

Preconception Health & Health Care: Before, Between and Beyond Pregnancy

Michael C. Lu, MD, MPH

Associate Professor
Department of Obstetrics & Gynecology
David Geffen School of Medicine at UCLA
Department of Community Health Sciences
UCLA School of Public Health

Preconception Health Update
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Why Preconception Care?

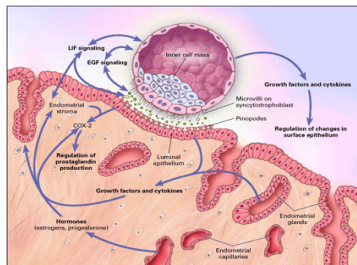
Why Preconception Care?

- Early prenatal care is too late.

Early Prenatal Care Is Too Late To Prevent Some Birth Defects

- The heart begins to beat at **22** days after conception
- The neural tube closes by **28** days after conception
- The palate fuses at **56** days after conception

Early Prenatal Care Is Too Late To Prevent Implantation Errors

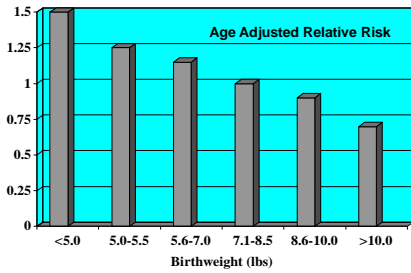


Nowiller EB, Schust DJ, Fisher SJ. Implantation and the survival of early pregnancy. *N Engl J Med.* 2001 Nov 8;345(19):1400-8.

Fetal Programming

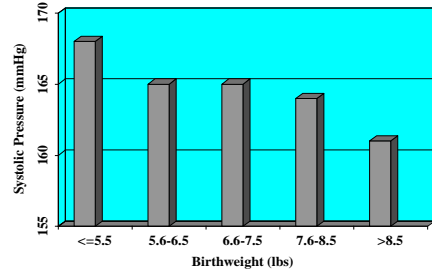


Barker Hypothesis Birth Weight and Coronary Heart Disease



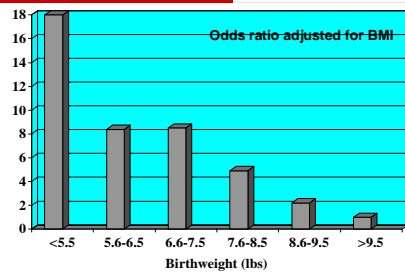
Rich-Edwards JW, Stampfer MJ, Manson JE, Rosner B, Hankinson SE, Colditz GA et al. Birth weight and risk of cardiovascular disease in a cohort of women followed up since 1976. *Br Med J* 1997;315:396-400.

Barker Hypothesis Birth Weight and Hypertension



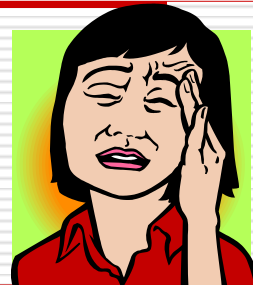
Law CM, de Swiet M, Osmond C, Fayers PM, Barker DJP, Cruddas AM, et al. Initiation of hypertension in utero and its amplification throughout life. *Br Med J* 1993;306:24-27.

Barker Hypothesis Birth Weight and Insulin Resistance Syndrome



Barker DJP, Hales CN, Fall CHD, Osmond C, Phipps K, Clark PMS. Type 2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidaemia (Syndrome X): Relation to reduced fetal growth. *Diabetologia* 1993;36:62-67.

Maternal Stress & Fetal Programming

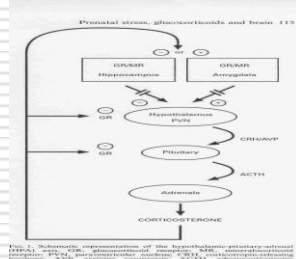


Prenatal Stress & Programming of the Brain

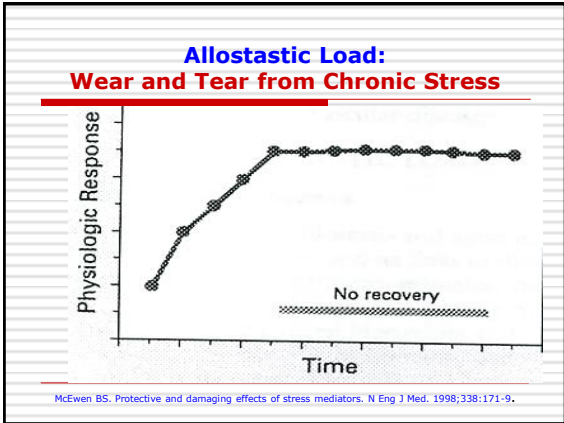
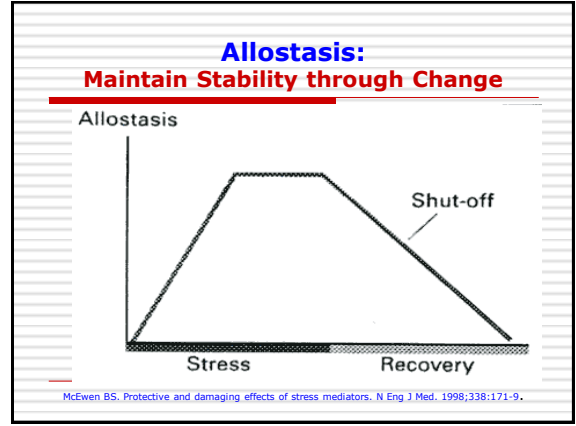
- Prenatal stress (animal model)
 - Hippocampus
 - Site of learning & memory formation
 - Stress down-regulates glucocorticoid receptors
 - Loss of negative feedback; overactive HPA axis
 - Amygdala
 - Site of anxiety and fear
 - Stress up-regulates glucocorticoid receptors
 - Accentuated positive feedback; overactive HPA axis

Welberg LAM, Seckl JR. Prenatal stress, glucocorticoids and the programming of the brain. *J Neuroendocrinol* 2001;13:113-28.

Prenatal Programming of the Hypothalamic-Pituitary-Adrenal Axis

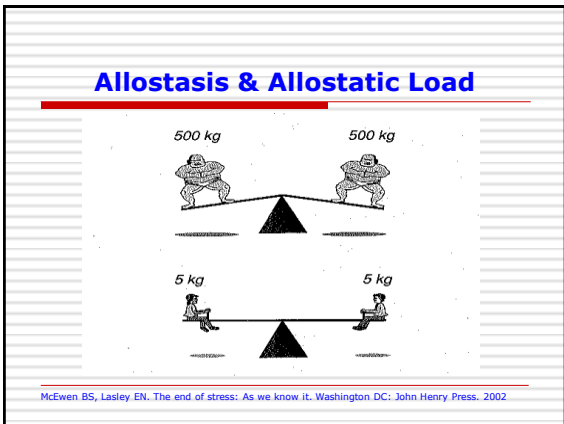


Welberg LAM, Seckl JR. Prenatal stress, glucocorticoids and the programming of the brain. *J Neuroendocrinol* 2001;13:113-28.

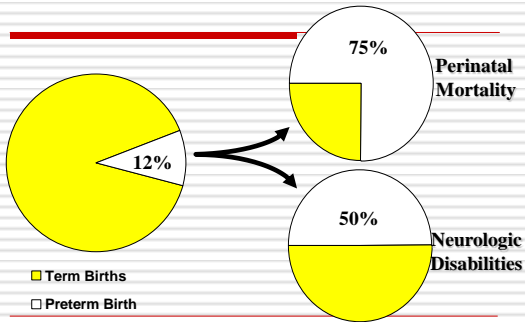


Stressed vs. Stressed Out

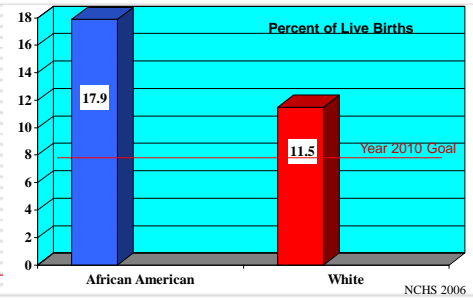
Stressed	Stressed Out
<ul style="list-style-type: none"> ■ Increased cardiac output ■ Increased available glucose ■ Enhanced immune functions ■ Growth of neurons in hippocampus & prefrontal cortex 	<ul style="list-style-type: none"> ■ Hypertension & cardiovascular diseases ■ Glucose intolerance & insulin resistance ■ Infection & inflammation ■ Atrophy & death of neurons in hippocampus & prefrontal cortex



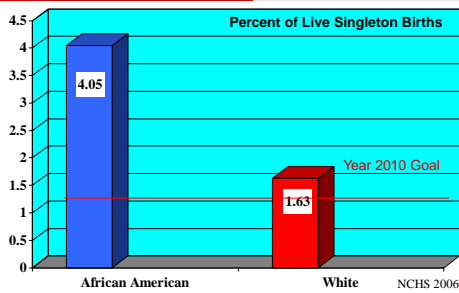
Sequelae of Preterm Birth



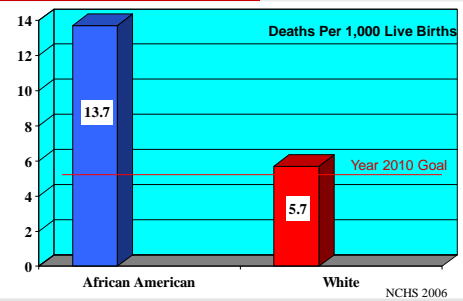
Racial & Ethnic Disparities Preterm Births < 37 Weeks



Racial & Ethnic Disparities Very Preterm Births < 32 Weeks



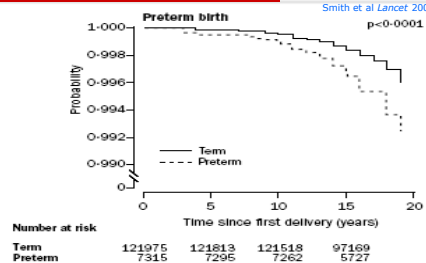
Racial & Ethnic Disparities Infant Mortality



Rethinking Preterm Birth

Vulnerability to preterm delivery may be traced to not only exposure to stress & infection during pregnancy, but host response to stress & infection (e.g. stress reactivity & inflammatory dysregulation) patterned over the life course (early programming & cumulative allostatic load)

Preterm Birth & Maternal Ischemic Heart Disease



Kaplan-Meier plots of cumulative probability of survival without admission or death from ischemic heart disease after first pregnancy in relation to preterm birth

Take Home Message #1

- ❑ Even early prenatal care may be too late
 - To prevent some birth defects
 - To prevent implantation errors
 - To restore allostasis quickly enough to optimize fetal programming

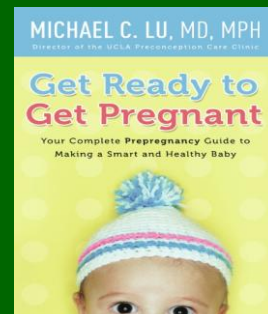
Take Home Message #2

- ❑ An important objective of preconception care is to restore allostasis and optimize women's health before pregnancy

Take Home Message #3

- ❑ Preconception care should address not only clinical factors, but also social determinants of women's health

Get ready to get pregnant



Get Ready to Get Pregnant

1. Start prenatal care before you get pregnant
2. Start eating for two
3. Eat more brain foods
4. Avoid toxic foods
5. Take a multivitamin everyday
6. Achieve a healthy weight
7. Learn how not to get stressed out
8. Give your immune system a tune-up
9. Detoxify your environment
10. Help your man get ready

Tip #1
Start prenatal care
before you get pregnant

Key Components of Preconception Care

1. Reproductive life plan
2. Past reproductive history
3. Medical assessment
4. Medication use
5. Infections & immunizations
6. Genetic risks
7. Healthy weight & nutrition
8. Psychosocial & behavioral risks
9. Healthy environment
10. Physical assessment

Reproductive Life Plan

- A set of personal goals about having (or not having) children based on personal values and resources
- A plan to achieve those goals

<http://www.cdc.gov/ncbddd/preconception/QandA.htm#5>

Examples of a Reproductive Life Plan

1. Do you hope to have any (more) children?
2. How many children do you hope to have?
3. How long do you plan to wait until you (next) become pregnant?
4. How much space do you plan to have between your pregnancies?
5. What do you plan to do until you are ready to become pregnant?
6. What can I do today to help you achieve your plan?

Reproductive Life Plan

- Counsel about age-related risks

Infertility increases with age

Age Group	Percent Infertile*
20-24	7
25-29	9
30-34	15
35-39	22
40-44	29

* Infertility is defined as inability to conceive after one year of unprotected sexual intercourse

Miscarriage increases with age

Age Group	Percent Miscarried
15-19	10
20-24	10
25-29	10
30-34	12
35-39	18
40-44	34
≥45	53

Risk of chromosomal abnormalities

Maternal Age	Risk for Down's	Risk for Any Chromosomal Abnormalities
20	1/1,667	1/526
25	1/1,250	1/476
30	1/952	1/385
35	1/378	1/192
40	1/106	1/66
41	1/82	1/53
42	1/63	1/42
43	1/49	1/33
44	1/38	1/26
45	1/30	1/21
46	1/23	1/16
47	1/18	1/13
48	1/14	1/10

<http://www.asrm.org/Patients/patientbooklets/agefertility.pdf>

Tip #2

Start "eating for two"
(in quality, not in quantity)

Make Healthy Food Choices Eat a Balance Diet

- Whole grain foods: 5-7 servings
- Plant oils: 6 teaspoons
- Vegetable and fruits: 5 servings
- Nuts, beans and lentils: ½ to 1 cup
- Fish, poultry or egg: 1 serving a day
- Dairy: 3 servings
- Multivitamin: 1 a day



<http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/pyramid>

Make Healthy Food Choices Vegetarian or Vegan Diet

- ❑ **Protein**
 - Eggs and milk
 - Eat a variety of plant proteins (e.g. combine beans with rice)
- ❑ **Smart Fats**
 - Increase intake of alpha-linolenic acid (e.g. tofu, soybean, walnuts, flaxseeds)
 - Take DHA supplement made from microalgae (300 mcg a day)
- ❑ **Vitamin B12**
 - Cereal or veggie meat fortified with vitamin B12
 - Take a multivitamin (2.6 mcg a day)
- ❑ **Micronutrients**
 - Zinc (tofu, beans, nuts, seeds, fortified cereal; 11 mg a day)
 - Calcium & Vitamin D (soymilk, tofu, almonds, figs, orange, collard greens; 1000mg of calcium & 5 mcg of Calciferol a day)
 - Vitamin A (beta carotene: orange, carrots, apricots, peaches, sweet potatoes, yams)
 - Iodine (sea vegetables e.g. seaweed or iodized salt; 220mcg a day)

Tip #3 Eat more brain foods

Top 10 Brain Foods

- ❑ Beans
- ❑ Eggs
- ❑ Nuts & seeds
- ❑ Olive oil
- ❑ Alaskan wild salmon
- ❑ Yogurt & kefir
- ❑ Whole grains
- ❑ Spinach, collards, kale & broccoli
- ❑ Prunes, raisin, blueberries
- ❑ Oranges, red bell pepper, tomato

Tip #4 Avoid toxic foods

Top 10 Toxic Foods

- ❑ Swordfish, shark, king mackerel and tile fish
- ❑ Soft cheese and unpasteurized milk
- ❑ Hot dogs, luncheon meats, deli meats, raw or smoked seafood
- ❑ Raw or undercooked meat
- ❑ Unwashed vegetables, raw vegetable sprouts, and unpasteurized juices
- ❑ Liver
- ❑ Saturated fats, *trans* fats, and partially hydrogenated oils
- ❑ Added sugars
- ❑ Refined flour
- ❑ Herbal preparations



Fish:

Brain Food or Toxic Food?

What You Need to Know about Mercury in Fish & Shellfish

- 2004 EPA/FDA Joint Advisory for
 - Women who might become pregnant
 - Women who are pregnant
 - Nursing mothers
 - Young children
- Do not eat Shark, Swordfish, King Mackerel, or Tilefish
- Eat up to 12 ounces (2 average meals) a week
 - Shrimp, canned light tuna, salmon, pollock, catfish are low in mercury
 - Albacore ("white") tuna has more mercury than canned light tuna
- Check local advisories about locally caught fish
 - www.epa.gov/ost/fish

www.epa.gov/mercury

Tip #5
Take a multivitamin
everyday

Micronutrients: Choosing Your Multivitamin

- **Folic acid**
 - 400 mcg a day
 - 4000 mcg a day with prior NTD
- **Avoid excess** (more isn't always better)
 - A>10,000 IU
 - D>4,000 IU
- **Nutrition first!**

Tip #6
Achieve a healthy weight

Achieve A Healthy Pre-Pregnancy Weight

- **Underweight: BMI<18.5**
- **Normal: BMI = 18.5-24.9**
- **Overweight: BMI = 25-29.9**
- **Obese BMI≥30**

National Heart, Lung, and Blood Institute at www.nhlbi.nih.gov

Achieve A Healthy Pre-Pregnancy Weight

- **For weight loss,**
 - Decrease calories in
 - Increase calories out (exercise)
 - Keep track of weight & nutrition
- **Maintain a healthy weight for 3-6 months before pregnancy**

National Heart, Lung, and Blood Institute at www.nhlbi.nih.gov

Tip #7
Learn how not to get stressed out

Stress & Preterm Birth

And his daughter in law, Phinehas' wife, was with child, near to be delivered; and when she heard the tidings that the ark of God was taken, and that her father in law and her husband were dead, she bowed herself and travailed; for her pains came upon her.

Samuel 4:19

Learn how not to get stressed out

- Exercise
- Eat right
- Get a good night's sleep

Learn how not to get stressed out

- Relaxation techniques**
 - Breathing exercises
 - Progressive relaxation
 - Meditation
 - Mindfulness

Learn how not to get stressed out

- Positive Mental Health**
 - A sense of meaning
 - Self-acceptance
 - Autonomy
 - Positive relations with others
 - Satisfaction with life
 - Optimism

Learn how not to get stressed out

- Develop Positive Mental Health**
 - Find your purpose ("follow your bliss")
 - Use your strengths
 - Count your blessings
 - Live in gratitude
 - Learn to forgive
 - Savor life's joy
 - Spend time with friends and families
 - Practice daily acts of kindness
 - Learn to be optimistic

Learn how not to get stressed out

Relationality is primary,
All else is derivative.

- Ronald David

Tip #8 Tune-up your immune system

How to Give Your Immune System A Tune-Up?

- ❑ Get rid of ongoing infections & inflammation
- ❑ Make lifestyle changes to improve immune fitness

Immune Tune-Up

- ❑ Brush
- ❑ Floss
- ❑ Go see your dentist

How to Avoid Toxoplasmosis

- ❑ Wear gloves when you garden
- ❑ Cook all meat thoroughly
- ❑ Wash raw vegetables thoroughly
- ❑ Exercise precautions around cats
 - ❑ Have someone else change the litter box
 - ❑ Wear gloves when you change the litter box
 - ❑ Change the litter box daily
 - ❑ Cover outdoor sandboxes
 - ❑ Never feed your cat raw meat
 - ❑ Keep indoor cats indoors



www.cdc.gov/toxoplasmosis

How to Avoid Cytomegalovirus

- ❑ Wash hands with soap and water after contact with diapers or saliva
- ❑ Do not share food, drinks, or utensils (spoons or forks) with young children
- ❑ Check your CMV titer if you work in day care

www.cdc.gov/cmV

Immune Tune-Up

- Update your immunizations
 - Tdap
 - Hepatitis B
 - Influenza
 - MMR
 - Chickenpox
 - HPV

Tip #9 Detoxify Your Environment

Detoxify Your Home

- **Bathroom**
 - Get rid of antibacterial soap
 - triclocarban and triclosan
 - Get rid of air fresheners
 - phthalates, formaldehyde, glycol ethers, and petroleum
 - Get rid of personal care products containing
 - Phthalates, formaldehyde, glycol ethers, petroleum
 - Get rid of bathroom cleaners containing
 - ammonia, alkylphenol ethoxylate, chlorine bleach, glycol ether, sodium hydroxide, sodium lauryl sulfate
 - Get rid of molds & mildew

Detoxify Your Home

- **Kitchen & dining room**
 - Get rid of non-stick pans
 - perfluorinated chemicals
 - Don't microwave plastic
 - Unless it says "microwave safe"
 - Get rid of glass & window cleaners containing
 - Glycol ethers or ammonia
 - Get rid of stovetop, countertop & oven cleaners
 - Lye, sodium hydroxide, chlorine bleach, silica
 - Get rid of drain cleaners containing
 - Sodium hydroxide, sodium hypochlorite
 - Avoid using pesticides

Detoxify Your Home

- **Living Room and Bedrooms**
 - Get rid of vinyl wallpapers & blinds
 - Phthalates
 - Replace furniture containing
 - urea-formaldehyde (ask for "exterior grade" products)
 - Replace mattress & sofas containing
 - polybrominated diphenyl ethers (PBDEs)
 - Replace old carpets
 - Volatile organic compounds, dusts & dustmites

Tap vs. Bottled Water

- **Tap water**
 - Test your tap water for lead
 - Use a water filter
 - www.nsf.org
- **Bottled water**
 - Check the recycle number on bottle
 - **Plastics to Avoid**
 - #3 (polyvinyl chloride, which may contain phthalates)
 - #6 (polystyrene)
 - #7 (polycarbonate, which may contain BPA)
 - Keep bottled water away from heat
 - Don't reuse water bottles

Dry Cleaning?

Avoid Occupational Exposures

- ☐ OSHA (Occupation Safety and Health Act)
- ☐ MSDS (Material Safety Data Sheet)
- ☐ CTIS (California Teratogen Information Service)
 - <http://www.ctispregnancy.org>
 - 1-800-532-3749

"Now that *you're* here,
the word of the Lorax seems perfectly clear.
UNLESS someone like you
Cares a whole awful lot,
Nothing is going to get better.
It's not.
"SO..
Catch!" calls the Once-ler.
He lets something fall.
"It's a Truffula Seed.
It's the last one of all!
You're in charge of the last of the Truffula Seeds.
And Truffula Trees are what everyone needs.
Plant a new Truffula. Treat it with care.
Give it clean water. And feed it fresh air.
Grow a forest. Protect it from axes that hack.
Then the Lorax
And all of his friends
May come back."

— Dr. Seuss, *the Lorax*

Tip #10 Help your partner get ready

Protecting His DNA

- ☐ tobacco
- ☐ alcohol
- ☐ drugs (e.g. anabolic steroids)
- ☐ caffeine
- ☐ poor diet
- ☐ radiation and chemotherapy
- ☐ testicular hyperthermia
- ☐ diabetes mellitus
- ☐ varicoceles
- ☐ epididymitis
- ☐ 1,2-dibromo-3-chloropropane
- ☐ nonylphenol
- ☐ polycyclic aromatic hydrocarbons (PAHs)
- ☐ polychlorinated biphenyls (PCBs)
- ☐ dioxins
- ☐ phthalates

Aitken RJ, Koonman P, Lewis SE. Seeds of concern. *Nature*. 2004 Nov 4;432(7013):48-52

Interconception Care