

授課講師學經歷

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課程名稱(主題)	婦幼體重控制與營養
服務單位(包含職稱)	臺北醫學大學附設醫院營養室主任
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授課內容摘要

現代人懷孕談何容易，不僅要考慮經濟、孩子的照顧問題，更重要的是如何健康安全的受孕、生下健康的寶寶，讓他快樂的成長。現今輔助性生殖技術的進步與發展，造福了很多不孕的夫妻，也使得孕前的營養，相形的被重視。父母親健康的身體狀況是生下健康嬰兒的重要因素，而孕前營養狀況是決定卵子或精子健康與否的必備條件，因此準備懷孕的婦女，應注意營養之均衡性，尤其是葉酸的補充，如多吃糙米、牛奶、香蕉、豬肝、肉類、深綠色蔬菜等食物，每日葉酸建議量為 400 微克。優良的精子是創造優質寶寶的第一步，因此男性也要多吃些增強精子活動力的營養素，如：蛋白質、鋅、硒、維生素 C、異黃酮等抗氧化性高的食物，如海鮮類、黑芝麻粉、大豆、菇類、核果類、水果等，可幫助維持精子的活動力。

除此之外，孕前的媽媽需注意體重的管理，太胖或太瘦都會影響受孕的機率，因為兩者都會因影響性荷爾蒙的分泌，造成不孕。因此將體重控制在理想的範圍，媽媽的孕前營養狀況良好，新生兒的體重適當，對胎兒的智力、健康、甚至成年後慢性疾病發生的預防，都會有良好的影響。

在懷孕的 40 週期間，寶寶由一個受精卵開始分化，最後發育成為一個完整的個體，體重約為 3000 公克左右。懷孕婦女除依據每日飲食指南獲得正常均衡的飲食外，在懷孕的第二、第三期，每日尚需增加 300 大卡的熱量。懷孕第一期的婦女，在懷孕前營養狀況佳，是不需要特別增加蛋白質的攝取量，到第二期、第三期，因為胎兒快速發育，母體、子宮、乳房、羊水及血液都大幅度的擴張，所以需增加 10 公克的蛋白質，且建議其中一半以上的蛋白質要來自高生理價值的蛋白質(如蛋、奶、魚、肉、黃豆)。

生產後的體重恢復，對媽媽來講是非常重要的，因為產後肥胖是大多數女性肥胖的主因，因此建議於生產後的六個月，能儘快回復到產前的體重。產後哺乳是恢復身材的最佳方法，但哺乳的媽媽還是要注意攝取足夠且適當的營養，以確保能提供嬰兒成長發育所需的營養。建議哺乳的媽媽熱量攝取應比懷孕前增加 500 大卡，蛋白質則增加 15 公克。

懷孕前後的營養維繫著兩個生命體的運行與調適，為了正常胎兒的成長與母體的健康，適當的營養調適是必要的，飲食應以正常的均衡飲食為基礎，於不同時期調整熱量及營養素，來渡過人生中一個重要的生命期。

產後瘦身計劃—飲食

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營養室主任
蘇秀悅營養師

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Women during the childbearing years

- The risk of obesity
 - The incidence is highest
 - The potential impact
 - Maternal and fetal outcomes in the short term
 - Chronic disease risk in the long term

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Obesity rates in young women

- The greatest increase in the incidence of obesity occurred in young women 18 to 29 years old. JAMA, 1999,282:1519-1522
- In the latest Pregnancy Nutrition Surveillance data (2004), approximately 40% to 50% of women were overweight when they became pregnant. www.cdc.gov. July15, 2006

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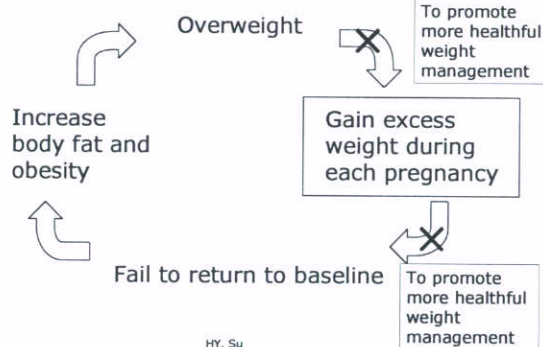
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- o Women who are overweight before pregnancy are most vulnerable to excessive gestational weight gain.

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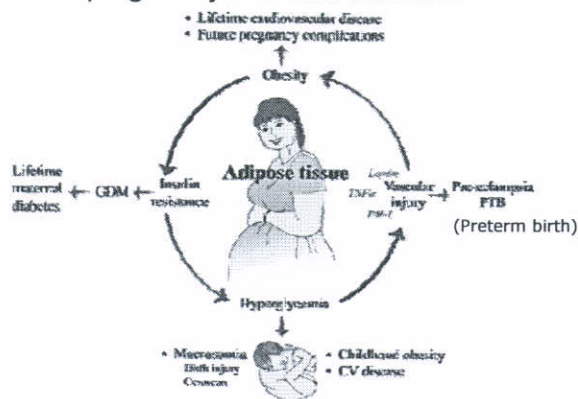
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Vicious cycle



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The pathological effects of obesity on pregnancy and fetal outcome



Recommended gestational weight gains based on prepregnant BMI

Prepregnant BMI	Recommended gain
<18.5	28-40(12.7-18.2)
18.5-24.9	25-35(11.4-15.9)
25-29.9	15-25(6.8-11.4)
>30	At least 15(6.8), no specific weight target

IOM, 1990

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Recommended gestational weight gains based on prepregnant BMI

Prepregnant BMI	Recommended gain(kg)
<19.2	12.5-18
19.2-26	11.5-16
26-29	7-11.5
>29	>=7

IOM, 1992

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Pregnancy weight matrices at midgestation (20 weeks)

Prepregnant BMI	Inadequate gain(lb)	Appropriate gain(lb)	Excessive gain(lb)
<18.5 or IBW<85%	<11 (5.0)	11-16 (5.0-7.3)	>16 (7.6)
18.5-24.9 or IBW 100%	<12 (5.4)	12-16 (5.4-7.3)	>16 (7.3)
25-29.9 or IBW 120%	<5 (2.3)	5-8 (2.3-3.6)	>8 (3.6)
>30 or IBW>150%	Weight loss or no gain	Not determined	Not determined

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Erick, 1991 12

Recommended gestational weight gains based on prepregnant BMI

Prepregnant BMI	Recommended gain
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>30 or IBW>150%	Weight loss or no gain	Not determined	Not determined

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Erick, 1991 12

Pregnancy weight matrices at term (40 weeks)

Prepregnant BMI	Inadequate gain(lb)	Appropriate gain(lb)	Excessive gain(lb)
<18.5 or IBW<85%	<28 (12.7)	28-40 (12.7-18.2)	>40 (18.2)
18.5-24.9 or IBW 100%	<25 (11.4)	25-35 (11.4-15.9)	>35 (15.9)
25-29.9 or IBW 120%	<15 (6.8)	15-25 (6.8-11.4)	>25 (11.4)
>30 or IBW>150%	Weight loss or no gain	15 (6.8)	Not determined

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Erick, 1991 13

Excess weight in the postpartum

- At 6 weeks postpartum, when blood volume and uterus size have returned to normal
 - 2/3 women still weigh more—an average of 3 to 7 kg—than their prepregnancy weight.
- Obese women accrued a higher fat mass during gestation
 - The more postpartum weight retention
 - The longer it will take the mother to return to her prepregnancy

Ethn Dis, 2004, 14:161-162

Am J Obstet Gynecol 2003, 189:1423-1432

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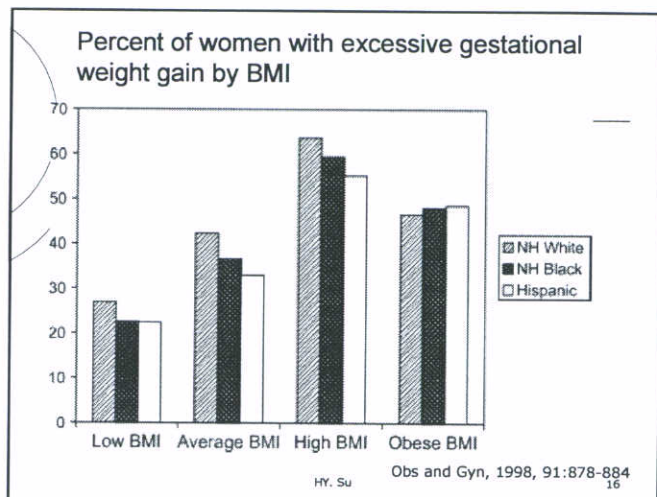
Prepregnancy BMI

- The strongest predictor of excess gestational weight gain and future obesity
 - Weight management needs to occur in the interconceptional period
- The most common time between pregnancies is more than 18 months.
 - This is sufficient time to attain a healthful BMI.

www.cdc.gov. July 15, 2006

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Body weight during the reproductive years

- o Predicted BMI 15 years later
 - Weight gain during pregnancy
 - Weight loss at 6 months postpartum
 - Prepregnancy BMI
- o Diabetes, heart disease, dyslipidemia, hypertension were higher in women who were obese prior to or after pregnancy.

Obstet Gynecol 2005, 104:1102-1108

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Postpartum period - a critical period for weight management

- o Women who gained the least weight during long-term follow-up had lost most of their pregnancy weight by 6 months postpartum had
 - Breastfed
 - Participated in regular aerobic exercise

J Am Diet Assoc 2007, 107:37-39

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Weight management in the postpartum period

- To assess readiness, intention, and barriers to change

J Am Diet Assoc 2007, 107:37-39

- Infant care
- Obese women were more likely to eat in response to emotional cues vs physiological cues
 - Help clients become aware of these cues and develop a strategy to replace eating at that time with other behaviors.

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Weight management in the postpartum period

- To assess lactation status, dietary intake, and activity levels

J Am Diet Assoc 2007, 107:37-39

- Breastfeeding for at least 12 weeks is highly beneficial to both the infant and mother.
- This amount of breastfeeding was associated with lower BMI later in life.

Obstet Gynecol 2005, 104:1102-1108

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4-6 months

Weight management in the postpartum period

- To perceive stress or depressive symptoms of women in the postpartum period.

- The weight-management behaviors are absent or impossible to attain because of negative psychosocial factors

Obstet Gynecol 2004, 103:231-239

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Many women do not realize that their body weight during the reproductive years affects their future health.

Not recognized in health care system

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The lack of attention to weight management in the postpartum period

- Without complications, the last visit to the obstetrician is at 6 weeks postpartum.

- > 2/3 of women have not attained their prepregnancy body weight

Ethn Dis. 2004, 14:161-162

- To incorporate obesity assessment and counseling into clinical practice before, during, and after pregnancy.
- Women have no access to health professionals who could help with weight management.

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The strategies to achieve a healthful BMI in the postpartum period

- Critical periods for intervention are
 - before pregnancy, to achieve a normal BMI
 - during pregnancy, to prevent excess gestational weight gain
 - after pregnancy, to return to prepregnancy weight and not gain additional weight
- Involve the physician, nurse, and registered dietitian in communicating messages about postpartum weight control

J Am Diet Assoc 2007, 107:37-39

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14
21
28

The strategies to achieve a healthful BMI in the postpartum period

- Communicate fetal and maternal risks of obesity to prospective mothers
- If weight-management counseling is not available in the obstetrician's office, refer clients to a food and nutrition professional
- Build support groups for women to help them achieve their prepregnancy weight
- Include services by a mental health professional for weight management

J Am Diet Assoc 2007, 107:37-39

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The strategies to achieve a healthful BMI in the postpartum period

- Obtain reimbursement for nutrition services in the postpartum period
- Increase promotion of breastfeeding in the hospital, by the physician, and in the community.
- Suggest methods to increase activity in women

J Am Diet Assoc 2007, 107:37-39

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Can excessive weight gain during pregnancy be prevented

- To prevent excessive weight gain during pregnancy have focused primarily on normal-weight and overweight women
 - to prevent normal-weight from becoming overweight
 - to help overweight avoid additional postpartum weight gain

JOGNN 2007, 36:490-500

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Structural
 (plan) (program)

Community Approaches to Pregnancy Weight Management		
Reference	Intervention	Results
Olson et al. (2004)	Body mass index (BMI) monitoring during pregnancy and up to 1 year postpartum; patient education using a "Health Checkbook" for monitoring weight gain using grids and health pyramid information; postcards to identify goals and ask questions; newsletters about weight gain, physical activity, and diet during pregnancy. N = 560	Intervention reduced the risk of excessive gestational weight gain in the low-income subgroup. Reduction in weight retention at 1 year postpartum in overweight, low-income women
Gray-McDonald (2000)	Prospective cohort study with control period followed by diet and activity intervention (local radio broadcasts, educational pamphlets, supermarket tours and cooking classes, one on-one counseling, walking groups) N = 219, 107 control group, 112 intervention group	No significant differences in control group and intervention group
Peterson et al. (2002)	Home visits, telephone counseling for motivation, group classes. Postpartum period is viewed as the "window of opportunity", encourages physical activity and healthy eating. N = 700	Four year, NIH funded study results not yet published

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Individual Approaches to Pregnancy Weight Management		
Reference	Intervention	Results
Polley et al. (2002)	Stepped-care behavioral intervention (education about weight gain, healthy eating, and exercise and individual graphs of their weight gain. Women exceeding weight gain goals received more intensive intervention.) compared to normal prenatal care. Women were followed through pregnancy to their first postpartum clinic visit. N = 120	Intervention reduced excessive weight gain in pregnancy for normal weight women but not overweight women
Stotland et al. (2005)	1460 women completed telephone surveys at 20, 24-28, 32-36 weeks gestation and 8-12 weeks postpartum. How much weight do you think you should gain during your pregnancy? Did your health provider advise you concerning pregnancy weight	Women's beliefs about proper weight during pregnancy and provider recommendation differ significantly. Women reported getting inaccurate advice from their health care provider
Althuisen et al. (2006)	Randomized control trial with individualized intervention (counselor coaches and informational brochures) compared to normal midwifery care (in the Netherlands). Study focused on early pregnancy through 1 year postpartum. N = 250	Funded study still in progress

Can excessive weight gain during pregnancy be prevented?

- Weight status, income, and culture were factors that influenced whether an intervention was efficacious in a group or subgroup

JOGNN 2007, 36:490-500

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Processes of weight change during the postpartum period

- One in six women will retain at least 5 kg after initial postpartum changes

Epidemiologic Reviews, 1999, 21:261-275

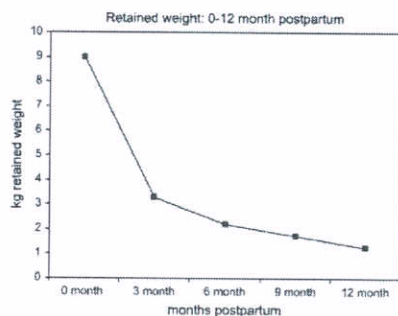
- Most women lose weight shortly after birth related to loss of excess body fluids accumulated during pregnancy, this drop is short lived and ends in the first 2 to 3 weeks postpartum

J of Obs Gyn, Neonatal Nursing, 2006, 35:472-481

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A hypothetical trend of weight changes from birth to 12 months postpartum based on European data



Kanadys, 1998

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Postpartum Weight Management Intervention Studies

Source	Design and Intervention	Participant Characteristics	Weight Outcomes
Dusdieker, Hemingway, and Stumbo (1994)	10-week, one-group intervention of reduced-calorie diet (25% less than energy requirements) and behavioral content that started at 4-14 weeks postpartum; 3 frozen meals provided each week	33 breastfeeding women (no income, education, or ethnic description of sample given)	Mean weight loss during the intervention was 4.8 kg (SD = 1.2); no control group

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Postpartum Weight Management Intervention Studies

Source	Design and Intervention	Participant Characteristics	Weight Outcomes
Leermakers, Anglin, and Wing (1998)	Randomly assigned to control group or 6-month intervention consisting of reduced-calorie diet (1,000-1,500 kcal), increased physical activity (walking 2 miles, 5 days a week), and behavioral content delivered through 2 group meetings, 16 mailed lessons, and telephone follow-up that started at 3-12 months postpartum	90 nonlactating women (most college educated; 97% of sample was White)	Mean weight loss in the intervention group was 7.8 kg ($SD = 4.5$) compared to 4.9 kg ($SD = 5.4$) in the control group

Postpartum Weight Management Intervention Studies

Source	Design and Intervention	Participant Characteristics	Weight Outcomes
Lovelady, Garner, Moreno, and Williams (2000)	Randomly assigned to a control group or a 10-week intervention of reduced-calorie diet (reduced by 500 kcal) and increased physical activity (for 45 min on 4 days a week) that started at 4 weeks postpartum	40 overweight breastfeeding women (no income or education data; 82.5% were White)	Mean weight loss in intervention group was 4.8 kg ($SD = 1.7$) compared to 0.8 kg ($SD = 2.3$) in control group

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Postpartum Weight Management Intervention Studies

Source	Design and Intervention	Participant Characteristics	Weight Outcomes
O'Toole, Sawicki, and Artal (2003)	Randomly assigned to self-directed group (1-hr program on diet and exercise) or structured intervention consisting of an individualized reduced-calorie diet (reduced by 350 kcal) and increased physical activity program that started at 1.5-6 months postpartum; weekly sessions for 12 weeks, then biweekly for 2 months, and then monthly to 1 year postpartum	40 overweight women (57% breastfeeding at enrollment; most college educated; 97.5% White)	At 1 year postpartum, mean weight loss in structured intervention group was 7.3 kg (SD not given) compared to 1.3 kg in self-directed group

Nutritional requirements - Energy

- Metabolism increases by 15% in pregnancy.

	14-18 yr	19-50 yr	Pregnant	Lactating
USA Energy(kcal)	2368	2403	+10 1st trimester +340 2nd trimester +452 3rd trimester	+330 1st 6 mo +400 2nd 6 mo
ROC Energy(kcal)	2150	2050	+0 1st trimester +300 2nd trimester +300 3rd trimester	+500 1st 6 mo

+蛋白質10公克
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+蛋白質15公克
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Consequences of energy restriction

- It is now accepted that an inadequately nourished mother is proportionately less affected than her fetus.
- Severe energy restriction is increased ketone production.
- The short- and long-term effects of maternal ketonemia are unclear.
- At this time obese women should be counseled that pregnancy is not a time for weight loss.

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Nutritional care during pregnancy

- Energy intake to meet nutritional needs and allow for about a 0.4 kg/wk weight gain during the last 30 weeks of pregnancy.
- Protein intake to meet nutritional needs, about an additional 25 g/day; additional 25 g/day/fetus if more than one fetus.
- Sodium intake that is not excessive but is no less than 2-3g/day.
- Mineral and vitamin intakes to meet the recommended daily allowances.
- Alcohol omitted.
- Caffeine in moderation: less than 200 mg/day - equivalent of 2 cups of coffee.

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懷孕期飲食設計(19-30歲，女性157公分，51公斤)
RDI建議熱量2050大卡，蛋白質50公克
以30-35大卡/公斤計算

	2050	1530	1530+300	1755	1755+300
低脂肪類	2	2	3	2	3
五穀根莖類	14	9	11	12	14
中脂肪肉類	3	3	3	3	3.5
蔬菜類	3	3	3	3	3
水果類	3	2	2	2	2
油脂類	9	5	6	6	6
蛋白質	68(13%)	58(16%)	70(16%)	64(15%)	80(16%)
脂肪	68(30%)	48(29%)	57(29%)	53(28%)	60(27%)
醣類	294(57%)	204(55%)	246(55%)	249(58%)	291(58%)
熱量	2060	1480	1777	1729	2018

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Table 1—Dietary reference intakes for pregnancy

Nutrient	RDA or AI* for pregnancy
Energy	+340 kcal/day second trimester +452 kcal/day third trimester
Carbohydrate	175 g/day
Total fiber	28 g/day*
Linoleic acid	13 g/day*
α -Linolenic acid	14 g/day*
Protein (g · kg ⁻¹ · day ⁻¹)	1.1 (additional 25 g/day)
Total water	3.0 L/day (~12 cups)
Sodium	1.5 g/day*
Potassium	4.7 g/day*
Calcium	1,000 mg/day
Phosphorus	0.7 g/day
Magnesium	350 mg/day
Copper	1,000 µg/day
Iodine	200 µg/day
Iron	27 mg/day
Zinc	11 mg/day
Vitamin A	770 µg/day retinol activity equivalents
Vitamin C	85 mg/day
Vitamin D	5 µg/day*
Vitamin E	15 mg/day
Vitamin K	90 µg/day*
Thiamin	1.4 mg/day
Riboflavin	1.4 mg/day
Niacin	18 mg/day
Vitamin B6	1.9 mg/day
Folate	600 µg/day
Vitamin B12	2.6 µg/day

From the Food and Nutrition Board, Institute of Medicine (2011). *AI, adequate intake; RDA, recommended dietary allowance.

Diabetes Care 30 (Suppl. 2):S188–S193, 2007

Nutritional requirements of lactation

- o Milk production is 80% efficient
 - 100ml of milk(75 kcal) requires an 85 kcal expenditure
- o During the first 6 months of lactation, average milk production is 750 ml/day(550-1200ml/day)

IOM, 1990

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Nutritional requirements of lactation

- The obese and overweight woman may not require the full 330-400 extra kcal/day.
- Maternal fat stores accumulated during pregnancy provide about 100-150 kcal to support the early months of lactation.

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Nutritional requirements of lactation

- Milk production decreases in mothers who undertake rigorous calorie-restricted diet (1500 kcal).
- Healthy breast-feeding women usually can lose as much as 0.5 kg/wk and still supply adequate milk to maintain their infants' growth.
- It is generally advisable for lactating women to maintain an energy intake of at least 1800 kcal/day.

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哺乳期飲食設計(19-30歲，女性157公分，51公斤)
RDI建議熱量2050大卡，蛋白質50公克
以30-35大卡/公斤計算

	2050	1500	1500+500	1755	1755+500
低脂奶類	2	2	3	2	3
五穀根莖類	14	9	13	12	16
中脂肉類	3	3	3.5	3	4
蔬菜類	3	3	3	3	3
水果類	3	2	2	2	2
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蛋白質	68(13%)	58(16%)	78(16%)	64(15%)	87(16%)
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醣類	294(57%)	204(55%)	276(55%)	249(58%)	321(57%)
熱量	2060	1480	1995	1729	2235

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坐月子餐點供應原則

- 新鮮
- 清淡
- 煮熟，易消化
- 忌生食
- 忌冷
- 忌辛、辣、酸

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GDM treatment targets

Time	Blood glucose
Fasting	90–99 mg/dl
1-h postprandial	< 140 mg/dl
2-h postprandial	120–127 mg/dl

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懷孕之飲食處置

MNT was defined as a
“Carbohydrate-controlled meal plan
that promotes adequate nutrition
with appropriate weight gain,
normoglycemia, and the absence of
ketosis” .

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懷孕與哺乳營養

- 維持定時定量醣類攝取是胰島素治療時飲食控制的基本目標
- 營養治療重點為增加合適體重、良好控制血糖及不要出現酮體
- 提供足夠能量；合適增加體重，不建議減重但對於肥胖及過重的妊娠糖尿病仍建議限制熱量及碳水化合物攝取；可減少**30%**的預估熱量需求及每日碳水化合物攝取量不要低於**175公克**
- 飢餓時間、血糖值、體重增加情形及酮體產生情形調整碳水化合物分配
- 比起其他餐別早餐對碳水化合物耐受較低（減少碳水化合物份量配量）

DIABETES CARE, VOLUME 31, SUPPLEMENT 1, JANUARY 2008

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早餐 2 份 CHD

懷孕與哺乳營養

- 每日飲食紀錄監測血糖及尿酮
- 每週檢查體重紀錄，確定足夠攝取量
- 補充睡前點心預防酮體產生
- 哺乳時血糖會高低起伏；建議補乳前或哺乳中間補充碳水化合物點心

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孕期建議增加之體重

BMI	Recommended Weight gain
< 19.8	12.5-18
19.8~26	11.4 -15.9 kg
26.1~29	6.8-11.4 kg
> 29	6.8kg

As BMI increases, the correlation between infant size and maternal gain weakens to the point that there is no correlation between weight gain and infant size in obese women.

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體重控制

- 飲食紀錄
- 每次諮詢秤量體重及記錄
- 設定行為目標
- 建議孕期當中常規接受營養諮詢3次

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熱量需求及碳水化合物分配—肥胖GDM

Table 1—Intervention studies of moderate to severe caloric restriction for obese women with GDM

Author	Number of study participants (type of trial)	Calorie comparison (kcal/day)	Range of carbohydrates (g/day) (percentage of total calories)	Outcomes
Knopik et al. (22)	12 overweight GDM (randomized)	1,200 (30% restriction) vs. 2,400	130 (30%) vs. 300 (50%)	1,200 kcal restriction improved glycemia, with increased ketones
Knopik et al. (22)	6 overweight with GDM (randomized)	1,600–1,800 (30–33% restriction) vs. 2,500 plus prophylactic insulin	200 (50%) vs. 300 (50%)	1,600–1,800 kcal restriction improved glycemia and triglycerides with no marked ketonuria
Alpert et al. (23)	22 obese (nonrandomized)	1,700–1,800	212–225 (50–60%)	Lower weight gain, higher mean birth weight, no ketonuria
Major et al. (24)	12 obese (randomized)	1,200 (50% restriction) vs. 2,400 (usual intake)	300 (50%) vs. 150 (50%)	50% kcal restriction lowered mean glucose, no change in fasting plasma glucose, increased ketonuria
Rae et al. (25)	66 intervention vs. 58 control with insulin (randomized)	1,560–1,776 (30% restriction) vs. 2,010–2,220	210–244 (51%) vs. 240–274 (46%)	No difference in frequency of insulin use; 30% restriction therapy had lower mean, lower dose; no increase in ketones

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DIABETES CARE, VOLUME 30, SUPPLEMENT 2, JULY 2007

熱量需求及碳水化合物分配

Table 2—Nutrition prescriptions and prevalence of insulin use in observational and nonrandomized studies in GDM

Author	Study design (n)	% Carbohydrate of total calories	% Women treated with insulin
Ratzmiller et al. (32)	Prospective, clinical (150)	58–65	30
Catalano et al. (33)	Retrospective cohort (180)	55	17
Langer et al. (34)	Population-based, prospective (2403)	52–55	30–66
Insler et al. (29)	Retrospective, chart review (333)	54	46
Jovanovic, Peterson and Peterson (35)	GDM clinic, nonrandomized, low carbohydrate (36)	50–60	26
Jovanovic, Peterson and Peterson (35)	GDM clinic, nonrandomized, high carbohydrate (36)	50–60	50
Major et al. (36)	GDM clinic, nonrandomized, low carbohydrate (21)	42	5
Major et al. (36)	GDM clinic, nonrandomized (21)	45–50	33
Reston et al. (37)	Prospective, observational (85)	43	39

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40–50%

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Thanks for your attention !