

Society for the Study of Human Biology

Proffered Papers Meeting, Loughborough, May 25th 2011

Wavy Top Building, Room LO.37 , University of Loughborough



10.00 Arrivals and Coffee

10.20 Morning session Chair Noël Cameron

Hour of birth and birth assistance: from a primate to a medicalized pattern?

Cristina Bernis & Carlos Varea, Department of Biology, Madrid Autonomous University, Spain.

10.40 **Characterisation of a Commercial Human Skeletal Muscle Cell Line.** Bradley Elliott¹, R Debigaré², F Maltais³, S Getting¹, D Renshaw¹, R Mackenzie¹ 1 School of Life Sciences, University of Westminster, London, England, 2 Faculté de Médecine, Université Laval, Québec, Canada, 3 Centre de Recherche de l'Hôpital Laval, Québec, Canada.

11.00 **Ecological influences upon pre-adolescent girls eating and physical activity behaviours.** Joanna May Kesten, Noël Cameron, Paula Griffiths. School of Sport, Exercise & Health Sciences, Loughborough University.

11.20 Coffee and poster viewing

11.45 Chair Barry Bogin.

Keynote Address: Dual nutritional burden in preschool children: the Yaoundé studies.

Patrick Pasquet, CNRS/MNHN, Paris, France.

12.30 Annual General Meeting

1.00 Lunch

2.00 After-lunch session starts

- 2.00 After-lunch session Chair Nick Mascie-Taylor
Acute effect of Fatmax exercise on glycaemia, insulinaemia and fat oxidation in overweight and non-overweight girls. Julia Zakrzewski, K. Tolfrey, Loughborough University.
- 2.20 **Height-for-age percentiles and IOTF cut-off points for BMI work best to assess nutritional dual-burden in Yucatec Maya.** Maria Inês Varela-Silva¹, Hannah Wilson¹, Hugo Azcorra¹, Paula Griffiths¹ Federico Dickinson², Barry Bogin¹ (¹Centre for Global Health and Human Development, SSEHS, Loughborough University, UK; ²CINVESTAV, Centro de Estudios Avanzados, Dep. Ecologia Humana, Unidad de Merida, Mx)
- 2.40 **Genetic association analysis of eight candidate genes in South Asian and Caucasian RAs of UK.** Anant M Ghelani, Teesside University, Ash Samanta, Leicester Royal Infirmary NHS Trust, Sarabjit S Mastana, Loughborough University.
- 3.00 Tea and poster viewing
- 3.20 After-tea session Chair Emily Rousham
Nutritional Status of Women in Bangladesh: Trends and Socio-economic Association over the Period 1996 and 2007. Masuda Mohsena and CG Nicholas Mascie-Taylor, Department of Biological Anthropology, University of Cambridge
- 3.40 **Impact of a Three Week Dietary Supplementation with Omega 3 on Exercise Induced Asthma in Recreationally Active Males.** Aishwarya Varma, Sarabjit S Mastana, Martin R Lindley, Human Cell and Molecular Biology Research Lab, School of Sports, Exercise and Health Sciences, Loughborough University.
- 4.00 **An investigation of the attitudes of micro business catering outlets in Camden towards the introduction of calorie information at point of choice.** Liliana Popa, School of Life Sciences, University of Westminster.
- 4.20 Award of Student Prize

Abstracts ORAL PRESENTATIONS

Hour of birth and birth assistance: from a primate to a medicalized pattern?

Cristina Bernis & Carlos Varea, Department of Biology, Madrid Autonomous University, Spain.

Natural selection shapes integrated reproductive strategies, coordinating physiological, anatomical and behavioral mechanisms in the ecological context in which the species lives. Primates and humans share a maternal circadian mechanism which regulates the typical nocturnal pattern of births. The analysis of the hourly distribution of 25,606 human births in Spain shows that increasing unnecessary hospital interventions have transformed the nocturnal pattern of birth into a diurnal one. This is contributing to the rise of preterm and low birth weight newborns, reducing their probability of being breastfed, and eliminating or transforming emotional and social support. Immigrant women present a higher frequency of the nocturnal pattern of delivery than their Spanish counterparts. The implications of these findings, which show a new situation in the evolutionary history of *Homo sapiens*, are discussed. It is suggested that a better knowledge of the evolutionary basis of human birth by health professionals and women will contribute to create positive changes towards fewer unnecessary intervened deliveries.

Characterisation of a Commercial Human Skeletal Muscle Cell Line.

B Elliott¹, R Debigaré², F Maltais³, S Getting¹, D Renshaw¹, R Mackenzie¹. 1 School of Life Sciences, University of Westminster, London, 2 Faculté de Médecine, Université Laval, Québec, Canada, 3 Centre de Recherche de l'Hôpital Laval, Québec, Canada.

Commercially available, immortalized cell lines are heavily utilized in physiological research. In skeletal muscle research the most widely used myoblast cell lines are L6 (rat) and C2C12 (mouse). These provide excellent models in terms of repeatability but are limited by not being human-derived. Human muscle primary cells cannot be cultured long term as skeletal muscle cells are terminally differentiated. We recently sourced a commercially available human myoblast cell line (HskM-Innoprot) and here characterise this line. HskM myoblasts were seeded at $\approx 41,000$ cells/cm² in DMEM (10%FBS). Daily cell counts were performed to assess proliferation. Myotube fusion was induced by DMEM (2%HS or 2%FBS). Cells were lysed and protein concentration determined by the technique of Lowry. Western blots were performed to quantify MHC (fast) expression, with data compared that of L6 cells. Protein data from western blot was expressed relative to β -actin expression. Rate of proliferation after multiple passages was impaired when compared with L6. Occurrence of myotube fusion was visually suggested by light microscopy. Greater fusion was witnessed in 2%HS and total protein concentration was elevated by 36% over FBS after 4 days differentiation. Western blot revealed no expression of MHC (fast) in HskM cells after 4 days differentiation compared to significant accumulation of MHC (fast) in L6 by day 4 (0 vs 35.1 OD). Here we demonstrate preliminary results of characterisation of a new muscle cell line. Absence of MHC (fast), characteristic of differentiated myotubes, suggests this cell line may not prove a useful *in vitro* model.

Ecological influences upon pre-adolescent girls eating and physical activity behaviours.

Joanna May Kesten, Noël Cameron, Paula Griffiths. Loughborough University.

Childhood overweight and obesity is recognised as a significant public health problem worldwide. Methods: This research used focus groups with pre-adolescent girls to identify key informants who influence their lifestyle choices regarding eating and physical activity behaviours. The study recruited 56 female participants aged between 7-11 years from 8 primary schools. In total 13 focus groups with groups of between 2 to 7 participants were performed. Results: A broad range of key informants were highlighted. At the individual level the children discussed their own health behaviour control, which was mediated by family members' particularly maternal influences. The peer group was described as a role model capable of encouraging the performance of positive and negative health behaviours. School health policies, encompassing school meals and physical activity provision (during and after school), were highlighted as influential. Wider social influences for instance the media, health professionals, government initiatives such as change4life and environmental factors such as the proximity and availability of physical activity facilities and the perceived safety of these facilities were also discussed. Conclusion: This research suggests that childhood overweight and obesity prevention interventions should focus upon multi-level approaches, covering both the wider social environment and the individual level of behaviour. There are several identifiable key informants with the potential to prevent pre-adolescent girls from becoming overweight and obese. Research is needed to investigate these key informants level of knowledge and awareness of health behaviours associated with the development of overweight and obesity in pre-adolescent girls.

Intergenerational and transnational correlates of health for Bangladeshi adult daughters and their mothers: Project MINA. Barry Bogin¹, Janice L Thompson², Diane Harper¹, Joy Merrell³, Jasmin Chowdhury³, Petra Meier⁴, Michael Heinrich⁵, Vanja Garaj⁶. ¹University of Loughborough, ²University of Bristol, ³Swansea University, ⁴University of Sheffield, ⁵University of London, ⁶Brunel University.

Project MINA explores the relation between Migration, Nutrition, and Ageing of Bangladeshi women. The Bangladeshi community in the United Kingdom (UK) is thriving; however, many of its members are socially disadvantaged and suffer from high levels of disability, obesity, diabetes, and cardiovascular disease. Little is known about the causes. We use a Life History Theory perspective to analyze trade-offs in growth, reproduction, and aging in a sample of 40 mothers (45+ years old) who migrated to the UK, 36 of their daughters (18-35 years old) born in the UK, and 22 mother-daughter pairs of the same two age groups in Bangladesh (BD). All women are of short stature ($X=150.5$ cm, $sd= 6.4$), with no significant differences between or within generations or countries. Daughters in both BD and UK are taller than their mothers. UK-born daughters (UK-UK) are taller than UK-living BD-born daughters (UK-BD). The UK-UK daughters have relatively greater knee height for stature than UK-BD daughters, indicating that UK born daughters had better health in infancy and childhood. All measures of fatness and arm muscle area are significantly larger in the UK women. This indicates greater energy intake, less energy expenditure, or both for UK women. The mean age at marriage for mothers (16.4 years, $sd=2.9$) is significantly less than that for daughters (18.6 years, $sd=2.7$). A 7-component lower body physical function test for older adults finds that BD mothers have significantly better total scores than UK mothers. Greater age at first birth and time lag between marriage and first birth are associated with greater physical function score. The results indicate that trade-offs in reproduction and energy balance do impact health and ageing.

Sponsor: Economic & Social Research Council, New Dynamics of Ageing Programme, UK, grant number RES-354-25-0002.

Acute effect of Fatmax exercise on glycaemia, insulinaemia and fat oxidation in overweight and non-overweight girls.

Zakrzewski, J.K., Tolfrey, K. Loughborough University.

Background: Exercise training at Fatmax (intensity corresponding to maximal fat oxidation) increases insulin sensitivity and fat oxidation in adolescents. It is possible that a single bout of exercise has similar effects. The acute effect of Fatmax exercise on glycaemia, insulinaemia and fat oxidation following a high glycaemic index (HGI) breakfast was examined in 8 overweight (OW) and 15 non-overweight (NO) girls. Methods: Participants completed two 2-day trials in a counter-balanced order. On day 1, participants either rested (CON) or expended 500 kcal during treadmill exercise at individual Fatmax (EX; 73(23) min at 57(11)% peak $\dot{V}O_2$). On day 2, blood and expired air samples were taken in the fasted state and at regular intervals for 2 h following HGI breakfast consumption. Subsequently, blood glucose and plasma insulin concentrations were determined and fat oxidation was estimated. Results: Blood glucose was similar between conditions in both groups ($P \geq 0.05$). Postprandial plasma insulin was reduced in EX compared with CON in NO ($P = 0.056$), but not OW girls. Fasting and postprandial fat oxidation (absolute and % total energy expenditure) was higher in EX compared with CON in NO ($P \leq 0.05$), but not OW girls. Conclusion: The reduced insulin concentrations and elevated fat oxidation in EX compared with CON suggest that a bout of Fatmax exercise performed ~16 h prior to HGI breakfast consumption favourably affects these health markers in NO girls. However, a similar effect was not found in OW girls, possibly because the higher absolute energy intake in this group compensated for the exercise energy expenditure.

Height-for-age percentiles and IOTF cut-off points for BMI work best to assess nutritional dual-burden in Yucatec Maya.

Maria Inês Varela-Silva¹, Hannah Wilson¹, Hugo Azcorra¹, Paula Griffiths¹ Federico Dickinson², Barry Bogin¹ (¹Centre for Global Health and Human Development, SSEHS, Loughborough University, UK; ²CINVESTAV, Centro de Estudios Avanzados, Dep. Ecología Humana, Unidad de Merida, Mx)

The nutritional dual-burden is defined as the coexistence of undernutrition and overnutrition. Undernutrition encompasses stunting, wasting and underweight. Overnutrition includes high weight-for-age or high BMI-for-age. The nutritional dual-burden has been reported at the population level (high prevalence of stunting, wasting or underweight coexisting with overweight/obesity within a group of people), at the household level (the presence of at least one individual who is either stunted, wasted or underweight, and at least one individual who is overweight/obese); and at the individual level (simultaneous presence of stunting and overweight/obesity in the same person). Individual dual-burden can be high in some groups of adults who were stunted during childhood and then gained weight during adulthood. Prevalence is usually relatively low in children but these low levels may be due to the choice of the analytical methods. In this analysis we compare the use of World Health Organization cut-off values for stunting, underweight and overweight using z-scores, with the Centre for Disease Control cut-off points based on percentiles and also with the International Obesity Task Force (IOTF) values for underweight, overweight, and obesity, to assess levels of dual-burden. The sample is comprised of 58 Maya mother-child dyads living in Merida, Mexico. Percentiles classify more people as stunted and the IOTF values classify more people as either underweight or overweight. The differences are of statistical, biological and humanitarian significance. The choice of the method should take into account the research question and how inclusive we can afford to be in case of planning an intervention.

Genetic association analysis of eight candidate genes in South Asian and Caucasian RAs of UK.

Anant M Ghelani, Teesside University, Ash Samanta, Leicester Royal Infirmary NHS Trust, Sarabjit S Mastana, Loughborough University, United Kingdom.

Rheumatoid Arthritis (RA), a chronic musculoskeletal disease of unknown aetiology has complex polygenic and multifactorial components. The disease has not been analysed comprehensively among South Asians, specifically in the East Midlands of the UK.

Two genetic approaches were used; case-control and sib-TDT analyses. Ten polymorphisms of eight genes (ACE, VDR, A2M, GSTT1 and GSTM1, TNFR11, FcγRIIIA and CRH) were analysed in South Asians (134 patients, 66 unaffected sibs, 149 random controls) and Caucasians (137 patients, 83 unaffected sibs, 150 random controls). The gender distribution (male:female) was 1:4 in South Asians and 1:3 in Caucasians.

Significant genetic associations were observed with VDR Bsm I B-B genotype (OR = 2.08, CI 1.23 - 3.52, $P < 0.05$), A2M 2-2 genotype (OR = 3.99, CI 1.19 - 17.18, $P < 0.05$), and GST T1null genotype (OR = 2.81, CI 1.40 - 5.77, $P < 0.002$) among South Asian RAs. In Caucasians, TNFR11 R-R (OR = 3.16, CI 1.20-9.26, $P < 0.05$), A2M 1-1 (OR = 2.09, CI 1.21-3.64, $P < 0.05$) and GST T1null (OR = 1.97, CI 1.07 - 3.68, $P < 0.05$) genotypes were associated with RA. In the majority of cases, recessive and multiplicative modes of inheritance explained the observed associations. There were no confounding interactions between the genotypes.

Overall this study demonstrates that ethnic and genetic variation plays a significant role in RA susceptibility. Possible implications of the results in RA will be discussed.

Nutritional Status of Women in Bangladesh: Trends and Socio-economic Association over the Period 1996 and 2007.

Masuda Mohsena and CG Nicholas Mascie-Taylor. Department of Biological Anthropology, University of Cambridge, Pembroke Street, Cambridge CB2 3RA, UK

Objective: To analyse trends in nutritional status in Bangladeshi women over the last 15 years and to examine the associations between nutritional status and socio-economic variable. *Methods:* Bangladesh Demographic Health Survey was the source of data, a total of 15734 women whose records were complete in the required individual and household level variables were included in the analysis, of whom 3437 are from 1996, 3856 from 2001, 4498 from 2004 and 3943 from 2007 BDHS. Women's nutritional status variables compared overall mean and SD of height, weight and body mass index (BMI). Sequential linear regression analyses were done to assess the relationship between demographic and socio-economic variables and nutritional status. *Results:* All of the selected socio-economic and demographic variables showed significant associations with all three nutritional status indicators of women before and after removing the effects of age, period of demographic health survey and several other interaction effects. Upward trends in maternal height, weight and BMI were evident from no possession to four possessions in households, and for no education to higher education of women and their husbands. Women living in better off households were on an average taller, heavier and had a higher BMI compared to those from less well-off houses. Bangladeshi women, measured in 2007 were found to be on an average 0.34 cm taller and 3.36 kg heavier than women measured in 1996. Comparison of mean height, weight and BMI within socio-economic groups showed that the secular increase, although varying, was evident in all subgroups. *Conclusion:* The study reveals that over the last fifteen years there has been substantial improvement in women's nutritional status in Bangladesh; it is also evident that malnutrition in Bangladesh is a multidimensional problem alike poverty itself which warrants proper policy mix and programme intervention.

Impact of a Three Week Dietary Supplementation with Omega 3 on Exercise Induced Asthma in Recreationally Active Males.

Aishwarya Varma, Sarabjit S Mastana, Martin R Lindley , Human Cell and Molecular Biology Research Lab, School of Sports, Exercise and Health Sciences, Loughborough University.

Omega 3 (n3) and Omega 6 (n6) are Essential Fatty Acids playing integral role in cell membrane composition and signalling pathways. To evaluate the possibility of using n3/n6 ratio as a biomarker for asthma, a double blinded Randomised Crossover Trial was conducted. Mild asthmatics (Males, n=9, mean age 21.77 ± 2.71 years) with a history of Exercise Induced Bronchoconstriction (EIB, >10% drop in post exercise FEV1, >40ppb Exhaled breath Nitric Oxide (FeNO)) completed the trial. Institution's ethics committee approved the study. Participants entered the study on normal diet; they were supplemented with dietary n3 (comprising 3.2 grams of EPA and 2.2 grams of DHA or placebo) for three weeks before they crossed over to alternate diet (2 week wash). Venous blood samples were used to isolate Peripheral blood Mononuclear Cells (PBMCs), genotyping and measurement of inflammatory markers. Standard FFQ and dietary recall was completed to ascertain n3/n6 intake and Exercise challenge test (ATS/ERS guidelines) were used to assess % change in FEV1 after exercise in pre and post supplementation phases. Significant increase in post exercise FEV1 ($p < 0.05$, Figure 1) and reduction in serum IL-6 levels were observed post n3 supplementation, with no reduction in serum TNF- α and IL-10 levels. The n3/n6 ratio in PBMC membrane was not modified significantly, requiring further investigation. Data suggests that higher n3/n6 can improve lung function and potentially serve as a biomarker for asthma.

An investigation of the attitudes of micro business catering outlets in Camden towards the introduction of calorie information at point of choice

L. Popa, School of Life Sciences, University of Westminster

Background: As a response to the increasing rates of obesity, the last two British Governments have been working closely with the food industry to enable people make healthier choices, partly by trying to implement a voluntary calorie labelling scheme at the point of choice. Objectives: To collect primary data relating to the immediate practical implications and the long term effects that the implementation of this scheme would have on micro business (business with less than 10 employees) catering outlets and put forward recommendations that would maximise their adherence to it. No prior studies have considered these issues for micro business in particular. Methods: For this cross sectional survey semi-structured interviews were applied to the representatives of 16 randomly selected micro business catering outlets in Camden. The data was analysed using framework analysis. Results: Most representatives would not consider implementing the scheme unless it became mandatory, their local competition implemented it or their customers expressed an interest in it. The major practical concerns raised were additional costs, staff's time in relation to obtaining the calorie information and the accuracy of the information they would be providing. Some representatives felt that implementing the scheme could decrease their revenue while others looked at the scheme as a possible marketing tool; some considered adopting healthier cooking practices; more outlets would consider implementing the scheme if the possibility of obtaining the caloric content of dishes was free. Conclusion: Although there are some limitations to the generalizability of the findings, unless mandatory, the scheme is unlikely to get much take up amongst micro businesses.

POSTER PRESENTATIONS

Accuracy and validity of various ambulatory devices in estimating energy expenditure

Kerin, E¹ and Varela Silva, MI^{1 1} (Centre for Global Health and Human Development, SSEHS, Loughborough University, Loughborough, England)

Introduction: The ability to accurately estimate energy expenditure in a free living setting is important in further understanding the role of physical activity. Numerous devices are commercially available which aim to measure energy expenditure. However their accuracy is, mostly, unknown. The aim of this study was to determine the accuracy and validity of the Actiheart (combined accelerometer and heart rate monitor), the KiFit Armband and the Yamax pedometer while measuring energy expenditure in a laboratory setting.

Methods: Lab-based energy expenditure was measured in 35 young, healthy adults (21 men, 24.11 ± 1.82 years and 14 women, 24.31±3.30 years) during 5-minute bouts of effort including walking (at 2mph and 4mph), along with activities not perceived as “physical activity” such as water carrying, corn crushing and fruit picking. Agreements between each device and indirect calorimetry were analysed using Bland and Altman limits of agreement. **Results:** Throughout the activities the mean error was lowest in measurements taken by the Armband device (4-36%) with lowest error being shown in the corn crushing and water carrying tasks, the Actiheart showed mean errors of 18-38% over the range of activities while the pedometers showed little agreement.

Discussion and conclusion: The results of the study indicate the Armband is the most accurate device for the measurement of energy expenditure; the Actiheart was found to also provide acceptable measures of activity while the activity levels measured by the pedometers were very inaccurate, however, more research is needed in each before recommendation as an ideal free-living measurement tool of energy.

Breakfast glycaemic index and exercise: the effects on adolescents' cognitive function across the school morning.

Simon B. Cooper, Stephan Bandelow, Maria L. Nute, John G. Morris & Mary E. Nevill
Institute of Youth Sport, School of Sport, Exercise & Health Sciences, Loughborough University.

The aim of the present study was to examine the effects of a mid morning bout of exercise, as opposed to continuing to rest, on adolescents' cognitive function across the morning following high and low glycaemic index (GI) breakfasts. With ethical approval, 42 adolescents were allocated to a high GI (HGI) or low GI (LGI) breakfast group. At 60 min after breakfast, participants completed 10 repeats of level one of the multi-stage fitness test (exercise trial) or continued to rest (resting trial). Cognitive function tests (Stroop test and Sternberg paradigm) were completed 30 and 120 min following breakfast. Analysis was conducted using a 3-way (breakfast by exercise by time) ANOVA. On the Stroop test, the improvement in response times across the morning on the LGI/exercise trial (134ms) was greater than on any other trial (LGI/resting: 51ms, HGI/exercise: 2ms, HGI/resting: 79ms) ($F_{(1,41)}=6.4$, $p=0.0115$). On the Sternberg paradigm response times improved across the morning on the LGI/exercise (31ms), LGI/resting (40ms) and HGI/exercise (61ms) trials, but were similar across the morning on the HGI/resting trial (2ms improvement) ($F_{(1,41)}=5.5$, $p=0.0187$). On both the Stroop test and Sternberg paradigm, there were no effects of breakfast group or exercise on accuracy across the morning (both $p>0.05$). Overall, given that the improvement in response times was not to the detriment of accuracy, these results suggest that both a LGI breakfast and a mid morning bout of exercise are beneficial for adolescents' cognitive function and that, for the Stroop test, these effects are additive.

**Knee Height in Bangladeshi women: intergenerational and transnational influences:
Project MINA.**

DIANE HARPER¹, BARRY BOGIN¹, JANICE L THOMPSON², JOY MERRELL³, JASMIN CHOWDHURY³, PETRA MEIER⁴, MICHAEL HEINRICH⁵, VANJA GARAJ⁶. ¹University of Loughborough, ²University of Bristol, ³Swansea University, ⁴University of Sheffield, ⁵University of London, ⁶Brunel University

Project MINA explores the relation between Migration, Nutrition, and Ageing of Bangladeshi women. The Bangladeshi community in the United Kingdom (UK) is thriving; however, many of its members are socially disadvantaged and suffer from high levels of disability, obesity, diabetes, and cardiovascular disease. We use a Life History Theory perspective to analyze trade-offs in growth, reproduction, and ageing in Bangladeshi women. The sample comprises 40 mothers (40+ years old) who migrated to the UK, 37 of their daughters (17-35 years old), and 22 mother-daughter pairs of the same two age groups in Bangladesh (BD). All women are of short stature (mean 150.5 cm, sd = 6.4), with no significant differences between or within generations or countries. However the UK sample has significantly shorter lower legs (mean knee height \pm sd: UK women 46.0 cm \pm 2.5; BD women 47.6 cm \pm 2.4), an indication that immigrant mothers and their daughters had poorer health in infancy and childhood. Further analysis shows that shorter knee length is found in UK mothers and those UK daughters who had been born in BD (before their mothers had migrated). The UK daughters who had been born in the UK (after their mothers had migrated) had a similar knee height value to their counterparts in BD. We use these findings on knee height to explain intergenerational and transnational variation in biosocial indicators of health of these Bangladeshi women

Sponsor: Economic & Social Research Council, New Dynamics of Ageing Programme, UK, grant number RES-354-25-0002.