Increased sleep also however decreased fat free mass. Less sleep was associated with higher BMI. Hazel cautioned against interventions at this point, as the full effects on body composition are still not well understood. Dr Caroline Childs discussed the effects of maternal Vitamin B status during pregnancy on offspring adiposity at 6 years. Low vitamin B2, B12, and B6 in pregnancy was associated with health increased fat mass, But B9 was not associated. Further work is being done looking at potential confounders and causal mechanisms. Dr Robert Levitan looked at the effects of maternal sensitivity (how a mother responds to infant signals) and child BMI. The 7 repeat DRD4 (dopamine 4 receptor gene) allele and plasticity effects of this gene were examined by looking at the MAVAN study in Canada and the Generation R study in Europe. Greater effects of sensitivity on BMI in girls who have the gene have been observed in the Generation R study, but in the MAVAN study they only found this effect for boys. Low maternal sensitivity was associated with high BMI in girls in both cohorts, but further modifications were seen after considering the DRD4 gene. Dr Albert Koulman discussed lipid metabolism in infants and has shown differences in breast fed vs lipid fed offspring where high triglycerides in the mother’s milk lead to high small triglycerides in the infant. Therefore lipid composition of breast milk affects how infants process lipids. Dr Arnd Van Deutemok looked at the association between birth weight and infant growth with energy balance behaviours using a systematic review. No association was found between birth weight and energy balance behaviours (such as energy intake, eating behaviours, physical activity and sedentary behaviours). Generally there was insufficient evidence for the association of infant growth with energy balance behaviours. Simon Schoenbuchner looked at ethnic differences in pubertal bone accrual in girls and boys. He suggested that a shift in focus from birth weight to infant growth should occur, and shift focus from physical activity measures to sedentary behaviours. Lastly, Simon Schoenbuchner looked at ethnic differences in pubertal bone accrual in girls and boys. He suggested that a shift in focus from birth weight to infant growth should occur, and shift focus from physical activity measures to sedentary behaviours. Lastly, Simon Schoenbuchner looked at ethnic differences in pubertal bone accrual in boys and girls. He suggested that a shift in focus from birth weight to infant growth should occur, and shift focus from physical activity measures to sedentary behaviours. Lastly, Simon Schoenbuchner looked at ethnic differences in pubertal bone accrual in girls and boys. 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DOHaD and Nutrition: Are we doing enough to improve birth and long term outcomes through maternal nutrition?

During this session, an overview of the current evidence on the role of nutrition in optimising short and long term infant outcomes was provided and key gaps in the research were identified for future prioritisation in this area.

Maternal micronutrient supplementation has well-documented effects on fetal growth and birth outcomes; however, each intervention (balanced protein-energy, iron-folate and multiple micronutrient supplementation) addresses individual nutritional causes of fetal growth restriction. It is important to start considering interventions in combination, rather than as independent factors, as they are usually found in undernourished settings where they present as multiple, rather than single deficiencies. By doing so, we may begin to see the additive effects of providing a comprehensive package of interventions to vulnerable pregnant women, rather than the beneficial, but perhaps limited, effects of isolated interventions.

Additionally, and particularly relevant for DOHaD, evidence for the medium/long term health benefits of early life micronutrient interventions in humans is limited and existing follow-up studies have focused on periods of the life course when overweight/obesity and cardiometabolic risk is still low, i.e., during childhood/adolescence. If we are to gain a deeper understanding of the associations between early pregnancy nutrition and health risk across the life course, preconception and antenatal interventions need more and longer term follow-up, particularly in low-middle income undernourished and transitioning populations.

Can we optimise maternal nutrition to minimize epigenetic errors?

The last WHO policy change in guidance for nutritional supplementation of pregnant women was in 1968, namely the use of iron/folic acid supplementation during pregnancy to prevent and treat gestational anaemia. The Cochrane review published on 1 November 2015 is set to change this as the reviewers reported a ‘strong basis to guide the replacement of iron, folic acid with multiple-micronutrient supplements for pregnant women in low- and middle-income countries.’

At this meeting, Parul Christian of John Hopkins reported that the benefits of multiple-micronutrient supplementation are over and above those seen with iron or folic acid use. A further recommendation was that in food insecure settings where maternal low BMI and low birth weight prevalence is high, balanced protein energy supplementation is needed.

However, we have little data on the use of nutritional supplements during pregnancy as statistics are available from just 28 countries. Mean coverage of iron-folic acid supplementation is only 29%.

Phillip James reports that in The Gambia, nutritional status varies considerably between the dry and rainy season. Maternal preconception concentrations of folate, B2, betaine and the SAM:SAH and the BET:DMG ratios were higher in the rainy season. This concentration change would possibly create a greater gene methylation potential.

DOHaD and Translating Public Health Nutrition Policy into Action: Reaching the Hard to Reach

The DOHaD message has centered on intercepting negative trajectories from as early as conception. This session explored how the research evidence brought forth by DOHaD can be taken up by governments, translate into policy and application of interventions in order to change negative behavior.

Research done in the UK Southampton Women’s Survey has shown that maternal diet has an impact on infant growth and health. Increased fat mass (FM) and lower IQ at age four resulted from poor maternal diet. Panel members from the University of Southampton demonstrated how in the UK they have translated research into action through the Life-Lab intervention, which aims to change negative behaviors in teenagers such as poor diet choice, unhealthy life among other things. The theory behind Life-Lab is that negative behavior (poor diet choice) is much easier to change pre-pregnancy than during or post-pregnancy. The Life-Lab intervention is termed as the “educational intervention” because the teens are first taught in a classroom the theories of how poor health choices have adverse effects later on in life, then the students are allowed to come to the lab to scientifically test those theories. It was shown that teenagers who did not attend the Life-Lab had a lower adherence to healthy behaviors as compared to their peers who did attend the Life-Lab.

Evidence from Denmark showed that targeting and concentrating government resources on risk populations proved to be effective in changing behavior. It is important for governments to address health inequities as a form of prevention. A Finnish study to investigate the role of maternal dietary patterns on adverse effects of asthma in the offspring, focusing on salty fish, vegetables and Vitamins D: Consumption of salty fish and Vit D were protective against asthma in the offspring.

Lung development starts in utero and continues up to about 20 years of age and therefore disruptions at that process could potentially lead to a decrease in lung function at an earlier age. A Finnish study to investigate the effect of preterm birth on adult lung function found an independent effect of preterm birth and fetal life on lung function not explained or mediated by childhood SES, current lifestyle or on adult lung function found an independent effect of preterm birth and fetal life on lung function not explained or mediated by childhood SES, current lifestyle or manifestation of obstructive airways disease. In the long term, fetal life may lead to increased airway obstruction at the age of peak lung function and kidney volume and function. While kidney volume was unaffected, high vegetable protein was associated with higher eGFR. This association needs further research.

The presenters in this session sought to answer the above question by highlighting how early life environments affect children’s developmental outcomes such as body composition, cognition and cardiometabolism.

DOHaD and Cardiovascular Disease

Various aspects of cardiovascular disease in childhood in animal and human studies were covered extensively in the Early life factors and cardiometabolic disease breakout session. Despite having over 12 presentations in this session that spanned almost all continents, the time restrictions of the presenters’ time meant we did not cover all aspects of the session. The main themes of focus in this session were fetal growth and growth restriction, metabolic disease, hypertension and heart and vessel imaging to estimate cardiovascular risk. Highlights from this session included the use of various growth curves for children to estimate various parameters of growth, of particular interest to fetal growth restriction. Conditional growth analysis was used to test the association between perinatal growth and energy intake and safety response at 5-6 years. Looking at non-nutritional exposures, the results from a birth cohort in Preto, Brazil were presented also using directed acyclic graphs (DAGs) and it was found that infants born by Caesarean section were at a higher risk of hypotension than those born naturally. Izuddin Aris presented findings from a multi-ethnic Asian cohort who aimed to determine the effect of infant weight, length and adiposity gains during early childhood on blood pressure at 36 months. Results showed that infants with rapid gains in weight, length and adiposity were predisposed to higher blood pressure in early childhood.

Early life Exposures and Later Outcomes

The principles of DOHaD describe how early life exposures in conception, pregnancy, infancy and childhood can have a significant impact on health and disease risk in later life. The presenters in this session sought to answer the above question by highlighting how early life environments affect children’s developmental outcomes such as body composition, cognition and cardiometabolism.

These were some of the findings reported by the speakers:

- Among indicators of physical development at birth, only head-circumference was the most prominent predictor of intelligence as measured by levels of IQ in 1 year old.
- It was reported that maternal HIV status was not associated with any outcomes. However, the higher maternal cognitive ability improved cognition and anthropometric measures compared to exclusive breastfeeding (i.e. more than 1 years) long term benefits on cognition.
- Early life exposures such severe acute malnutrition have adverse long-term effects on children’s physical development (i.e. stunting, body composition associated with increased risk of cardiometabolic disorders and functional impairments).
- Methylation variations of the SLC6A4 gene in the umbilical cord were associated with differences in childhood adiposity as measured by fat-mass and triceps skinfold.
- The Pune Maternal Nutrition Study (PMNS) showed that measuring femoral length from 18 weeks of gestation can predict stature at 20 years.
- In the New Delhi Cohort it was found that mother-child versus father-child associations were stronger predictors of cardiometabolic risk, of which they postulated it to be an intergenerational transstate through intra-generational programming.

A woman burns up to 500 extra calories a day by breast feeding her baby.