Terminology:

1. Obesity: 肥胖
2. gestational diabetes: 孕期糖尿病
3. metabolomic: 代谢物
4. epigenetic: 表观遗传学
5. hyperthyroidism: **甲状腺功能亢进症**
6. neural tube defects (NTDs): **神经管缺陷**
7. non-communicable diseases (NCDs): **非傳染性疾病**
8. inflammation: 炎症
9. oviductal: 输卵管的
10. seminal fluid: 精液
11. endocrine： 内分泌
12. maternal: 产妇
13. cleft palate: 腭裂
14. anticonvulsant: 常用抗癫痫藥
15. legumes: 豆类
16. food-borne illnesses: **食源性疾病**
17. anatomy: 解剖学
18. physiology: 生理
19. pathological: 病理的
20. corpus luteum: 黄体, 为排卵后由卵泡迅速转变成的富有血管的腺体样结构
21. fetal: 胎, placental: 胎盘的
22. uterus: 子宫
23. luteinizing hormone: **黄体化激素**, 是一种在脑下垂体前叶合成的荷尔蒙。 它的形成是受到促性腺激素释放激素(GnRH)的控制。
24. progesterone: **黄体酮**
25. human placental lactogen: **人胎盘催乳素**, 其分子结构和生物学作用与人生长激素相似，可促进孕妇乳腺生长发育和胎儿生长，妊娠第2个月开始分泌，后持续增多，妊娠末期达高峰
26. estrogen: 雌激素
27. amino acids: 氨基酸
28. myometrial: 子宫肌层，是子宫壁的中间层，包括主要的子宫平滑肌细胞（uterine smooth muscle，也称子宫肌，uterine myocytes）
29. neomyocyte proliferation: 新生肌细胞增殖
30. hypervolemia: 血容量过多
31. erythrocytes: 红细胞
32. blood plasma: 血浆
33. physiological anemia: 生理性贫血
34. ventricular: 心室
35. diaphragm: 隔膜
36. bronchioles: 細支氣管
37. lumbar lordosis: 脊柱前凸
38. cartilage: 软骨
39. sacroiliac: 骶骨
40. femur: 股骨
41. insulin secreting pancreatic beta cells: **胰岛β细胞**
42. glucose: 葡萄糖
43. hepatic basal glucose: 肝糖
44. hypoglycemia: 低血糖的
45. anabolic state: 合成代谢
46. catabolism: 分解代谢
47. adipose: 脂肪
48. triglycerides: **三酸甘油酯**
49. **corticotropin releasing hormone: 促肾上腺皮质激素释放激素**
50. **buttock: 臀部**
51. **homeostasis: 稳态**
52. **lactation: 哺乳期**
53. fatty acid: 脂肪酸
54. alpha linoleic acide: α-亞油酸
55. endothelia functions: 内皮功能, **内皮**调节血管张力；调控细胞和营养物转运；维持血液流动性；有助于促炎症和抗炎症介质之间以及促凝和抗凝活性之间的局部平衡；
56. glycemic index: 升糖指数
57. thyroid: 甲状腺
58. alkaloid: 生物碱
59. pathogen: 病原
60. Epigenetic: **表观遗传学**
61. methylation: **DNA甲基化**是真核细胞正常而普遍的修饰方式，也是哺乳动物基因表达调控的主要表观遗传学形式。 DNA甲基化后核苷酸顺序及其组成虽未发生改变，但基因表达受影响。
62. metabolome: 代谢物组
63. enzymes: 酵素

Preconception

Vaccination: Rubella （风疹，MMR） and hepatitis B (乙肝)

No smoking, no alcohol

Food and beverage (nutrition > energy):

- vegetables, whole grains, sea food, eggs, beans, peas, unsalted nuts and seeds
- salt < 2.3g
- Folic Acid (Vitamin B9):
  - Preconception month (3 month before conception): 400 ug/day
  - first trimester of pregnancy (12 weeks): 400 ug/day
  - second and third trimester (>12 weeks): 800ug/day

Weight Control and Exercise:

- 2.5 hours/week, muscle strengthening exercises > 2 days
- BMI: 18.5 - 24.9kg/m
- BMI>30, clinically obese
  - Mom:
    - preeclampsia: 妊娠毒血症
    - cesarean section: 剖腹产
    - postpartum hemorrhage: **產後出血**
  - Baby:
    - macrosomia: 巨大儿
    - hypolyglycemia: 低血糖症

During Pregnancy

Physiological Adaption:

- reproductive tract:
  - uterus: weight increases 70g - 1.1kg
  - breast tenderness
- cardiovascular system:
  - blood volume increase
  - blood viscosity decrease (血液粘度)
  - stroke volume increase -> heart rate increase (peak at 16 to 24 weeks)
- respiratory tract:
  - lung volume increase
  - chest configuration changes.
- musculoskeletal system: 肌肉骨骼
  - lumbar lordosis: 脊柱前凸
  - pelvic floor: 盆底肌 -> urinary incontinence: 尿失禁

Metabolic Adaption:

- lipid metabolism: 脂肪酸代谢
- insulin-secreting pancreatic beta cells become hyper-plastic (增生) -> insulin secretion increase (胰岛素增加) -> lipid deposition: 脂肪沉积， inhibit lipolysis: 抑制脂肪分解 (peak around 10-13 weeks)

Macronutrients:

- Energy supply: energy requirement only increase slightly, about 10%, 250 kilocalories per day is sufficient.
  - first trimester: no weight gain
  - second/third: increase slightly weight
- Quality of food:
  - extra protein (15%) and carbonhydrate intake (55%), but not fat intake (15% - 30%)
  - **avoid saturated fatty acids (trans-fatty acids): in processed food or fired foods or fast foods.**
  - carbonhydrate: low glycemic index food to increase the glucose and insulin level evenly.

Micronutrients:

- folate, calcium, iodine, vitamin D and vitamin B12, iron

Food to avoid:

- Caffeine: guarana berries (瓜拿纳果), kola nuts -> energy drinks, cola-related beverage. <200ug (<3 cups per day), otherwise, will cause retardation.

food borne Infections:

- listeria monocytogenes (李斯特菌): unpasteurized milk (未经高温消毒的牛奶), sausage, soft cheese, smoked fish, salad -> neonatal sepsis (新生儿败血症), meningitis (脑膜炎), death
- salmonella (**沙門氏桿菌): hollandaise sause(荷兰酱), mayonnaise(蛋黄酱), salad dressing, tiramisu, frosting (糖霜)-> meningitis**
- toxoplasmosis(弓形虫): from cat -> neurological & ophthalmological(眼科) consequences.

Nutrition-related Pregnancy Outcomes

Obesity: Management during pregnancy

- Weight gain: weight gain is based on different BMI
- Food
  - high in fiber with fresh fruits, vegetables, lean protein, and complex carbohydrates
  - sugar, saturated fats, and cholesterol should be avoid.
- Exercise
  - Water exercise
- Nutrition
  - facid acid: obese women should take more than normal weight women.
  - vitamin D

Gestational Diabetes Mellitus (**妊娠期糖尿病**): Management during pregnancy

- most commonly developed during the last trimester
- even women with normal BMI could get the GDM
- Maternal Adverse Outcome
  - Hypertension
  - Preeclampsia: 妊娠毒血症（子癎前症）
  - Ceasarian delivery
  - Labor complications
- Neonatal Adverse Outcomes (新生儿不良后果)
  - Macrosomia: **巨大兒**
  - Large-for-gestational age
  - hypoglycemia: 低血糖症
  - Fetal Organomegaly (器官肿大)
  - Shoulder dystocia: 肩难产
  - Perinatal morbidity and mortality
- GDM Screening practices
  - 2 hr 75g Oral glucose tolerance test (OGTT)
  - Non-fasting 50g Oral Glucose Challenge Test (OGCT)

Early Nutritional Programming: is epigenetic the key?

- 270 (pregnancy) + 365 (year 1) + 365 (year 2) = 1000 days have a lasting impact for the rest of their life.
- DNA methylation: particularly an early event.
- Environmental cues, e.g. lifestyle and dietary choices, can change the offspring's physiology and function for lifetime and modulate long-term health and disease development.
- dietary carbohydrate intake during the early phase of pregnancy altered the DNA methylation status at the site of the vitamin E receptor gene -> increase the levels of body fat deposition (沉淀).

Practical Advice for a Health Pregnancy

1. Why pregnant Women should be eating fish?
   a. Oily Fish provides
      i. EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid):
         1. influence cardiovascular and immune functions, platelet (血小板) aggregation and inflammation.
         2. nerve cells and brain, gray matter
         3. retina (视网膜) of the eye
         4. muscles, liver
      ii. Vitamin D and iodine,
      iii. choline(**胆碱**), selenium (硒), iron, zinc, and copper
   b. Fish selection:
      i. Types of fish to avoid (carnivorous fish, 食肉的鱼): Tuna, Swordfish, pike, hake, marlin, king mackarel
      ii. Types of fish to eat: salmon, trout, herring, haddock, atlantic mackarel, sole
   c. Fish consumption:
      i. dietary omega-3 fatty acid: 300 milligram DHA per day = two portions of fish per week, one of which should be oily fish.
      ii. take a supplement that provides 200 milligram DHA per day if not eat sea fish.
2. Physical activity tips for a healthy pregnancy
   a. do not exercise very vigorously in early pregnancy -> miscarriage
   b. **best exercises:** swimming, aerobics, walking
   c. **benefit**: lung function, blood flow to the uterus, the blood flow to the baby
   d. **strength training of the pelvic floor** (盆骨底) -> prevent urinary incontinence.
   e. **warning sign**: excessive shortness of breath, chest pain, painful uterine contractions, leakage of amniotic fluid, vaginal bleeding, reduced fetal movement.
   f. **suggestion**: 150 minutes of moderate intensity aerobic exercise per week
3. Nausea and Vomiting in Pregnancy
   a. It usually happens between 6 to 12 weeks of gestation.
   b. if it appears after the 12th week, you should consult your physician because it might have different causes.
   c. if weight loss of more than 5% of your pre-pregnancy weight -> a sign of hyperemesis gravidarum (**妊娠劇吐症**) -> dehydration and nutrient deficiencies.
4. Planning for infant feeding: plan before the pregnancy and identify the potential hurdles. Partner is very important.
5. Nutrition in Pregnancy - Fact or Fiction