental Health, Japan), Kazumi Maeshiro (Shirayuri College), Sachiko Amou (Aoyama Institute of Education)

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The purpose of this study was to examine factors that effect on children's trust in mothers. From the point of view of human behavior genetics, we studied the influence of genetic and environmental factors on children's trust in mothers. As part of ongoing longitudinal study in a Japanese twin sample (MZ and DZ, 0-15 years old, total 2,135 pairs), 381 twin pairs (215 MZ pairs, 166 DZ pairs) in childhood and puberty completed questionnaire about trust in mothers and their mothers completed questionnaire about trust in their children and Parenting Bonding Inventory (PBI: Parker et al.,1997). Main results were as follows: First, using genetic ACE (Additive genetic, Common environment, and non-shared Environment) model, the effect of genetic factors on children's trust in mothers increased as children grew up, on the other hands, the effect of common environment was decrease. Second, regression analyses showed that the effect of mother's trust in their children's trust in their mothers attained significance in both childhood and puberty, but mother's care factor on PBI was only significant with children's trust in their mothers in childhood.

213P

TWIN PARENTING PATTERNS

A C Sandbank, B M Sandbank

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Twins differ from the rest of the population in their dyadic relationship with the rest of their family. This paper looks at the relationship of twins with their own children to determine whether twins as a group share similar parental attitudes. Also examined are the effect of zygosity, birth order, birthweight and dominance on twin parent/child relationships based on questionnaires which look first at childhood relationships, then adolescence. Correlation between similar parental attitudes. Also examined are the effect of zygosity, birth order, birthweight and dominance on twin parent/child relationships based on questionnaires which look first at childhood relationships, then adolescence. Correlation between similar parental attitudes, birthweight and dominance on twin parent/child relationships based on questionnaires which look first at childhood relationships, then adolescence.

214S

THE CONTRIBUTION OF ASSISTED REPRODUCTIVE TECHNOLOGY TO THE RISE IN MULTIPLE BIRTHS

Laura A. Schieve

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Each year, infertility affects millions of couples who desire children. Couples have increasingly turned assisted reproductive technology (ART) procedures to help them conceive. First ART birth was in 1978. One public health concern is the impact ART is having on multiple birth rates. To optimize the chance for pregnancy, ART often involves the transfer of more than one embryo into a woman's uterus. In the U.S., > 2 embryos transferred in 95% of ART procedures; consequently, each year 35–39% of ART pregnancies and births involve multiple infants. We used the U.S. ART registry to perform a number of studies related to the multiple birth risk. In sum, the findings indicate that 1) in 1997, 0.6% of the total births, 9% of the twin births and > 40% of the triplet and higher order births in the U.S. were conceived with ART, 2) the risk for multiple birth is particularly high among younger women (< 35 years) when compared to older women even when number of embryos transferred is held constant; 3) younger women who use ART also have a higher likelihood of success and reach peak livebirth rates with fewer embryos transferred than do older women; 4) women who use eggs donated from younger women have high livebirth rates and a high risk for multiple birth regardless of their age; 5) certain procedures used in conjunction with ART may pose an increased risk for monochorionic/twinning in addition to dizygotic twinning. These findings will be compared to those from countries such as Denmark and the U.K. that have regulations limiting the number of embryos transferred.

215P

THE RELATIVE IMPORTANCE OF GENETIC AND ENVIRONMENTAL FACTORS ON VARIATION IN FAT PERCENT -- THE IMPACT OF FITNESS

Karoline Schousboe, Bircan Erbas, John L. Hopper, Kirsten O. Kyvik, Jan E. Henriksen, Thorkild L Sorensen

Correspondence address: The Danish Twin Registry, SDU- Odense University, Denmark

The aims of this study are: 1) to elucidate the relative importance of genetic and environmental factors on variation in body fat(%) assessed by body mass index (BMI) and skinfolds (SF), respectively; and 2) to assess the effect of smoking and fitness on the total and the additive genetic variation of body fat(%). 152 female (79 MZ, 73 DZ) and 103 male (58 MZ, 45 DZ) healthy twin pairs of 18–57 years underwent anthropometric measuring and a fitness test. Two outcome measures of body fat(%) were calculated: fat(%)ass, assessed by BMI and age, and fat(%)ss, assessed by SF, weight, height, and age. Multivariate analysis methods were applied to these measures of fat(%) adjusting for smoking, and fitness.

Results. Adjusting for age, the heritability of body fat(%) was about 60% for females and 74% for males. Adjusting for smoking, did not alter the total variation of body fat(%). Adjusting for fitness, reduced the total variation in both fat(%)ass, and fat(%)ss, by more than one third in both females and males. More than two thirds of the reduction of the total variation in body fat(%) was due to a reduction in the additive genetic variation. However, the fraction of the total variation due to the genetic variation (the heritability) changed very little, in both genders. In summary, smoking does not seem to have much influence on total variation of body fat(%), whereas the variation in body fat(%) attributable to fitness exhibits a strong additive genetic effect. This association however, does not change the overall picture of a high heritability of body fat(%) .

216P

IVF/ART TWIN PREGNANCIES CARRIES HIGHER RISK FOR CESAREAN SECTION

David Segal, Zahi Ben-Aroyo, Michael Friger, Jury Bar-David, Miriam Katz and Moshe Mazor.

Correspondence address: Dept. of Obstetrics & Gynaecology, Soka University Medical Center, Beer-Sheva, ISRAEL

Objective. To evaluate whether IVF/ART induced twins pregnancies are at greater risk of peripartum complications than spontaneous twins pregnancies.

Study Design. The study population consists of twin pregnancies following ovulation induction and IVF treatment (n = 727). The control group consisted of 143 parturients with spontaneous twins pregnancies. Demographic and obstetrical parameters were abstracted retrospectively from the computerized patients’ records in our institution during period of 10 years (1989–1996).

Results. Cesarean section was significantly higher in the study group than in the control group (56.6% vs. 29.2%, p < 0.001). Non-progressive labor during the first stage was higher in the study group than in the control group (5.6% vs. 1.2%, p < 0.0003). No statistical significant was found between the two groups. Cesarean section was more frequent in primiparas. No other peripartum complications were noted.

Conclusions. IVF/ART induced twins pregnancies appears to be associated with an increased risk for cesarean section, mainly due to non progressive labor at first stage. No other peripartum complications were noted.
217P NULLIPAROUS PARTURIENTS WITH TWINS PREGNANCIES ARE EXPOSED TO INCREASED RATES OF CESAREAN SECTIONS

David Segal, Zahi Ben-Arya, Michael Friger, Jary Bar-David, Miriam Katz and Moshe Mazor

Correspondence address: Dept. of Obstetrics & Gynaecology, Soroka University Medical Center, Beer-Sheva, ISRAEL

Objective. To determine whether nulliparous women with twin pregnancies are at greater risk of peripartum complications than non-nulliparous women.

Study Design. The study population consists of nulliparous women (n = 217) whose labor was induced by amniotomy. The comparison group were multiparous women (n = 635) who were induced by the same way. Demographic and obstetrical parameters were abstracted retrospectively from the medical record of the nulliparous patients.

Results. Cesarean section rate was significantly higher in the nulliparous group than in the control group (43.8% vs. 30.5%, p < 0.001). Non-progressive labor during the first stage was higher in the nulliparous group than in the control group (5.1% vs. 0.9%, p < 0.001) as well as non-progressive labor during the second stage (4.6% vs. 0.6%, p < 0.001). Abnormal fetal heart rate patterns were detected during labor in 24 patients (11.1% of nulliparous group, as compared to 34 cases (5.2%) in the control group (p < 0.003). No statistical significant was found between the two groups as referred to abruptio placentae, prolapse of cord, post-partum hemorrhage and vacuum extraction.

Conclusions. Nulliparous twin pregnancies appear to be associated with an increased risk of cesarean section, mainly due to non progressive labor 1st and 2nd stage and suspicious fetal heart rate patterns.

218S SOCIAL RELATIONSHIPS: TWINS REARED TOGETHER, TWINS REARED APART AND TWINS WITHOUT PARTNERS

Nancy L. Segal PhD and Sara Arad

Correspondence address: California State University, Psychology Dept., 800 N. State College Blvd. Fullerton, CA 92834 USA, nsegal@fullerton.edu

The nature and bases of social relationships between twins have fascinated the scientific community for many years. Twin relationships are also meaningful in what they reveal about human social behavior in general. Past research reveals greater closeness between MZ than DZ twin pairs, more severe bereavement responses among surviving MZ than DZ co-twins. This work serves as a backdrop against which to assess findings from the first systematic survey of social relations between twins meeting for the first time as adults. Ratings of immediate and present social closeness and familiarity between reunited twins were explored via a comprehensive Twin Relationship Survey. Responses were available from 89 monozygotic (MZA) and 65 dizygotic (DZA) individual twins and triplets who participated in the Minnesota Study of Twins Reared Apart. Repeated measures analysis of variance indicated a significant main effect of zygosity with MZA twins providing higher mean ratings than DZ twins. Subsequent analyses revealed that a larger proportion of MZA than DZA twins endorsed the highest choice levels of relatedness (e.g., "feeling closer" or "more familiar" - "best friends"). Furthermore, twins' current closeness and familiarity ratings for their newly found co-twins exceeded those nonbiological siblings with whom they were raised. These findings are consistent with a variety of theoretical perspectives predicting increased cooperation and affiliation among close genetic relatives, compared to distant relatives and non-relatives.

219S WHEN TWINS LOSE TWINS: IMPLICATIONS FOR THEORY AND PRACTICE

Nancy L. Segal, Ph.D., Shelley A. Blozis, Ph.D., Lauren Sussman, M.S.

Correspondence address: California State University, Psychology Dept., 800 N. State College Blvd. Fullerton, CA 92834 USA, nsegal@fullerton.edu

Factors underlying individual differences in bereavement response have attracted considerable interest. Not all research programs have, however, compared psychological correlates of bereavement across diverse groups of twins. The current study, the first to exceed those findings with reference to a meaningful theoretical framework. Responses from bereaved MZ and DZ twins offer a fruitful domain for testing kinship-genetic predictions generated by evolutionary psychological perspectives. Twin loss studies conducted at CSU Fullerton generally revealed more intense grief intensity (at the time of loss, and currently) and higher scales scores on the Grief Experience Inventory (GEI) (at the time of loss) among surviving MZ than DZ twins. These findings, which have been supported by other investigators, mirror findings from a second stage study. New analyses, including twins' current responses to the GEI, will be reported. These findings suggest new ways of understanding differential bereavement response within families that may assist counsellors and therapists in devising appropriate intervention strategies. This information should also benefit attorneys and other legal experts representing families in cases of twin's wrongful death and injury.

220S VIRTUAL TWINS AND WHAT THEY TELL US ABOUT HUMAN BEHAVIOR

Nancy L. Segal, Ph.D., Samantha Ettchells, Nathaniel Houston, Claire V. Bertram

Correspondence address: California State University, Psychology Dept., 800 N. State College Blvd. Fullerton, CA 92834 USA, nsegal@fullerton.edu

Virtual twins (VTs) are unrelated siblings of the same age who are adopted into the same family at nearly the same time. These unique siblings pairs replay essential features of twinship, enabling sensitive tests of the contribution of shared environment to influence on behavioral development. This project has been ongoing at California State University, Fullerton since 1983. An early report, based on 21 pairs, indicated an IQ correlation of .17, a verbal IQ correlation of .01 and a performance IQ correlation of .29. New analyses, based on a sample of 90 pairs, yielded an IQ intra-class correlation of .26 (p < .01). This correlation, while statistically significant, falls considerably below correlations of .86, .60 and .50 reported for monozygotic (MZ) twins, dizygotic (DZ) twins and full siblings, respectively. The VT IQ subtest profile correlation of .08 also falls below corresponding MZ (.45) and DZ (.24) twin correlations. These results are consistent with explanatory models of intelligence that include genetic factors, demonstrating that shared environments have modest influence on intellectual development. Subsequent analyses of VT similarity in personality traits and behavioral problems are currently underway. Implications of the findings for theories of intellectual development and for practices regarding rearing and education will be discussed. Future plans for this ongoing study include a broad range of genetically and environmentally informative relationships.

221S USING TWINNING TO MONITOR HUMAN FERTILITY

Roger V Short

Correspondence address: Department of Obstetrics and Gynaecology, University of Melbourne, 112 Grattan Street, Carlton, Victoria. 3053, Australia

Is human fertility declining? Although there has been much concern about a possible decline in the sperm count, animal evidence suggests that the ovulation rate would be the first parameter to be adversely affected. We, for example, have already seen the end of the last ice ages and a profound increase in human fertility due to the warming of the environment. The ultimate measure of human fertility is fecundability - the probability of conceiving in a given menstrual cycle. Such information is extremely difficult, costly and time consuming to obtain. It is possible to get a good indication of the ovulation rate by studying the incidence of dizygotic twinning, corrected for race and age, and excluding the use of any ovulation inducing drugs or assisted reproductive technologies. Rates are difficult to calculate unless you know the size of the base population, so a simple alternative is to study the ratio of monozygotic (MZ) to dizygotic (DZ) twin births over time. MZ twinning is a near-random embryological event with a similar incidence rate in all human populations, so the MZ:DZ ratio will provide a good indirect measure of the DJZ twinning rate. The number of DZ twins born can be estimated quite accurately by doubling the number of opposite sexed twins: this can then be subtracted from the total number of twins born to give the number of MZ twins. It would be a very simple matter for any country, or large city, to monitor the corrected MZ:DZ ratios over time, and this would provide the best possible early warning system for any significant decline in human fertility.
The prevalence of twins was 3.25 twin pairs per thousand people in the area surveyed. The twining rate at the hospital was 9.78 multiple births per thousand live births. A discrepancy of 36 multiple births between the hospital labour room records and those registered at the DS were noted. The response for the postal invitation for recruitment was 59% and the response for the personal invitation was 71%.

### 226F THE RELATIVE IMPORTANCE OF GENETIC AND ENVIRONMENTAL FACTORS TO DEATH PRIOR TO AGE 65 YEARS

Axel Skythte, Niels V Holm, James W Vaupel, Knud Juul, Kaare Christensen

Correspondence address: The Danish Twin Registry, University of Southern Denmark.

Longevity has been shown to be influenced moderately by genetic factors with a heritability of 0.20-0.25. However, genetic factors may influence the liability to death differently across different age ranges. For example, in a study of Swedish twins mortality from cardiovascular diseases has been shown to be influenced more by genetic factors at younger ages than at old ages. In a Danish adoption study genetic factors were found to play a greater role for death prior to age 50 years than for death at higher ages. Based on a newly established register of Danish twins born 1931-1952 we conducted a classical twin study of the relative importance of genetic and environmental factors on early death, i.e. death prior to age 70 years old. Included were 821 twin pairs with both members alive on April 1, 1968 and aged 18 or older. The main findings were that the liability to die prior to age 65 for both men and women are influenced equally by genetic and environmental factors. The findings are consistent whether the analyses were done on the total age range of 18-70 years or were restricted to a narrower age range of 37-49 years. The estimates of genetic effect tended to increase in the younger age range. Furthermore cause-specific analyses have shown that for men a strong genetic component in the liability to die from vascular diseases was present, with a heritability of 0.6.

### 224P DISCORDANT ANOMALIES IN MONOZYGOTIC TWINS

Karin Sloots, Renske Rijkeardams, Birgit Arabin

Introduction. Monozygotic (MZ) discordant twin pairs suggest the complex nature of the MZ twinning process.

Methods. We evaluated our data base of monochorionic (MC) twin and dichorionic (DC) triplet pregnancies for discordancy of malformations in MC multiples.

Results. In 1999, we registered 5 pregnancies with MC multiples discordant for abnormalities. All patients had been referred from peripheral hospitals. Case 1: MCDA boys with oligohydramnios/polyhydramnios and hydrops of the supposed "recipient", the hydropic twins died 2 days after a CS. Post mortem investigation showed a mediastinal tumour with infiltrative growth into the left lung diagnosed as a sporadic infantile infiltrative growth into the left lung diagnosed as a sporadic infantile lymphangioendothelioma. Case 2: MZ twin pairs born at different gestational age range. Furthermore cause-specific analyses have shown that for men a strong genetic component in the liability to die from vascular diseases was present, with a heritability of 0.6.

Conclusions. The pathogenesis of discordant MZ phenotype includes: rupture of the zona pellucida, mosaicism, third type twins, postzygotic chromosomal non-dysjunction, skewed X-chromosome inactivation or abnormal vascular events. This study demonstrates that concordant and discordant MZ multiples is obligatory.

### 228F ASSESSING NEED AND DEVELOPING A STRATEGY FOR A NATIONAL VOLUNTARY ORGANISATION TAMBA.

David Stern

Correspondence address: Eliot Vale, Blackheath, London SE3 0UU

This presentation will outline the process used to develop a strategy for the twins and Multiple Births Association (Tamba) and assess the needs of families with twins, triplets or more. From the initial stage of the Tamba's growth and development of Tamba was examined and how the organisation met the needs of families with twins, triplets or more. The review led to the development of a 3 year strategy and plan of action. The presentation will illustrate the historical performance, vision, and values. The achievements and existing services of the organisation were examined. The strategy for the future included activities and priorities, provision of support services and specialist groups, awareness raising, external communication, and fundraising. The operating structure and support systems were given further consideration in order to identify gaps, implications and make recommendations. An action plan was developed with specific targets. Tamba is currently implementing the plan and is regularly monitoring and evaluating progress and the way forward.
229F THE SOCIAL REALITY OF TWINSHIP
Elizabeth A. Stewart
Correspondence address: Department of Sociology, London School of Economics, Houghton Street, London WC2A 2AE, England

Within the twin context, interaction with others particularly stresses and reinforces 'twinship'. Therefore being — and remaining — a twin carries social significance. Social processes external to the twin may emphasize the unitary nature of twinnship; to the extent that this is the case, the negotiation of twinnship by the relevant twins both within wider social groups and between themselves will be coloured by such processes. Statements such as 'I am a twin' or 'Oh, you are twins, are you?' are actually statements about lack of individuality and lack of autonomy. The social analysis of twinnship must address both the culturally variable construction of 'twinship' (what twins 'are' within particular cultures and what norms they are expected to conform to) and the negotiation of twinnship to create a sense of self.
Commitment against obstacles and basic knowledge was vital, but books and journals were a scarcity. This demanded networking with experienced twin researchers. A partnership model for collaboration was used for mutual scientific benefits but not for economically cheaper research in the developing world. Forming a multidisciplinary team to raise awareness on their issues. It will work with professionals, statutory organization to initiate service development.

### 235S / STARTING FROM SCRATCH IN SRI LANKA

Athula Sumathipala

Correspondence address: SEPIC, Institute of Psychiatry, London.

Despite some strengths in size, the registry was unable to provide more invasive ART mechanisms have been proposed as to why MZ twins may be more common. These will be reviewed and will include intracytoplasmic sperm injection (ICSI), extended embryo culture, assisted hatching methods (using acid tyrode and more recently laser techniques.) Also the possible implications of the use of Preimplantation Genetic Diagnosis, which involves the process of embryo biopsy will be discussed.

### 235F / THE KOREAN TWIN REGISTRY


Correspondence address: Dept of Preventive Medicine, Kangwon National University

In 1996, the registry began in Korea with a pilot study that included a random sample of twin pairs for both birth year between ages 17 to 19 for the study of twins. The first target diseases were congenital malformations and asthma. Despite some strengths in size, the registry was unable to provide more invasive ART techniques, specific mechanisms have been proposed as to why MZ twins may be more common. These will be reviewed and will include intracytoplasmic sperm injection (ICSI), extended embryo culture, assisted hatching methods (using acid tyrode and more recently laser techniques.) Also the possible implications of the use of Preimplantation Genetic Diagnosis, which involves the process of embryo biopsy will be discussed.

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### 238P / COMPUTER ASSISTED TELEPHONE INTERVIEWS WITH 26,000+ TWIN: A NEW UPDATE OF THE SWEDISH TWIN REGISTRY

Pia Svedberg, Nancy L. Pedersen, Paul Lichtenstein

Correspondence address: Dept Medical Epidemiology, The Swedish Twin Registry, Karolinska Institutet, Box 2051, SE-171 77 Stockholm, Sweden.

The Swedish Twin Registry comprises in principle all twin births in Sweden since 1886. All living twins in the Swedish Twin Registry born before 1958, are currently contacted for screening of health status. This current update of the registry began in 1996 with a pilot study that included a random sample of twin pairs for both birth year between ages 17 to 19 for the study of twins. The first target diseases were congenital malformations and asthma. Despite some strengths in size, the registry was unable to provide more invasive ART techniques, specific mechanisms have been proposed as to why MZ twins may be more common. These will be reviewed and will include intracytoplasmic sperm injection (ICSI), extended embryo culture, assisted hatching methods (using acid tyrode and more recently laser techniques.) Also the possible implications of the use of Preimplantation Genetic Diagnosis, which involves the process of embryo biopsy will be discussed.

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243P THE EMOTIONAL WELL-BEING OF MOTHERS OF TWINS
Karen J Thorpe
Correspondence address: Dept. Psychology, University of the West of England, Oldbury Court Rd, Fishponds Bristol BS16 2JP

The care of twins presents additional and exceptional stresses compared with those experienced by parents of singletons. This may have a adverse effect on the emotional well-being of mothers of twins. The paper presents two studies which sought to examine the association between child care burden and the emotional status of mothers. These studies were particularly focused on the number and spacing of children within a family and the impact of having twins.

246P THE EFFECT OF LOSING THE TWIN AND LOSING THE PARTNER ON MORTALITY
Cecilia Tomassini, Alessandro Rosina, Francesca Billari, Axel Skytte, Kaare Christensen
Correspondence address: Age Concern Institute of Gerontology, King’s College, London, UK. cecilia.tomassini@kcl.ac.uk

Several studies have explored the impact of marital bereavement on mortality, while increasing emphasis has recently been placed on genetic factors influencing longevity. In this paper, we study the impact of losing the spouse and losing the co-twin for adult twins. We use data from the Danish Twin Register (with data on more than 30,000 Danish twins born between 1870 and 1950) and the Population Register of Denmark.

Firstly, we use survival analysis to study mortality after the death of the co-twin. We then use event history analysis techniques to show that there is a strong impact of the event ‘losing the co-twin’ even after controlling by age, sex and zygosity, and that this effect is significantly higher in the second year of bereavement. The effect is similar for men and women, but it is significantly higher for monzygotic twins. The effect of losing the co-twin on mortality has been explained so far mainly in terms of genetic factors, as it is well known that the survival of twins is correlated by the action of common genes. Our findings suggest that there is not just correlation, but also independence. Our results are consistent with the existence of both a genetic and a twin bereavement effect.
247P SELECTIVE TERMINATION OF ACARDIAC/ACEPHALIC TWIN BY RADIOFREQUENCY ABLATION

Kuojen Tsao, Vickie A. Feldstein, Per L. Sandberg, Roy A. Filly, Craig T. Albanese, Michael R. Harrison

Correspondence address: Department of Radiology, Box 0628, University of California, San Francisco, CA, USA 94143-0628

Acardiac/accephalic twin malformations are a rare anomaly. The normal “pump” twin perfuses the acardiac/accephalic twin resulting in twin reversed arterial perfusion (TRAP). Various techniques have been attempted to obliterate the vascular connections between the donor (“pump”) and acardiac twins. Seven cases in which the blood flow to the acardiac twin was obliterated by radiofrequency ablation (RFA) are reported. Patients were evaluated by means of ultrasound (US) with Doppler. Gestational age at time of intervention ranged between 17 and 24 weeks. Under real-time US guidance, a 14 gauge RFA device was inserted through the umbilical cord into the abdominal wall of the acardiac twin, at the level of the cord insertion. RFA was initiated after adequate placement of the device. RFA was discontinued once cessation of blood flow to the acardiac twin was achieved, as documented by US. All 7 patients and pump fetuses tolerated the procedure without major complications. On post-procedure US, blood flow was obliterated in all acardiac fetuses and donor twins appeared normal. To date, 4 patients have delivered infants without sequelae. Two patients remain pregnant. One patient delivered an infant at 24.4 weeks which subsequently died from complications of prematurity. TRAP sequence is a rare anomaly that compromises the pump twin. Percutaneous RFA with US guidance is a minimally invasive technique that effectively obliterates the blood supply to the acardiac twin in order to protect the normal co-twin.

248P COMPARATIVE RATING MEASURES OF HEALTH AND ENVIRONMENTAL EXPOSURES: HOW WELL DO TWINS AGREE?

Adam M. Turner, Chandra A. Reynolds, Nancy L. Pedersen, and Margaret Gatz

Correspondence address: University of Southern California, Department of Psychology, Los Angeles CA 90089-1001 USA

Epidemiological studies often compare one twin’s self-reported behaviors and exposures to the twin partner in order to test whether the exposure is related to a health outcome experienced differentially by the twin pair. An alternative technique is to use comparative ratings, in which twins are asked if they or their partner had greater exposure. The present study asks: (1) To what extent do twin pairs agree on comparative ratings? (2) How well do ratings agree with objective information about exposures? Using 55 MZ and 71 DZ pairs reared together, percentage agreement was calculated for 12 comparative ratings (including agreement on which member was more exposed, or that both were equally exposed). Pairs agreed on average about half of the time (MZ, 52%; DZ, 48%). Agreement was best for more discrete exposures, such as head injury (72%) and lowest for more subjective or private variables, such as degree to which life is experienced as stressful (30%). Signed rank tests were used to contrast comparative ratings to differences in self-reports, e.g., whether the twin rated as the heavier smoker had previously self-reported more tobacco use. For variables where self-report indices were available, the twin identified by the comparative ratings differed significantly from the twin partner in the direction suggested by the rating. Comparative ratings appear most accurate for smoking and alcohol use, and less consistent for mental health symptoms and self-rated health. This research was supported by NIH grants No. R01-AG08724 and AG10175.

249P BIRTH ORDER AND ADULT SIZE AND BLOOD PRESSURE IN TWINS

Chuluuntuulu Tuya, Geraldine McNeill, Doris M. Campbell

Correspondence address: Faculty of Medicine and Medical Sciences, University of Aberdeen, Aberdeen AB25 2ZD, UK

We have studied the relationship between birth order, adult size and blood pressure (BP) in 60 MZ (22M and 38F) and 70 DZ same sex (30M and 40F) twin pairs aged 33 (range 18–50) years recruited via obstetric records. Gestational age was on average 37 (range 28–44) weeks. The table shows data for first and second born twins:

<table>
<thead>
<tr>
<th>Variable</th>
<th>All N = 130</th>
<th>MZ N = 60</th>
<th>DZ N = 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Wt (kg)</td>
<td>Mean 2.58b</td>
<td>2.38b</td>
<td>2.52a</td>
</tr>
<tr>
<td>SEM</td>
<td>0.05</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>Mean 168.32, 168.36</td>
<td>167.52, 167.65</td>
<td>169.02, 168.97</td>
</tr>
<tr>
<td>SEM</td>
<td>0.86</td>
<td>0.87</td>
<td>1.32</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>Mean 25.08</td>
<td>24.23</td>
<td>24.12, 23.82</td>
</tr>
<tr>
<td>SEM</td>
<td>0.45</td>
<td>0.31</td>
<td>0.47</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>Mean 26.53</td>
<td>25.50</td>
<td>25.85</td>
</tr>
<tr>
<td>SEM</td>
<td>0.82</td>
<td>0.72</td>
<td>1.22</td>
</tr>
<tr>
<td>Systolic (mm Hg)</td>
<td>Mean 125.42</td>
<td>127.45</td>
<td>126.00, 126.26</td>
</tr>
<tr>
<td>SEM</td>
<td>1.26</td>
<td>1.30</td>
<td>1.73</td>
</tr>
<tr>
<td>Diastolic (mm Hg)</td>
<td>Mean 78.84</td>
<td>79.47</td>
<td>78.61</td>
</tr>
<tr>
<td>SEM</td>
<td>0.82</td>
<td>0.83</td>
<td>1.14</td>
</tr>
</tbody>
</table>

*p < 0.001

Excluding pairs with one or both twin on antihypertensive treatment (3 MZ and 4 DZ pairs).

In both MZ and DZ pairs birth weight was around 200g lower in the second twin but adult height was almost identical. There was a tendency for BMI, % fat and waist circumference to be lower and BP to be higher in the second born twin, especially in DZ pairs but the differences were not statistically significant.

250S MONITORING THE EDUCATIONAL ACHIEVEMENTS OF TWINS AND HIGHER MULTIPLES FROM ENTRY TO SCHOOL AT AGE 4

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This paper reports a quantitative study of the attainments, progress and attitudes of a little over 2500 twins and higher multiples aged 4-5 at the start of school and, in decreasing numbers, at two other time points (one year later and at the age of 7). A computer adaptive assessment (the PIPS baseline) was used for the first two assessments. At 7, their vocabulary, non-verbal ability, reading and maths were tested and their attitudes towards school based activities were assessed. Little difference was found between singles and multiples at the three time points although twins were on average slightly behind singles. The differences were 0.2 SD or less. The discrepancy was similar for all cognitive measures, although, contrary to previous research, it was slightly greater for maths than reading. Paradoxically, triplicates started school slightly ahead of singles. After school entry the progress of twins and higher multiples was in line with that made by singles. The inattentiveness and hyperactivity of twins aged 5, as rated by their teachers, was slightly greater than that of singles. An unanswered question surrounding the education of twins and higher multiples is whether to separate them or not. One driving hypothesis is that if the twins differ greatly in the cognitive ability then the less able twin might make more rapid progress if educated alone. However, there was no indication that the less academic of pairs in the same school was disadvantaged by his or her relatively low achievement level suggesting that no academic advantage would accrue from separating twins even when their ability scores differ markedly. The findings are discussed in relation to the changing population of twins and higher multiples as well as the developing self-concepts of young children and current classroom practices.

251P GENETIC INFLUENCES ON PIAGETIAN CONSERVATION ABILITY IN SEVEN YEAR OLD TWINS

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In addition to continuous growth, cognitive abilities during childhood show clear discontinuous developmental patterns, as indicated by the Piagetian stages in the sixties. The transitions between the different developmental stages coincide with growth spurts in brain maturation (e.g. as indexed by electroencephalographic power and coherence). This may suggest that discontinuous cognitive development will be influenced more by genetic than environmental factors and thus will show a high heritability (i.e., the relative importance of genetic influences on interindividual differences). Surprisingly little research has been done to establish heritabilities of indices of discontinuous cognitive development like the Piagetian...
conservation ability, which generally emerges in children around age 7 years. We addressed this question using a twin design. In establishing and testing the hypothesis of conservation ability, we specifically included the possibility of sex differences. Around their 7th birthday, 192 twin pairs performed a computerized version of Piaget’s conservation ability task, which tests volume conservation ability. Children were either classified as conservers or non-conservers. Tetrachoric twin correlations were mononzygotic (MZ) males = .95 (N = 371); dizygotic (DZ) males = .44 (N = 41); MZ females = .59 (N = 42); DZ females = .40 (N = 34); DZ male-female pairs = .51 (N = 38). Using threshold models in structural equation modelling, we found heritabilities of 94% (males) and 62% (females) ($\chi^2 = 12.83$, $df = 12$, $p = .381$). Sex differences were significant, ($\chi^2 = 4.04$, $df = 1$, $p < .05$), possibly reflecting maturational differences. These results support Piaget’s assertions regarding the biological origins of conservation ability.

### 252F GENETIC AND ENVIRONMENTAL INFLUENCES ON PROBLEM BEHAVIORS IN 5-YEAR-OLD DUTCH TWINS

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Problem behaviors in young children do not form clearcut diagnostic categories, but involve quantitative variations of behavior that most children display to some degree. It is therefore preferable to examine genetic influences on the psychopathology of these quantitative variations of behavior rather than a present-vs-absent diagnosis. For this purpose, standardized ratings of problem behavior filled in by parents may be a good source of information of child psychopathology. In the present study, behavior problems were assessed with items from the Devereux Child Behavior (DCB) rating scale (Spieker & Spieker, 1996) filled in by the parents. The rating yielded 5 problem scales: aggression, distraction, anxiety, physical coordination, and inability to delay. The sample consisted of 3600 5-year-old twin pairs. Structural equation models were used to estimate genetic and environmental influences on problem behavior. Univariate genetic analyses yielded large additive genetic effects for all problem scales. We found heritabilities ranging from .50 to .80. Shared environmental effects were only significant for aggression and anxiety and explained a much smaller part of the variance. Test of sex differences showed no significant results. This research was supported by grant 904-57-094 from the Netherlands Organization for Scientific Research (NWO).

### 253S INCLUDING QUANTITATIVE TRAIT LOCI IN STATISTICAL MODELS TO STUDY THE INTERPLAY OF MULTIPLE FACTORS AFFECTING COMPLEX TRAITS

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The complexity of complex traits may perhaps best be conceptualized by a coherent network of multiple factors that mediate the influence of the genes on the eventual outcome. Existing quantitative association tests are not suitable for disentangling this complex interplay. We therefore propose a model with observed and latent variables that does not impose restrictions on the number of variables or the direction of their causal relations, and provides a general approach for fitting theoretical models to empirical data. The model is very flexible and 1) allows for genetic effects on the means, variances, and relations between variables, 2) can control for stratification effects on all these components, 3) can be fitted in nuclear families of any size, 4) is estimated using an interpretable parameterization, and 5) can incorporate di- and multi-allelic loci, marker haplotypes, multiple loci simultaneously, and parental genotypes. The model can be estimated with the Mx software and a program that generates the proper Mx script on the basis of few simple questions concerning the data structure and parameter matrices. A simulation study showed that the model yielded correct Type I errors, unbiased parameter estimates, and satisfactory power to discriminate between alternative models. An example is also given that illustrates how the model could be applied to real data.

### 254F ASSOCIATIONS BETWEEN TRIPLET ETIOLOGY AND CHILD BEHAVIOR PROBLEMS AT SCHOOL AGE

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From 148 triplet sets, born between January 1987 and December 1993, 42 sets originated naturally (spontaneous), 45 by hormone induction of ovulation (hormones), and 61 by in vitro fertilization (IVF). Birth weight, birth order, gender and maternal age at delivery time were registered shortly after birth. Between the ages of 6 and 11 years (mean: 7.37 years) parents filled in the Child Behavior Check List (CBCL/4–18), measuring Externalizing behavior and Internalizing behavior.

The main question was: Is problem behavior associated with etiological modus of the triplets? Other questions were: Can previous findings in twin and singleton samples with regard to the associations between birth weight, gender and maternal age on the one hand and externalizing behavior on the other, be replicated? Is there a deviating sex-ratio (more girls in the hormones-group)?

**Results.** Low birth weight appears to be associated with more externalizing behavior. Young mothers (< 28 years) gave birth to triplets with more externalizing behavior compared to old mothers (> 34.6 years). Boys and girls born to IVF mothers were more externalizing than triplets born naturally, with triplets born by hormonal induction of ovulation being the least externalizing. In the IVF-group, significantly more girls than boys are born. The absence of a gender difference in externalizing behavior raises the question whether the IVF-twins, is discussed in the context of the (speculative) possibility of a slightly deviating process of X-inactivation and/or genomic imprinting in this group.

### 255P VULNERABILITY TO DEPRESSION AMONG 12,063 ADULTS — EFFECT OF LIFE EVENTS, SOCIAL SUPPORT AND SOMATIC HEALTH

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The Finnish Twin Cohort consists of all twin pairs of the same sex born in Finland before 1958 and with both co-twins alive in 1967. The 21-item Beck Depression Inventory (BDI) was included in the 1990 questionnaire to assess depressiveness. The sample consisted 12,063 Finnish adults aged 33 to 60 years. We have found remarkably strong effects of various psychosocial variables on depressiveness. These effects remained significant in multi-variate models, such that high BDI scores were associated with stressful life events, and poor somatic health of the subject and lack of social support increased the strength of this association. High neuroticism and low self-esteem were also associated with high BDI Scores. The regression model of the total BDI explained 34.9% of the variability of the BDI score. The most important variables were stressful life events (18.5%), neuroticism (8.6%), social network (4.1%), self-esteem (9.9%), and the interaction term of social network and stressful life events. These effects were seen in both men and women, as well as in those classified as healthy and those considered to have some chronic medical condition. We will further examine if the relationship between life-events and depression is changed when examined within pairs, i.e. by adjustment for genetic factors and childhood experiences. This will be first through analyses of discordant pairs by conditional logistic regression techniques to identify explanatory factors accounting for intra-pair differences in depressiveness. Secondly multi-variate genetic modelling of MZ and DZ twin variance-covariance matrices of these data will be undertaken. It is of special interest to estimate the magnitude of genetic and environmental effect on life events and depression, with particular focus on non-shared environmental factors, as these may prove amenable to intervention.

### 256S FETAL GROWTH AND THE INSULIN-LIKE GROWTH FACTOR (IGF) SYSTEM

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The IGF system includes two ligands (IGF-I and -II), six IGF-binding proteins (IGFBPs), and two IGF receptors (type 1 and 2); it plays a pivotal role in fetal growth regulation. IGF-I and IGF-II are produced by many cell types in virtually all fetal tissues, and stimulate growth & differentiation in an auto- and paracrine mode, predominantly through the type 1 receptor. The paternal imprint IGF-II gene is expressed more abundantly than the IGF-I gene. Both homozygous IGF-I gene deletion and paternal IGF-II allele deletion result in intra-uterine growth retardation (IUGR), and their effects are additive. In human fetuses, IGF-I and IGF-II levels are correlated with birth wt, but the correlation between IGF-I and birth wt is more consistent. IGF-I appears to be a good source of information of child psychopathology. In the present study, problem behaviors were assessed with items from the Devereux Child Behavior (DCB) rating scale (Spieker & Spieker, 1996) filled in by the parents. The rating yielded 5 problem scales: aggression, distraction, anxiety, physical coordination, and inability to delay. The sample consisted of 3600 5-year-old twin pairs. Structural equation models were used to estimate genetic and environmental influences on problem behavior. Univariate genetic analyses yielded large additive genetic effects for all problem scales. We found heritabilities ranging from .50 to .80. Shared environmental effects were only significant for aggression and anxiety and explained a much smaller part of the variance. Test of sex differences showed no significant results. This research was supported by grant 904-57-094 from the Netherlands Organization for Scientific Research (NWO).
257S  HOW CAN WE PREVENT IATROGENIC MP?
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In developed countries, 1% of babies born result from IVF and other assisted reproductive technologies (ART). Registries indicate a high incidence of multiple pregnancies (MP). In France, the birth frequency of twins after IVF was 23.5% and of triplets and more 3.75%. Because of new techniques in ART (not all involving IVF), the MP rate is exploding worldwide. The major risks in MP include: very high rates of preterm delivery, low birth weight, intrauterine growth retardation and neonatal and infant mortality. The life of couples who experience a high order MP is changed dramatically for many years to come. A reduction of the proportion of multiple pregnancies should be a major goal for all centers performing ovulation induction with or without IVF. Factors influencing MP are: the number of embryos transferred, the age of the mother, the ovulation stimulation regimen, the embryo quality and the rate of embryos remaining after transfer. To reduce the incidence of high order MP, the following should be considered: natural cycle IVF, low dose stimulation regimen, elective transfer of only two or even one embryo, embryo quality, fertilization rate, transfer of blastocysts, cryopreservation, embryo reduction and skill/responsibility. In our experience, reduction of the number of embryos transferred to two or one and transfer of blastocysts are the major tools. The transfer of only two embryos does not change the pregnancy (or twinning) rate but avoids Higher MP. Embryo reduction however, is just an emergency solution.

Conclusion. Can we avoid higher MP? Answer — no. Can we reduce the incidence? Answer — clearly yes.

258S  PATTERNS OF FAMILY TRANSMISSION IN PERSONALITY TRAITS: THE PSYCHOPATHIC DEVIAE (Pd) AND THE WIDGINS FEMININITY (FEM) SCALES
Richard J. Viken, Richard J. Rose, Jaakko Kaprio, & Markku Koskenvuo.
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When augmented with data on parents, twin samples allow differentiation of genetic and cultural transmission as explanations for parent-child similarity. Thus far, analyses of personality and other individual differences measures have found little evidence for cultural transmission, much to the surprise and disappointment of psychologists (and parents). But it can be argued that parental or personality characteristics are supposed to reflect individual differences in basic biological characteristics, and are poor candidates for observing cultural transmission. Traits assumed to be under strong social influence still might show environmental transmission from parents to offspring. We investigated family transmission in two such variables, using 2,500 sets of adolescent twins and their parents drawn from the FinnTwin6 project. The Pd scale from the MMPI assesses antisocial characteristics and social deviance. The FEM scale, also derived from the MMPI, assesses endorsement of traditional masculine versus feminine interests, attitudes, and activities. Both variables show significant genetic influences in twin data, and both show significant parent-offspring correlations, although the pattern of associations differs for the two traits. We fit a variety of family transmission models to specific sets of variables, and in particular, we focus on similarities and differences in the pattern of transmission in the two variables. (Support: NIAAA 08315 and the Academy of Finland 440069)

260P  TAMBA SURVEY OF WOMEN’S EXPERIENCES OF A MULTIPLE BIRTH IN THE NHS
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The present quality agenda in the NHS places more emphasis than ever before on the views of patients and users of health services. Women giving birth to multiples are a minority group and it is therefore important for Tamba as the only voluntary user organisation to canvass the views of women delivering twins or triplets in NHS maternity units. In 1998, we carried out a 4-page questionnaire to individuals giving birth to over 200 Twin Clubs, to be completed by all women who had given birth to multiples in 1997. We received responses from 563 families – equivalent to 5.5% of all twins and 12.5% of all triplets born in the UK in 1997 — whose experiences covered 214 different hospital units. The key findings of the survey are presented, covering quantitative and qualitative information on many aspects of antenatal care, delivery and postnatal care including breastfeeding. General satisfaction levels were high, particularly with care received in neonatal intensive care units. Specific information on antenatal classes for parents were still not readily available. The results of the survey have been used to inform parents and midwives through publications and study days, to update Tamba’s own information booklets, and to support new grant applications. We hope to use the findings to set up standards and a Tamba Multiple Birth Excellence Award Scheme for NHS maternity units.

261F  THE MUMBAI PROSPECTIVE TWIN STUDY
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Background. The Mumbai Prospective Twin Study group was constituted from the four major teaching hospitals of the city, namely the Wadia Maternity Hospital, the B.Y.L. Nair Hospital, the K.E.M. Hospital, and the S.C.T. Municipal General Hospital. Its purpose was to study all twins born in the city, and other things, chorionicity and outcomes in this hospital-based population.

Methods: A database was constructed using a pickoff sheet specially designed by Dr. Isaac Blickstein of Israel. One person was assigned to collect data on every twin pregnancy at each hospital.

Results. Among the first 146 cases, mean maternal age was 26 years, with 90 percent of mothers being 30 years of age or less, and 91 percent of patients para 2 or less, and 91.8 percent of twins and 92.5 percent being spontaneous conceptions. Among the maternal complications were anemia (HB less than 10 gram percent in 36 percent of cases) and antenatal hypertension in 25.4 percent of cases. Of these, 59.4 percent were mild PIH, 21.6 moderate PIH, 10.8 percent severe PIH, and 8.2 percent eclampsia. Preterm labor occurred in 45.2 percent of cases. Birth weight differences after delivery were under 15% in 63.7 percent, 15–25% in 19.9 percent, and > 25% in 16.4 percent. Of the total 292 births, there were 11 stillbirths and 17 neonatal deaths.
Abstracts

The perinatal mortality rate was 98 per thousand total births and the neonatal death rate was 62 per thousand live births.

Conclusion. This is the first attempt to systematically study maternal and fetal outcomes in an Indian population of twins. The work is ongoing.

262S CHARACTERISATION OF ANASTOMOTIC ANATOMY IN TWIN-TWIN TRANSFUSION SYNDROME

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Aim: To characterise the macroscopic appearances of arterio-venous anastomoses (AVAs) in monochorionic (MC) twins with and without twin-twin transfusion syndrome.

Main Outcome Measures. To determine in TTTS pregnancies and uncomplicated MC pregnancies: 1) number of and direction of AVAs 2) number of and location 4) AVA intra arteriovenous angle and 5) AVA branching order

Results. Preliminary results from 50 MC placenta showed that there was no difference in the overall number of AVA (median 2, range 2–7 versus 4, range 0–11), diameter of AVA (mean = 1.5mm versus 1.4mm) and their angulation (mean 130 degrees, range 100–150 versus 125 degrees, range 110–180) between the TTTS group and uncomplicated MC pregnancies. Net anastomotic gradient was also not associated with TTTS development. AVAs in either direction were nearer to the uppermost or lowermost edge of placenta in the TTTS group compared to the control MC group. The branching order of both arteries and veins for AVAs were not significantly different across the groups for vessels from larger to smaller twin. However with AVA travelling from smaller to larger twin, there was a lower branch order in the artery in the TTTS and growth discordance groups compared to uncomplicated MC pregnancies

Conclusion. Subtle differences have been observed in AVA anastomotic configuration in placenta affected by TTTS and these may further contribute to understanding of this disease

263P MULTI-FETAL PREGNANCY: ACHIEVING SUCCESSFUL OUTCOMES

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Balancing the joy and anticipation of bringing higher-order multiple birth children into the world with the very real, practical concern of managing a high-risk pregnancy is a challenge for all involved. Through extensive research, the National Organization of Mothers of Twins Clubs, Inc. has prepared a "hands-on" program for physicians, support personnel and expectant parents of triplets, quadruplets and more. These materials focusing on ways to improve communication and outcomes will be shared during this session. Issues covered during this presentation include pregnancy management, tests and procedures, nutrition, medical intervention, complications, stress management and assistance with transitional needs after the birth of the babies. Resources to facilitate communication between physicians and patients have been successfully researched and developed in a variety of formats to aid in their use and effectiveness. The continuum of advancing health care will be examined and tools to assist the provider, administrator and parents in making the most well informed choices will be distributed. Understanding the unique experiences and issues facing mothers with multi-fetal pregnancies and coordinating the best techniques for their medical and psychological care is crucial to creating the most successful outcome for families with triplets, quadruplets and quintuplets.

264P SOCIAL ALIENATION IN ADOLESCENT FINNISH TWINS

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Social Alienation has an important effect on many kinds of behaviour, including, for example, adolescent drinking. Despite its importance, there have been few genetic studies of the phenomenon. We measured Social Alienation with a Harris-Lingoes scale, consisting of nine items from the Minnesota Multiphasic Personality Inventory, in a population-based family data set consisting of parents and their 16-year-old co-twins in 1,882 families (FinnTwin16). According to a previous study, Social Alienation, measured with this scale, was strongly related to some social environments (unemployment among adults), but not to other kinds of environmental variation (regions). Our intention in this study was to broaden our knowledge of social alienation by using a twin-family research design. The relationship of social alienation between the co-twins and their parents was studied using correlations. We also modelled the relationships among the family members using twin-family models in Mx.

Results. Mean scores and standard deviation: Boys 2.4 (1.97), Girls 2.76 (1.98), Fathers 1.97 (1.89), Mothers 1.84 (1.77). Correlations among family members: father-mother 0.21, father-son 0.09, father-daughter 0.12, mother-son 0.10, mother-daughter 0.12. Correlations among twins: Female MZ 0.52, Male MZ 0.50, Female DZ 0.32, Male DZ 0.29, Opp.sex 0.11.

Conclusion. The pattern of family correlation support familial aggregation and possible genetic influences on social alienation.

265P NO HERITABILITY OF PARKINSONISM IN SWEDISH TWINS

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One large twin study using the all male NAS/NRC World War II Veteran Twin Registry reported similar concordance rates for Parkinson’s disease in monozygotic and dizygotic twins. We evaluated concordances in the Swedish Twin Registry, where both sexes and opposite sexed pairs are included. A total of 25,064 twins in 8,597 pairs above 55 years were screened for most complex diseases using computer assisted telephone interviews. The twins were asked whether they have received a Parkinson’s diagnosis, take anti-Parkinson medication, and whether they experience a variety of parkinsonian symptoms. The symptoms were difficult to stand up, smaller letters in handwriting, balance problems, feet stuck on the floor when walking, dragging feet when walking, stiffness of the face, shaky arms or legs, difficulty buttoning buttons and low voice. Validation of screening questions is ongoing using medical records and somatic examinations. Probandwise concordance rates were calculated stratified by zygosity, sex and age, considering those with positive answers to the questions about diagnosis or treatment and those with three positive answers to the symptom questions as affected. Concordances were 19.8% for monozygotic twins (19.5% for men and 20.0% for women), 20.1% for dizygotic twins (20.1% for both men and women) and 11.5% for opposite sexed twins. Monozygotic concordances were slightly greater than dizygotic among twins age 55-64, suggesting a potential influence of genetic effects for early onset cases.

266P FAVORITISM IN MOTHERS OF MULTIPLE BIRTH CHILDREN

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The birth of twins is associated with an increased risk of child abuse. In Japan, a nationwide survey found that 10% of child abuse victims were products of multiple births, almost ten times the rate found in the general population. In particular, in multiple births, the risk of abuse of only one child is high, and the abusers are mostly the mothers. Moreover, favoritism by parents has been suggested as the reason for this tendency. This study investigated the state of occurrence of favoritism in mothers with multiple birth children and identified factors associated with increased risk. The 231 subjects were 126 mothers of twins, 96 of triplets, 7 of quadruplets and 2 of quintuplets. The state of health in the mothers who showed a tendency towards favoritism was significantly poorer (p < 0.05) than in those who did not show a tendency towards favoritism. The rate of those who frequently contracted upper respiratory infections was also significantly higher (p < 0.01) in the mothers who showed a tendency towards favoritism. The state of fatigue based on characteristics in the Fatigue Symptom Index and 5-grade ratings of physical and mental health was significantly more advanced in the mothers who showed a tendency towards favoritism than in those who did not show a tendency towards favoritism. The state of sleep was poorer in the mothers who showed a tendency towards favoritism.