ABSTRACTS OF INVITED SPEAKERS

Presentation number: 01 (ISGA)

PERSISTENCE OF FETAL GROWTH EFFECTS ON POSTNATAL GROWTH IN GAMBIAN CHILDREN

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We examined how changes in fetal size from 20 to 30 weeks' gestation relate to postnatal growth in Gambian children who were participants in the Early Nutrition and Immune Development (ENID) trial. Non- pregnant women (age 18-45 yr.) were identified through monthly surveillance, and those with a missed menstrual period and a positive pregnancy test were recruited prior to 20 weeks' gestation. At 20- and 30-weeks' gestation, fetal biparietal and occipitofrontal diameters, head circumference, abdominal circumference and femur and tibia length were measured by ultrasound. Estimated fetal weight (EFW) was calculated using the Intergrowth fetal biometry reference. Change in EFW and in femur length (FL) from20 to 30 weeks was regressed on gestational age at 20 weeks, the interval from 20 to 30 weeks and infant sex. The standardized residuals from these models represent rate of fetal weight gain and linear growth, respectively and as residuals, are uncorrelated with size at 20 weeks. We then used longitudinal random effects models to see how fetal size and rate of growth were related to postnatal weight and length frombirth to 24 months in 776 children with fetal measurements and at least one post birth measurement.Models included gestational age at delivery, child sex, dummy variables for study visit to represent non- linear effects of age, maternal height, primiparity, and education level. Results show persistent statistically significant associations of EFW at 20 weeks and weight gain from 20-30 weeks on postnatal weight and of FL and length gain from 20-30 weeks on postnatal linear growth. In addition, positive coefficients on the interaction of fetal measures with time show strengthening effects with child age. Additional analyses will identify the role of additional factors that predict fetal growth and birth outcomes. Overall, the results demonstrate the importance of fetal growth restriction as a persistent determinant of postnatal growth.

Keywords: Fetal growth, postnatal growth, growth restriction

Presentation number: 02 (ISGA)

LMS GROWTH CHARTS AND SITAR GROWTH CURVES – OLD DOGS AND NEW TRICKS

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The distinguished auxologist James Tanner greatly advanced the field of human growth and development. He popularised the construction and use of growth charts – the 1966 Tanner-Whitehouse standards set a high bar for what came later. However, his way of constructing skew weight centiles was both subjective and time-consuming, until the LMS method (Cole and Green, 1992) simplified the process. Later GAMLSS (generalised additive models for location, scale and shape) (Rigby and Stasinopoulos, 2005) provided a flexible toolbox for fitting centiles to data. Growth charts ideally need a reference sample of 7000 or more (Cole, 2021) – a large number to find when working with syndromic conditions, and infeasible with gene- specific charts for monogenic neurodevelopment disorders where there may be fewer than 100 patients worldwide. The talk will describe a modification to the LMS method for very small samples. Called the LMSz method, it uses an existing baseline growth reference to transform the data to z-scores, then models them using GAMLSS assuming a Normal distribution with linear age trends in the mean and standard deviation, and then back-transforms the centiles. The LMSz method will be applied to example data for several different genes, in work with Dr Karen Low (Bristol University). Tanner also experimented with growth charts modified to handle the chaos of puberty, where growth tempo is very variable between individuals. Longitudinal data are essential here to obtain a full picture, and the SITAR method of Cole et al (2010) summarises individual growth curves in terms of final height, peak height velocity and age at peak velocity. However, just as with growth charts, weight is more complicated than height as it fails to plateau post- puberty – it keeps on rising. The talk will describe an extension to the SITAR method which models the post-growth period of the weight curve, in work with Dr Ahmed Elhakeem (Bristol University) with examples from large cohort studies.

Keywords: growth charts; growth curves; LMS method; SITAR model

Presentation number: 03 (EAA)

TRACING ANCIENT HISTORIES: FROM DIET TO MEDICINE THROUGH DENTAL CALCULUS

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In the last decade, the analysis of ancient dental calculus has become a powerful tool for studying prehistoric and historical diets, lifestyles, and health practices. This calcified biofilm on teeth preserves dietary particles, plant phytoliths, microbial DNA, and therapeutic compounds, providing insights into the daily lives and socio-economic conditions of ancient populations. Initially focused on diet, this research has recently expanded to encompass broader issues such as human evolution, trade, health impacts, and contributions to historical knowledge.

Recent advancements in biomolecular techniques, such as high-resolution microscopy and DNA sequencing, have enabled the identification of plants used as dietary staples before agriculture and as medicinal herbs, revealing intricate details of human life over millennia. Studies have uncovered the presence of β-lactoglobulin, a milk protein, in dental calculus from Neolithic sites, offering some of the earliest direct evidence of dairy consumption. Exotic substances such as turmeric, ginger, and other spices found in dental calculus provide evidence of ancient trade routes and cultural exchanges in protohistoric and historical times. Beyond dietary reconstruction, dental calculus has also contributed to recognizing hidden aspects of ancient history. For example, the presence of lapis lazuli in the dental calculus of medieval nuns has recently highlighted the role of these women as some of the first female amanuenses in history.

From a multidisciplinary perspective, the analysis of dental calculus has become key in archaeological research to understand ancient socio-cultural practices and human-environmental interactions. This presentation will review the current state of dental calculus research, highlighting key findings that have advanced our understanding of historical diets and health. I will explore interdisciplinary approaches that combine archaeology, molecular biology, and forensic science to extract biographical information from dental calculus. Furthermore, I will discuss the potential applications of this research in understanding ancient medicinal practices, trade networks, and cultural interactions, along with future research directions emphasizing the need for standardized analytical techniques.

Additionally, I will present the project ROMAN CALCULUS – Ancient materia medica, modern therapeutic substances and drugs of abuse through dental calculus, which focuses on archaeological, clinical, and forensic disciplines for understanding medical care and lifestyles in ancient times. By comparing ancient and modern evidence, this project opens new avenues for research on ancient medical care.

Keywords: diet, medicine, dental calculus

Presentation number: 04 (ISGA)

CURVE MATCHING: A BIG DATA TECHNIQUE TO PREDICT GROWTH IN PATIENTS RECEIVING GROWTH HORMONE THERAPY

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Curve matching may be used to predict growth outcomes. To apply this method a longitudinal database is needed with a large amount of patients' longitudinal growth data that forms the basis of developing growth curves. This database can be used to identify growth curves (e.g. height) of patients that are similar to the growth curve of a new patient up until their current visit. The growth curves of these 'matched' patients can then be added to the growth chart of the new patient to visualize how this patient is expected to grow in the future. We aimed to investigate the validity of curve matching to predict growth in patients with growth hormone deficiency (GHD) and those born small for gestational age (SGA) receiving recombinant human growth hormone (r-hGH). Height data collected between 0–48 months of treatment were extracted from the easypod™ connect ecosystem and the easypod™ connect observational study. Selected patients with height standard deviation scores (HSDS) [-4, <-1] and age [3, <16y] at start were included. The 'Matching Database' consisted of patients' monthly HSDS obtained by the broken stick method and imputation. Standard deviation (SD) was obtained from the observed minus the predicted HSDS (error) based on matched patients within the 'Matching Database'. Data were available for 3,213 patients in the 'Matching Database', and 2,472 patients with 16,624 HSDS measurements in the observed database. When ≥2 HSDS measurements were available, the error SD for a one-year prediction was approximately 0.2, which corresponds to 1.1 cm, 1.3 cm, and 1.5 cm at 7, 11, and 15 years of age, respectively. We conclude that curve matching is a simple and valid technique for predicting growth in patients with GHD and those born SGA. The results are interpretable and explainable without adding significant workload to the clinicalpathway.

Keywords: curve matching, growth disorders, growth hormone, prediction model, paediatric, growth hormone deficiency, small for gestational age

Presentation number: 05 (ISGA)

INFANT AND CHILDHOOD GROWTH DYNAMICS: MODELLING,PRENATAL CORRELATES, AND LIFE-COURSE OUTCOMES

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Childhood obesity rates have increased fourfold in the last three decades. Growth dynamics in infancy and childhood highlight early developmental processes driving the risk of increasing adiposity. Thus, it is important to characterize early life growth and identify its correlates and outcomes. I will use data from multiple population-based birth cohort studies to present some of my ongoing work in this area. I will first present a study comparing mixed effects models with the aim of identifying the best method for modelling infant to childhood growth curves, for the purpose of estimating growth curve features (BMI peak, rebound, and area under curve). I will then present two studies that investigate how birth weight for gestational age centiles and assisted reproductive technology conception associate with Infant and childhood growth dynamics. Finally, I will present a study that aims to examine how early life growth dynamics relate to long- term cardio-metabolic trajectories up to adulthood.

Keywords: Growth curves, P-splines, mixed effects, adiposity rebound

Presentation number: 06 (ISGA)

ASSOCIATIONS OF EARLY LIFE 'STUNTING' WITH COGNITIVE AND CARDIOMETABOLIC HEALTH IN SAMOAN CHILDREN

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In some settings, stunting in early childhood is associated with increased risk of later obesity-related cardiometabolic disease. In Samoa, where obesity prevalence is among the highest globally, few early life risk factors have been explored. We used longitudinal data from an ongoing mixed longitudinal cohort – the Ola Tuputupua'e (Growing Up) study, which collects data on ~500 families biannually, beginning at 2-4 years of age – to examine associations between stunting and mid-childhood cardiometabolic and cognitive health. Among n=246 children aged 5-11 years (48.4% female; measured in 2019) we examined differences in body mass index (BMI), blood pressure, glycated hemoglobin (HbA1c), and fluid intelligence based on the presence or absence of stunting four years earlier (age 1-5 years). Fluid intelligence was measured using the non-verbal Ravens Progressive Matrices test. Low height-for-age was present at age 1-5 years in 21.3% of boys and 16.8% of girls, but these cases of 'stunting' were likely a poor indicator of chronic malnutrition given healthy to high weight-for-age z-scores among the sample. Stunting had resolved in all but one child by 5-11 years. In boys, early childhood stunting was associated with lower BMI and marginally lower systolic blood pressure at age 5-11 years. In girls, stunting was associated with lower BMI, lower systolic and diastolic blood pressure, and lower Raven's ability scores. After adjusting for child height at the 5–11-year assessment, maternal height, maternal education, and household income in linear regression models, associations between stunting and BMI persisted across the whole sample; among girls, associations with diastolic blood pressure and fluid intelligence became non-significant, but the association with lower systolic blood pressure remained. In a sample of Samoan children at high risk for obesity-related cardiometabolic disease, stunting in early childhood was associated with a generally more favorable cardiometabolic profile in later childhood.

Keywords: early life stunting, cognitive health, cardiometabolic health, samoan children

Presentation number: 07 (ISGA)

EXPOSURE TO PER- AND POLYFLUOROALKYL SUBSTANCES AND TIMING OF PUBERTY IN NORWEGIAN BOYS: DATA FROM THE BERGEN GROWTH STUDY 2

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Per- and polyfluoroalkyl substances (PFAS) are widespread environmental contaminants with endocrine-disruptive properties. Their impact on puberty in boys is unclear. In this cross-sectional study, we investigated the association between PFAS exposure and pubertal timing in 300 Norwegian boys (9-16 years), enrolled in the Bergen Growth Study 2 during 2016. We measured 19 PFAS in serum samples and used objective pubertal markers, including ultrasound-measured testicular volume (USTV), Tanner staging of pubic hair development, and serum levels of testosterone, luteinizing hormone, and follicle-stimulating hormone. In addition to logistic regression of single-pollutants and the sum of PFAS, Bayesian and elastic net regression were used to estimate the contribution of the individual PFAS. Higher levels of the sum of perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononaoic acid (PFNA) and perfluorohexanesulfonic acid (PFHxS) were associated with later pubertal onset according to USTV (age-adjusted odds ratio (AOR): 2.20, 95% confidence interval (CI): 1.29, 3.93), and testosterone level (AOR: 2.35, 95% CI: 1.34, 4.36). Bayesian modelling showed that higher levels of PFNA and PFHxS were associated with later pubertal onset by USTV, while higher levels of PFNA and perfluoroundecanoic acid (PFUnDA) were associated with later pubertal onset by testosterone level. Our findings indicate that certain PFAS associate with delay in male pubertal onset.

Keywords: Child; Adolescent; Endocrine disruption; Environmental health; Puberty

Presentation number: 08 (ISGA)

THE PROPORTION OF WEIGHT GAIN DUE TO CHANGE IN FAT MASSIN INFANTS WITH VS WITHOUT RAPID GROWTH

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Background There is extensive evidence that rapid infant weight gain increases the risk of childhood obesity, but this is normally based on childhood body mass index (BMI) only and whether or not this is because infants with rapid weight gain accrue greater fat mass is unknown. Objective The primary objective of our study was to test whether the proportion of infant weight gain due to concurrent increasesin fat mass is greater in infants with rapid weight gain as compared to those with normal growth. Methods Body composition was assessed by 1) air-displacement plethysmography (ADP) at 0 & 6 months in 342 infants from Australia, India, and South Africa and 2) deuterium dilution (DD) at 3 & 24 months in 555 infants from Brazil, Pakistan, South Africa, and Sri Lanka. Weight gain and length growth were each categorized as slow, normal, or rapid using cut-offs of < -0.67 or > +0.67 Z-scores. Regression was usedto estimate and contrast the percentages of weight change due to fat mass change. Results Approximately 40% of the average weight gain between 0-6 months and 20% of the average weight gain between 3-24 months was due to increase in fat mass. In both samples, compared to the normal group, the proportion of weight gain due to fat mass was higher on average among infants with rapid weight gain and lower among infants with slow weight gain, with considerable individual variability. Conversely, slow and rapid length growth was not associated with differential gains in fat mass. Conclusions Paediatricians should monitor infant growth with the understanding that, while crossing upward through the weight centiles generally is accompanied by greater adiposity gains (not just higher BMI), upward crossing through the length centilesis not.

Keywords: Rapid infant weight gain, infant growth, childhood obesity, body composition, growth monitoring

Presentation number: 09 (ISGA)

UNDERSTANDING THE COMMON AND RARE GENETIC BASIS OFBIRTHWEIGHT, CHILDHOOD GROWTH, AND PUBERTY

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Growth patterns in early life vary considerably in the population, have a significant heritable component,and are associated with a range of health outcomes in later life. To elucidate their underlying biological mechanisms, we conducted genetic association analyses for birthweight, childhood body size, and pubertal onset. We performed a multi-ancestry genome-wide association study (GWAS) in ~800,000 women, identifying >1000 independent signals associated with age at menarche. Women at the top and bottom 1% of polygenic risk exhibited ~11 and ~14-fold higher risk of delayed and precocious puberty, respectively. We delineated which pubertal signals may exert primary effects on growth, using longitudinal childhood growth data from birth to late childhood, in up to ~72,000 children. We identified body size dependent and independent biological pathways, implicated in pubertal timing. These common variant analyses were supported by exome sequence analyses of rare putative loss-of-function (LOF) variants inup to ~420,000 participants, which highlighted many of the GWAS identified genes but also novel genesand mechanisms. We identified 6 genes harbouring rare LOF variants that associate with pubertal onset, including TACR3, MKRN3 and MC3R. We identified further components of the leptin-melanocortin pathway, where LOF was associated with increased childhood adiposity, POMC and MC4R, among other genes. LOF carriers of the gene INHBE reported simultaneously increased childhood adiposity and increased birthweight, alongside a propensity for favourable adiposity in adulthood. We also identified regulators of fetal adipose tissue; ACVR1C and PPARG, fetoplacental angiogenesis; NOS3 and NRK, and insulin-like growth factors; IGF1R and PAPPA2, as determinants of birth weight. These findings extend our understanding of the biological complexity of early growth and pubertal timing and demonstrate how common genetic variants can often influence the clinical extremes.

Keywords: GWAS; exome sequencing; rare variants; puberty; menarche; birthweight; childhood growth; fetal development; BMI; obesity

Presentation number: 10 (EAA)

DIFFICULTIES IN FORENSIC DENTAL AGE ESTIMATION FROM DEVELOPING TEETH

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The aim of this study was to highlight difficulties in dental age estimation based on developing permanent teeth. Individual forensic age estimation represents valuable information for the legal authorities upon which they make decisions that affect one's rights. The forensic odontologist who conducts the individual age estimation should always provide complete information regarding the accuracy of a particular dental age estimation method to the legal authorities. Herein lies the first problem; most published studies report the performance of different dental maturity reference data/methods as a single value, despite differing age range, structure and statistical approach. The second difficulty is that tooth formation is divided into qualitative, descriptive stages that are discrete events in a continuous process. The reliability of stage assessment is crucial as a one stage difference effects the dental age. Another challenge is the inappropriate use of Demirjian, Goldstein and Tanner (1973) dental maturity method, never designed to estimate age. These issues will be illustrated and discussed with a view to improve how forensic dental age estimation for an individual is reported and explained in light of individual variation.

Keywords: age estimation, developing teeth

Presentation number: 11 (ISGA)

DENTAL BIORHYTHMS AND HUMAN GROWTH

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Teeth retain evidence of biological cycles. One of these cycles is preserved in the form of layered enamel. Studies report an association between the timing of enamel layers measured in days (layer periodicity: LP) and adult body mass across primates. Accumulating evidence suggests these layers may form in response to an underlying biorhythm that temporarily modifies enamel formation and acts upon the hypothalamus to regulate cell growth and body mass. The relationship of this biorhythm to human growth is poorly understood though it appears to be person-specific with a periodicity that ranges between 5 to 12 days. To further our understanding, the Biorhythm of Growth study was established in New Zealand (NZ) and the United Kingdom (UK) between 2018 and 2023. In the first stage of data collection, we observed modal LP's differed between males and females. The biorhythm could change within an individual in relation to periods of non-specific systemic stress but otherwise LP remained constant within molars. The next stage of data collection investigated LP related to weight gain and BMI during early adolescence. Measurements were recorded every 4 weeks for 14 months for n=125 New Zealand-European, Māori and Pacific Island male and female participants (mean starting age=10.3 years) in NZ. Their naturally exfoliated milk molars were collected and two matching LP's were calculated for a subset of n=61, using histological methods in the UK. Analyses accounted for sex differences in growth trajectories, maturation stage, ancestry, and a Covid-19 national lockdown. We observed that within the sexes, those with an LP of 5 or 6-days gained less weight and had a smaller change in their BMI over 14 months compared to those with a 7 or 8-day periodicity. A BMI above the 95th percentile associated with a higher periodicity. This presentation focuses on what we have learned so far about this biorhythm in relation to human growth. Our next research steps will be outlined.

Keywords: child cohort, weight gain, obesity, adolescence, dental histology

Presentation number: 12 (ISGA)

SHORT HEIGHT-FOR-AGE: SHOULD WE THINK OF IT AS A DEFICIT, ADELAY, OR A BIT OF BOTH?

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Stunting, growth faltering, and short height-for-age are all terms used to describe linear growth that falls below set thresholds on growth standards. Many studies continue to investigate the causes and consequences of malnutrition and short height in children globally, yet the conversation surrounding what short height-for-age represents biologically has mostly died down. This talk discusses some recent developments in our understanding of the biological and conceptual underpinnings of 'stunting' using evidence from Demographic and Health Surveys and a longitudinal cohort study from Guatemala, whichalso includes detail on the children's bone age (bone maturation). Does a delay in bone growth explain the observed height deficits, as suggested by a recent revival of the concept of 'height-age'? Are there observable differences between the sexes, or related to the severity of the nutritional insults? What about weight? The final part of the talk encourages colleagues to contribute to the conversation by welcoming their expert insights.

Keywords: growth; stunting; height-age

Presentation number: 13 (EAA)

ASPECTS OF THE GENETIC MAKINGS OF NORTHEAST EUROPE

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It has been well established that postglacial peopling of Europe has involved three major demic expansions. Hunter-gatherers (HG) and early agriculturalists both from West Asia and pastoralists from the Pontic steppe. In addition, there is a more easterly influence in NE Europe detected in the Iron Age. Here we refine this broad narrative in NE Europe. We first explore the dynamics of western and eastern HGs in the Baltics, suggesting more genetic connections between people associated with different cultures/periods than previously thought. Then we document both abrupt and continuous patterns of genetic change during and after adoption of agriculture in the northern East European Plain. A genetic change with the arrival of steppe ancestry can be seen all over the region, whereas later changes are more subtle and region-specific. We will also take the example of Uralic language family to explore if languages and genes walk the same path. Finally, we explore patterns of genetic sharing between Estonians and Finns using large scale biobank datasets and novel methods. Despite substantive differentiation in allele frequencies, the two populations sport unexpectedly many segments of long shared allele intervals dating roughly to around 5th/6th century AD. This shows the importance of relatively recent events for the formation of contemporary populations.

Keywords: population genetics, Northeast Europe, demic expansions

Presentation number: 14 (EAA)

SEVERE OBESITY IN SCHOOL-AGED CHILDREN IN CROATIA – AN EPIDEMIOLOGICAL PERSPECTIVE

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Croatia joined the World Health Organization (WHO) European Childhood Obesity Surveillance Initiative (COSI) in 2015 to estimate prevalence and monitor changes in overweight and obesity in children aged 8 years. Since then, there have been three rounds of data collection in Croatia involving more than 16 thousand children. The aim of this work was to present the prevalence of severe obesity in 8-year-old children from Croatia using COSI data. The data are from cross-sectional studies in Croatia that were carried out as the first three CroCOSI rounds of data collection (2015/2016, 2018/2019, 2021/2022). School-aged children were measured using standardized instruments and methodology. Children were classified as having severe obesity using the definitions provided by WHO and the International Obesity Task Force (IOTF). Analyses over time and parental educational level, were also performed. In 2022, the prevalence of severe obesity varied greatly among regions. According to the WHO definition, severe obesity ranged from 1.3% in City of Zagreb (95% CI 0.6–2.6) to 5.3% (95% CI 3.6–7.7) in Pannonian Croatia. The prevalence was generally higher among boys compared to girls. The IOTF cut-offs lead to lower estimates, but confirm the differences among regions, and were more similar for both boys and girls. In the Adriatic and Pannonian regions 1 in 4 children with obesity have severe obesity. Applying the estimates of prevalence based on the WHO definition to the whole population of children aged 8 years in Croatia, around 1,200 children would be expected to have severe obesity in Croatia. Severe obesity was more common among children whose parental educational level was lower. The trend between 2015 and 2022 did not show a clear pattern. Severe obesity is a serious public health issue which affects a large number of children in Croatia. Because of the impact on educational, health, social care, and economic systems, obesity needs to be addressed via a range of approaches from early prevention of overweight and obesity to treatment of those who need it.

Keywords: Obesity, BMI, Childhood Obesity Surveillance Initiative, Croatia

Presentation number: 15 (EAA)

ENTERING THE UNDERWORLD: BIOARCHAEOLOGY OF THE LATE ROMAN PERIOD BURIALS FROM OZALJ CAVE, CONTINENTAL CROATIA

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The paper aims to present the results of a combination of (bio)archaeological, genomic and isotopic analyses conducted on the remains of individuals buried in Ozalj Cave, located on the outskirts of the town of Ozalj in continental Croatia. The recent excavations conducted in the cave revealed the presence of the remains of several individuals dated to 3rd c. CE based on direct radiocarbon dating. The remains of at least one adult and two subadults show several pathological changes indicating intense physical work, poor subadult health as well as poor oral health. The ongoing carbon and nitrogen isotopic studies will reconstruct the everyday diet of these people, while genomic analysis will tell us more about their genetic ancestry, molecular sex as well as possible kinship. And finally, the individuals from Ozalj Cave will be compared with other contemporaneous individuals from a wider region buried in a similar manner.

Keywords: Roman period, bioarcheology, stable isotopes, paleopathology, aDNA

Presentation number: 16 (EAA)

FROM INEQUALITY TO FUTURE WELLBEING: UNLOCKING HUMAN FLOURISHING AND PLANETARY HEALTH

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To safeguard our planet and guarantee wellbeing for all, we must drastically reduce inequality and fundamentally transform our economic objectives. Large income and wealth differences – both within and between countries – reduce the chances that our societies can respond adequately to the environmental crisis and ensure the health of both people and planet. Moulding a sustainable future requires changes that are much more profound than simply transitioning from fossil fuels to renewable energy resources. The scale of inequality has profound effects on our ability to navigate these challenges. It also sets necessary conditions on what a sustainable society should look like, and, above all, on whether we are willing to make the changes required to get there.

Keywords: inequality, sustainability, planetary health

Presentation number: 17 (EAA)

BODY HEIGHT AS A MIRROR OF SOCIAL STATUS AND STATE OF INTEGRATION IN MIGRANT POPULATIONS

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Background: Body height of migrants differs to body height in their countries of origin, sometimes they are taller sometimes shorter. In contrast to the general understanding genetic, nutrition and public health do not play an essential role in the regulation of growth, and in the case of migrants it does not provide an argument to explain the discrepant body height adjustment. But regulation of growth depends on social environment. Aim: We want to test the hypotheses that body height of migrants is strongly influenced by the perceived integration of migrants themselves. Sample and Method: We describe the socio-endocrine regulation of human growth with the transmitter-receiver-model to explain the differences in height of migrants comparable to the body height in host communities and countries of origin. We used data of recent and historic migrant populations. Results: Comparable to the peer-group well-integrated (e.g., in education, culture) migrants are tall; migrants of not well integrated groups are short. Also, migrants without sense of belonging to the new social host group are short. Whereas children of migrated colonial masters as members of a dominant group are tall. Conclusion: Through the mechanism of endocrine- regulated strategic growth, the target size during adolescence adjusts to the perceived social status in a community. This depends on the individual's perception of his or her status in society and the social acceptance of that status in society.

Keywords: Migrants, body height, socio-economic-political-emotional factors

Presentation number: 18 (EAA)

POPULATION MOBILITY AND CLIMATE CHANGE: IMPLICATIONS FOR PUBLIC HEALTH

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Extreme weather events such as heat waves, drought, heavy rainfall, floods, hurricanes, and tornadoes are associated with climate change and can result in population displacement. Additionally, the decrease in land productivity and habitability, along with diminished food and water security due to climate change, can intersect with various demographic, economic, and social factors to drive population mobility and migration with implications for population health. Migrants may be more susceptible to both communicable and non-communicable diseases due to changing climatic conditions in their home countries, their destinations, or during their migration journey. While migration has not yet been a major factor in communicable disease outbreaks, it is essential for public health authorities to implement effective screening and vaccination programs for priority diseases.

The rise in population, coupled with socio-economic development, is boosting travel and tourism. Moreover, technological advancements have enhanced global connectivity, shortening travel times. Thus, travel and tourism can contribute to disease dispersion of tropical diseases to temperate regions of the world, where climate change has created suitable conditions for transmission. Many temperate regions, including high-income countries, are now more hospitable to vector-borne diseases. This increases the risk of importing vectors and pathogens from endemic areas, potentially leading to outbreaks of diseases that local health professionals may not be familiar with.

Health systems must be equipped to handle the potential public health impacts of migration, travel, and tourism, and the broader effects of climate change. Integrated surveillance, early case detection, and other public health measures are vital to safeguard public health and prevent and control communicable disease outbreaks.

Keywords: population mobility, climate, health

Presentation number: 19 (EAA)

THE EMERGENCE OF HUMAN SCOCIETIES WITH NATURAL LANGUAGE

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Some people hold the view that the origin of natural language is the hardest problem of science. While there are some other rival problems, the emergence of natural language remains an open problem. Arguably, the origin of language was a major evolutionary transition that had its biological and social foundations. Language provided a novel inheritance mechanism and led to symbolic cultural evolution. I shall put language in the context of the human-specific adaptive suite that includes a complex theory of mind, efficient teaching, analogical reasoning, shared attention and computation, and advanced tool making and use. Protolanguage is thought to have appeared in Homo erectus in the confrontational scavenging niche, while the full syntactic capacity is likely to have appeared in Homo sapiens. Finally, I shall attempt to look at some interesting positive and negative consequences of the AI revolution.

Keywords: language, major evolutionary transitions, protolanguage, cultural evolution, symbols

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BIOLOGICAL DETERMINANTS OF INDOOR AIR POLLUTION AND IT'S RELATION TO CHILD HEALTH

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People in developed countries spend up to 90% of their time indoors and indoor air pollution has been recognized as an emerging health threat. The most common sources of pollutants of indoor air include volatile organic compounds, carbon monoxide and dioxide, indoor combustion, tobacco smoke, as well as biological sources of pollutants such as moulds, bacteria and other allergens. In their homes, people are exposed to a large number of microbes which can have important implications for their health. Within the EDIAQI project, the main sources and composition of biological determinants of indoor air pollution have been analysed, as well as the link between the exposure to microorganisms and health-related outcomes. 200 dust samples from homes of asthma patients aged 6-18 years have been collected and analysed to retrieve dust microbiome data (the diversity and quantity of bacteria and fungi) by sequencing on the Illumina MiSeq platform. Obtained genetic results have been associated with medical and other health- related data and the analysis gave support to the current findings in the field. Namely, higher microbial diversity in the environment has been shown to be inversely associated with asthma and the most prominent environmental factors affecting the house dust microbiome are living conditions (such as moisture), level of urbanization, season, pets and number of children in the family.

Keywords: indoor air pollution, dust microbiome, child health

Presentation number: 21 (EAA)

AGE AT MENOPAUSE IN RELATION TO SOCIOECONOMIC AND GENERAL HEALTH STATUS INDICATORS: A MULTIFACTORIAL ANALYSIS OF DATA FROM DIFFERENT COUNTRIES AND EVOLUTIONARY APPROACH

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Background and Objectives. Only female humans and a few species of whales go through menopause (MP). Why and what is the biological meaning of this phenomenon, which risks may be associated with early or late MP? Menopauses vary worldwide and is related to many biological and extrinsic factors. The aim of this study was to analyse global variation of MP age in relation to socioeconomic and general health status indicators, and to provide an evolutionary perspective on MP age variation. Material and Methods: Data on age at MP during the last decade were analysed in 45 countries using 36 literature sources. The MP age of the Lithuanian population was calculated using the data of 2019-2023 (880 women aged 40 to 60). Socioeconomic and general health status indicators of the included countries were taken from officially available statistical data websites. Factor analysis was applied to reveal potential factors associated with global variation of MP age. Results: Globally, the average age of MP in the analysed countries was 48.6 years (SD±2.01; Min-Max = 45.3-52.3 years). As for Lithuania, MP age was 49.6 (SD ±4.4) years. Factor analysis showed that MP is a multifaceted phenomenon that was mostly associated with general well-being indicators (GDP, life expectancy, etc.), also with many diseases that are common in developed societies today (in particular, hypertensive and ischemic heart diseases, polycystic ovary syndrome, various cancers). In addition, geographic issues were also partially related to MP age. Evolutionary theories to explain variations in MP age will be presented. Conclusions: The earliest menopause was found in countries with a sunny and warm climate. On the other hand, these countries are less advanced economically. The complex relationships between late menopause, various socioeconomic factors, and diseases need to be explored on the individual level as well in order to better understand the multifaceted structure of this phenomenon.

Keywords: Age at menopausal, global variation, general health status, socioeconomic factors, factor analysis

Presentation number: 22 (ISGA)

DEVELOPMENT OF PEAK BONE MASS: FINDINGS FROM THE NICHDBONE MINERAL DENSITY IN CHILDHOOD STUDY

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The development of peak bone mass closely follows the growth of the skeleton, but not exactly. Optimizing peak bone mass is important to prevent or delay the onset of osteoporosis later in life and also has implications for bone strength during childhood. Reference ranges for bone mineral density (BMD) are critical for interpretation of measurements by dual energy X-ray absorptiometry and paediatric bone health assessment because of the age, sex and puberty associated changes in bone accrual. However, it is unclear how to incorporate related factors, such as size, body composition and racial background into bone health assessment. Using data from the NICHD Bone Mineral Density in Childhood Study (BMDCS), a multi-centre, multi-ethnic, mixed-longitudinal, observational cohort study of over 2,000 children, the effectsof height, lean mass, pubertal development and racial background will be examined. Findings show that the association of height status (height for age Z-score) with BMD Z-scores vary as a function of age and are strongest during the ages of rapid pubertal development. Although puberty stage is a statistically significant predictor of BMD Z-score, there is large overlap between puberty stage groups, so it's value in bone health interpretation is limited. Differences based on racial background are most pronounced for African American children vs other groups. Adjustment for lean mass accounts for some, but not all of these differences. The relevance of accounting for racial background in bone health assessment and its clinical interpretation are discussed.

Keywords: bone density, body composition, bone health