

## Expect the Best: Update on Preconception, Pregnancy, and Post-Partum Nutrition and Exercise Advice

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## Preconception Nutrition

### Priming The Body for Pregnancy

## Centers for Disease Control and Prevention (CDC)

- *Recommendations to Improve Preconception Health and Health Care* (2005)
- Details the goals of preconception care for an estimated 62 million women in their childbearing years (15 to 44 yrs.)  
(CDC: A Report of the CDC/ATSDR Preconception Care Work Group and the Select Plan on Preconception Care)

## Preconception care includes:

- Screening for health risks, such as iron deficiency, diabetes, and overweight
- Health promotion and education
- Implementing interventions that address the identified risks to mom and to the outcome of her pregnancy
- 10 major recommendations meant for use by individuals, communities, public health and clinical practitioners and governments

## Healthy babies: Everyone's business

- The report emphasizes the critical role of all health care providers who routinely treat women, including dietitians
- Nutrition and weight control are cited as important areas to discuss with women prior to pregnancy

## Pre-pregnancy planning

- Priming the body for pregnancy, an ongoing pursuit that ideally begins well before conception
- Nearly 50% of pregnancies in US are unexpected or mistimed
- Women with unintended pregnancies are less likely to seek early prenatal care and are more likely to expose the fetus to noxious substances (AAP/ACOG, Brown and Eisenburg, eds. 1995)
- The developing fetus is highly susceptible to birth defects and other problems during the first 8 weeks

## Pre-pregnancy planning

- Should be personalized
- Account for chronic conditions, such as diabetes, obesity, HTN
- Women who have had a pregnancy end with a LBW baby, pre-term delivery, birth defect; or infant death should seek medical advice prior to conceiving

## Overweight and Obesity In Women of Childbearing Age

### Prevalence of overweight and obesity in women of childbearing age (20-39 years)

- Pre-pregnancy overweight is at an all-time high
- About 60% of women in childbearing years are overweight (BMI  $\geq$  25); 34% are obese (BMI  $\geq$  30)

(Flegal, et al. JAMA 2010;303(3))

### Prevalence of overweight and obesity in women of childbearing age (20-39 years)

- BMI  $\geq$  25: 59.5%
  - BMI  $\geq$  30: 34.0%
  - BMI  $\geq$  35: 18.9%
  - BMI  $\geq$  40: 7.6%
- (Flegal, et al. JAMA 2010;303(3))
- About 50% of women conceive at BMI  $>$  25. (IOM, 2009)
  - Majority of US adults are unaware of how health and lifestyle factors such as obesity affect reproductive health and childbearing. (CDC)

### Pre-pregnancy body weight and fertility

- Infertility affects estimated 7 million couples in the US
- Polycystic Ovary Syndrome (PCOS) is the primary reason for female infertility; a healthy body weight plays a role in managing PCOS
- BMI within the Normal range improves the chances of conception
- Higher BMI may interfere with chances of conceiving with assisted reproduction treatment  
(Influence of Pregnancy Weight on Maternal and Child Health: Workshop Report, National Academies Press, 2007; Wang, J. BMJ 321:1320-1321, 2000)

### Celiac disease and fertility

- Gluten triggers an immune response that damages SI
- Reduced capacity to absorb nutrients
- As many as 1 in 22 people may have the disease
- May reduce fertility

(Fasano A, et al. Arch of Intern Med. 2003;163(3):268-292)

## Girth control for Dad, too!

- Overweight male partners may lengthen the time to conception for the couple.
- The higher Dad's BMI, the lower the sperm count, and the lower the quality.

(Nguyen, R. Human Reproduction 2007; 22:2488-2493; Jensen, T., et al. Fertility and Sterility 2004; 82:863-870)

## Excess maternal adiposity at conception:

- May exacerbate complications of pregnancy:
  - GDM
  - -HTN
  - -pre-eclampsia
  - Macrosomia
  - Cesarean delivery (JADA 2009;109.9:18-927)
- Associated with greater fat mass in infants at birth and subsequent overweight in children (Oken, et al. Am J Obstet Gynecol 2007;196:322.e1-322.e8)
- Increases the risk of post-partum weight retention. (IOM, 2009)

## Dealing with diabetes

- 1.85 million women ages 18-44 have DM, mostly type 2
- More likely to have a pregnancy affected by a birth defect
- More likely to miscarry
- Increased risk of infant death
- Macrosomia is more likely, and so is cesarean delivery
- Offspring are at greater risk of overweight and type 2 DM later in life

(CDC: Diabetes and Pregnancy Frequently Asked Questions)

## Pre-diabetes and pregnancy

- Estimated 57 million Americans are at risk for DM because of pre-diabetes
- Pre-diabetes: FBS 100-125 mg/dl
- Pre-diabetes often predicts GDM and post-pregnancy type 2 DM

(ADA, Pre-diabetes; CDC: Diabetes and Pregnancy Frequently Asked Questions)

## Hyperglycemia and pregnancy outcomes

- Hyperglycemia is a major contributor to developmental malformations.
- Pre-conceptual diabetes management has the potential to reduce the risk for pregnancy loss and congenital malformations for about 13,000 births per year.

### Screening is key.

(A Report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care, 2009)

## Excess adiposity at conception

- BMI  $\geq$  30: Increased risk of structural defects, including NTD, heart defects, hypospadias, limb reduction defects

(Raamussen, et al. Am J Obstet Gynecol 2008;198:611-19; Waller, et al. Arch Pediatr Adolesc Med 2007;161:745-50)

## Excess adiposity at conception

- Pre-pregnancy BMI  $\geq 30$ : decreases the chances of breastfeeding as a feeding choice.
- When breastfeeding is chosen, obese women breastfeed for less time than normal weight women (BMI of 18.5 - 25); less likely to maintain BF at 1 and 3 month

(Mok, et al. Pediatrics 2008;121:e1319-e24; Viswanathan et al. AHRQ Publication No. 08 EC09, Rockville, MD, May 2008)

## Weight Gain During Pregnancy:

### Reexamining the Guidelines Institute of Medicine, 2009

## Why the need for new guidelines?

- Rising obesity rates in women of CB age since last edition (1990)
- Large proportion of women with excessive gestational weight gain (GWG)
- Strength of the evidence linking GWG to pregnancy outcomes

(IOM, 2009)

## How do the 2009 recommendations differ from the 1990 edition?

- Use World Health Organization (WHO) standards to categorize pre-pregnancy BMI
- Specify fairly narrow range of recommended weight gain for obese women (BMI  $\geq 30$ ) : 11-20# vs at least 15# in the 1990 version

(IOM, 2009)

## Other special populations

- Women of short stature: gain in the lower end of the ranges
- Adolescents: gain as adults
- Women pregnant with multiple fetuses: recommendations have changed

(IOM, 2009)

## GWG and obese women

- Recommendations are based primarily on data for women with BMI of 30 - 34.9; women with higher BMIs should gain in lower end of weight gain ranges.  
(IOM, 2009)

- BMI  $\geq 35$ : 18.9%

- BMI  $\geq 40$ : 7.6%

(Flegal, et al. JAMA 2010;303(3))

### Criteria for Classifications of Pre-pregnancy Weight

#### Body Mass Index (kg/m<sup>2</sup>)

Underweight	<18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obese	≥30

(IOM, 2009)

### Recommended Weight Gain for Pregnant Women (in pounds)

Prepregnancy BMI (kg/m <sup>2</sup> )	Recommended Weight Gain (singleton)	Recommended Weight Gain (twins)
<18.5	28 to 40	N/A*
18.5-24.9	25 to 35	37 to 54
25.0-29.9	15 to 25	31 to 50
≥30	11 to 20	25 to 42

\* No guidelines were established based on lack of sufficient data.

(IOM, 2009)

### Recommended Weekly Rate of Weight Gain for Singleton Pregnancies, 2nd and 3rd trimesters (in pounds)

Prepregnancy BMI (kg/m <sup>2</sup> )	Recommended Weight Gain	Range
<18.5	1	1.0-1.3
18.5-24.9	1	0.8-1.0
25 - 29.9	.6	0.5-0.7
≥30	.5	0.4-0.6

(IOM, 2009)

Note: Assumes 1 to 4.4 pound weight gain in the first trimester.

## Pregnancy Pounds

When to increase calories and by how much?

## GWG and maternal consequences

- Post-partum weight retention
- Cesarean delivery
- Gestational Diabetes Mellitus (GDM)\*
- Pre-eclampsia/hypertension in pregnancy\*

(\* No relationship found with GWG)  
(IOM, 2009)

## Calorie needs in pregnancy

- First trimester: 0 calories
- Second trimester: 350 calories/day
- Third trimester: 450 calories/day

(IOM, DRI)

## Cesarean delivery

- Highest rate ever recorded: 31.8% in 2007 (up 50% in last decade)
- Maternal obesity is a risk factor for cesarean delivery

(IOM, 2009; Heron, et al. Pediatrics, 2010; 125;1:4-15)

## Gain more, retain more

- Less than 50% of women gain within the recommended range for their pre-pregnancy BMI (1990 IOM ranges)
- Regardless of pre-pregnancy BMI, gaining above the recommended ranges is associated with excess maternal weight retention at 1 year post-partum

(IOM, 2009)

## Consequences of GWG for child

- SGA (<10% weight for gestational age)
- LGA (>90% weight for gestational age)
- Pre-term birth
- Childhood obesity

(IOM 2009)

## Birth weight/Infant adiposity

- Birth weight is significantly greater in neonates of overweight and obese women
- Maternal pregravid BMI has a stronger relationship with fetal adiposity than GWG and GDM
- Greater GWG is associated with higher birth weight

(IOM, 2009)

## Intentions of IOM guidelines

- Written with the idea that the reproductive cycle begins before conception and continues through the first year postpartum.
- Maternal weight status throughout the cycle influences the health of mother and child.

(IOM, 2009)

## Goals of IOM guidelines

- Conceive at a healthy weight and gain accordingly, which will require (pre-pregnancy) weight loss for many women.
- Provide dietary assessment early in pregnancy with a referral to an RD, if needed.

## Nutrients of Concern In the Childbearing Years

Helping women to close the  
gaps

Dietary patterns of women in the US  
are often deficient in:

- Calcium
- Fiber
- Magnesium
- Vitamin E
- Carotenoids
- Potassium

(USDA, USDHHS. Dietary Guidelines for Americans, 2005)

## Other nutrients of concern:

- Docosahexaenoic Acid (DHA)
- Vitamin D
- Choline
- Folic acid
- Iron
- Phytonutrients

## Iron

- Necessary for hemoglobin production oxygen transport fetal immunity, energy production, CNS development
- Estimated 8 million women of CB age have iron-deficiency anemia
- Iron stores at conception are a strong indicator for iron-deficiency anemia later in pregnancy

(CDC. A Report of the CDC/ATSDR Preconception Care Work Group and the Select Plan on Preconception Care. Scholl, T. A. JCN, 2005, 81:1218S-1225S)

## Iron

- Nonpregnant: 18 mg/day
- Pregnant: 27 mg/day
- Lactation: 9 mg/day
- Iron-deficiency during pregnancy may increase pre-term delivery, LBW, perinatal mortality
- CDC: 30 mg elemental iron/day to prevent anemia and 60 to 120 mg to treat
- Serum ferritin best reflects iron stores

(Scholl, T. A. JCN, 2005, 81:1218S-1225S)

## Folic Acid

- Women in the CB years capable of becoming pregnant should consume 400 - 800 ug/day of folic acid (U.S. Preventive Health Services Task Force. Ann Intern Med 2005;143:626-631)
- Helps prevent NTD during first month of pregnancy; low folate levels are associated with higher risk of preterm birth, LBW, fetal growth restriction
- Previous pregnancy affected by a NTD: 4000 ug/day
- Women carrying multiples; those with DM; and those with epilepsy may need more, too

(Berry, R, et al. NEJM 1999;341:1485-1490)

## Choline

- Essential nutrient, B-like vitamin
- Choline is associated with a lower risk for NTD, independent of folic acid status
- Necessary for CNS development (particularly the hippocampus); acetylcholine production; muscle control; liver function  
(Jensen, HH, et al. Experimental Biology. 2007; Shaw G, et al. Amer J of Epid. 2004;160:102-109)

## Choline

- Women: 425 mg/day
- Pregnant: 450 mg/day
- Nursing: 550 mg/day
- Just 10% of women, pregnant women, and lactating women consume adequate choline

(Dietary Reference Intakes: IOM, 2006)

## Common Choline Sources

- Egg yolk, large: 125 mg
- Cooked ground beef, 3 ounces: 83 mg
- Cooked chicken, 3 ounces: 65 mg
- Cooked salmon, 3 ounces: 65 mg
- Cooked broccoli or cauliflower, 1 1/4 cup: 40 mg  
(USDA)

## DHA

- Dominant fatty acid in brain cells; comprises up to 50% of the total FA content of rods and cone outer segments in the retina
- Pregnant and nursing women need at least 200 mg/day of DHA for proper brain and retina development in their child

(Kolezko, et al. Br. J Nutr 2007;198:873-877; Kolezko, et al. J. Perinatal Med 2008;36:5-14)

## DHA

- Many women do not consume adequate DHA
- ALA is converted to DHA, but rate is considered poor
- ALA supplementation has no appreciable affect on infant DHA levels and breast milk levels of DHA

(Innis, SM. Brain Res 2008;1237:35-42; Groot de RH, et al. Am J Clin Nutr 2004;79:251-260)

## DHA

- Fish and shellfish are rich sources of preformed DHA
- Preformed DHA gets preferential transport across the placenta and is available in breast milk
- Higher maternal DHA intakes during pregnancy and lactation linked to improved vision and cognition

(Helland, et al. Ped 2003;111(1):e39-e44; Hoffman, et al. PLEFA 2009;31:151-158)

## Selected Sources of DHA (mg)

- Salmon, coho, farmed, 3 oz cooked: 740
- Expecta Lipil, 1 pill: 200
- Blue crab, 3 oz, cooked: 196
- Tuna, light, canned, drained, 3 oz: 190
- Chicken, roasted, dark meat, 1 cup: 70
- Fortified eggs, 1 large: 50 - 150
- Fortified cheese, 1 oz: 32
- Fortified soy beverages, milk, yogurt, 8 oz: 32

## Vitamin D

- Many women in the northern part of the US, especially those of color, are at risk for vitamin D deficiency
- Overweight women are at greater risk for vitamin D deficiency

## Vitamin D

- Pregnant, lactating, nonpregnant: 200 IU/day
- UL: 2,000 IU/day
- Maternal vitamin D status (determined by measuring 25-OH-D) largely determines vitamin D status of the fetus and newborn

(Wagner,CL, Greer, FR. Ped 2008;122:1142-1152)

## Multivitamins

- Low-risk, relatively low-cost with big rewards
- Taking MV qd prior to conception reduces the risk of pre-term birth
- Meta-analysis of 41 studies suggests a link between MV and reduced NTD, heart and limb defects and cleft palate

(Vainraitan, A, et al. Jour Epidem 2004;160:886-892; Geh, Y, et al. Jour Obstet and Gyn of Canada Aug 2006; 680-689.)

## Supplement Savvy

- Look for:
  - About 100% of the Daily Value (DV), including folic acid, iron, and vitamin D
  - Less than 3,000 International Units (IU) of vitamin A; majority as beta-carotene
  - Account for vitamins and minerals in Belly Bars, Omamal Bars, other fortified foods
  - Consider calcium, vitamin D, DHA intake

## Exercise Guidelines

What's New for Women in the Childbearing Years?

## 2008 Physical Activity Guidelines for Americans

- Healthy women: At least 150 minutes (2 hours and 30 minutes) per week (ex. five 30-minute walks) of moderate-intensity aerobic activity, such as brisk walking, during and after their pregnancy, spread throughout the week.
- Healthy women who already do vigorous-intensity aerobic activity, such as running, or large amounts of activity can continue doing so during and after their pregnancy provided they stay healthy and discuss with their health care provider how and when activity should be adjusted over time.

([www.cdc.gov/physicalactivity/everyone/guidelines/pregnancy.html](http://www.cdc.gov/physicalactivity/everyone/guidelines/pregnancy.html))

## Exercise during pregnancy:

- Improves mood and energy level
- Improves chances of gaining within the IOM's guidelines
- Lessens constipation
- Improves sleep
- Improves glucose tolerance
- Helps prevent GDM

## Off limits during pregnancy:

- Skydiving
- Surfing
- Kickboxing
- Scuba diving
- Downhill skiing or snowboarding
- Waterskiing
- Horseback riding
- Skateboarding
- Roller and ice skating
- Contact sports (football, hockey, etc.)
- Gymnastics
- Mountain climbing

## Alcohol, Caffeine, and Other Safety Issues

### Considering Caffeine

- Consuming more than 200 mg/day increased the risk of miscarriage in a group of more than 1,000 pregnant women
- Greater risk attributed to caffeine as risk held for soft drinks, tea, and hot chocolate

(Weng, et al. Amer Journ Obstet Gyn 2008;198: 279.e1-279.e8)

### Common Caffeine Sources

- Starbucks coffee, 16 oz: 330 mg
- Einstein Bros coffee, 16 oz: 300 mg
- Foosh Energy Mints, 1: 100 mg
- Red Bull, 8.3 oz: 75 mg
- Mountain Dew, 12 oz: 71mg
- Diet Coke, Coke, 12 oz:~50 mg
- Tea, 8 oz: 47 mg

## Alcohol: No Amount is Safe

- No alcohol during pregnancy and when trying for a baby
- Moderate drinking (1/day) may lengthen time to conception
- Drink: 12 oz regular beer; 5 oz wine; 1 1/2 oz 80-proof distilled spirits

(March of Dimes. Drinking Alcohol During Pregnancy; NIH. Fetal Alcohol Syndrome)

## Alcohol's Lasting Effects

- Interferes with cell differentiation in the first trimester
- Deprives fetus of oxygen and nutrients
- Causes irreparable harm that lasts a lifetime

## Fetal Alcohol Syndrome (FAS)

- Leading cause of Mental Retardation in the US
- Learning disabilities
- Birth defects
- Behavioral problems
- Emotional problems

## Priming for pregnancy: Other safety considerations

- Dental care: PD may lead to pre-term birth and LBW babies
- Medications: OTC and prescription?
- Vaccinations: Up to date?
- Smoking: Only 20% of women quit while pregnant
  - LBW, pre-term, birth defects, infant death

## The Fourth Trimester

Recovering; Preparing for the Next Child?

## Nutrient Needs: Nursing Moms

- Calories: 330/day for first 6 months; 400/day for 6-12 months
- DHA: 200-300 mg/day throughout
- Continue with daily multivitamin to cover nutrient needs
- Nursing infants: Start on 400 IU vitamin D daily within first few days of birth

(Wagner, CL, Greer, FR. Ped. 2008;122:1142-1152)

## Post-partum weight loss

- No severe calorie restriction for at least 6 weeks post-delivery (Nursing moms, no less than 1,800 calories/day.)
- OK to exercise, if exercise is OK per MD
- Give your body time to recover; can take up to a year to return to "normal"

## Contact info

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