



Breast Cancer and the Environment Research Centers

Epidemiology Projects

Fox Chase Cancer Center (FCCC)

Michigan State University (MSU)

Bay Area (BA)

University of Cincinnati (UC)

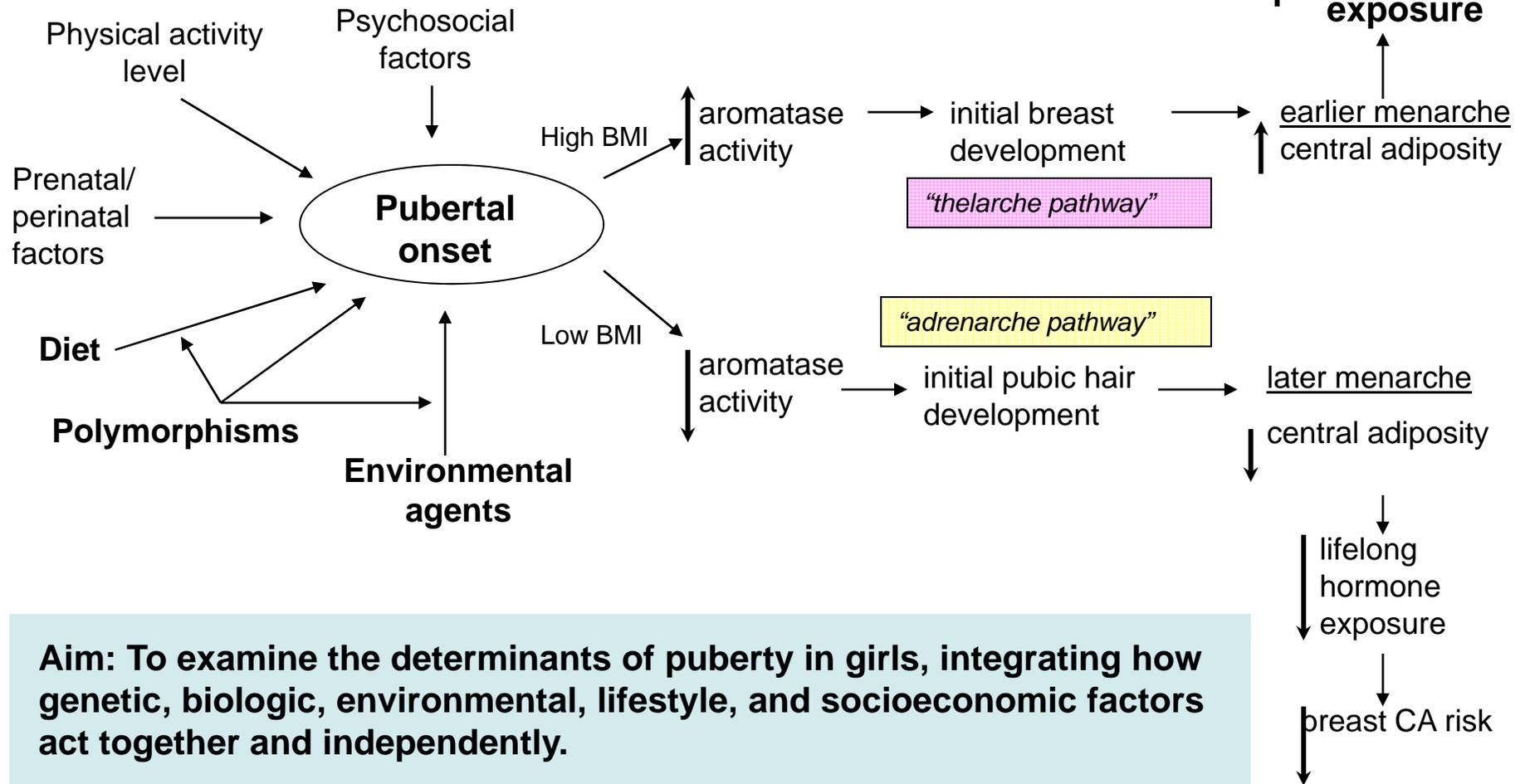


Rationale for the Study of Puberty

- **Increased concern about the impact of environmental factors on breast cancer**
- **Recognized breast cancer risk markers/factors**
 - Age at menarche, at first full-term pregnancy, at menopause; adult height (age at peak height velocity)
- **Pubertal breast: Stem cell expansion; increased number of proliferative cells**
- **Factors associated with the onset of puberty may be linked with later risk for breast cancer**
 - Association with IGF, genetic susceptibility, obesity, environmental exposures



Pathways Through Puberty

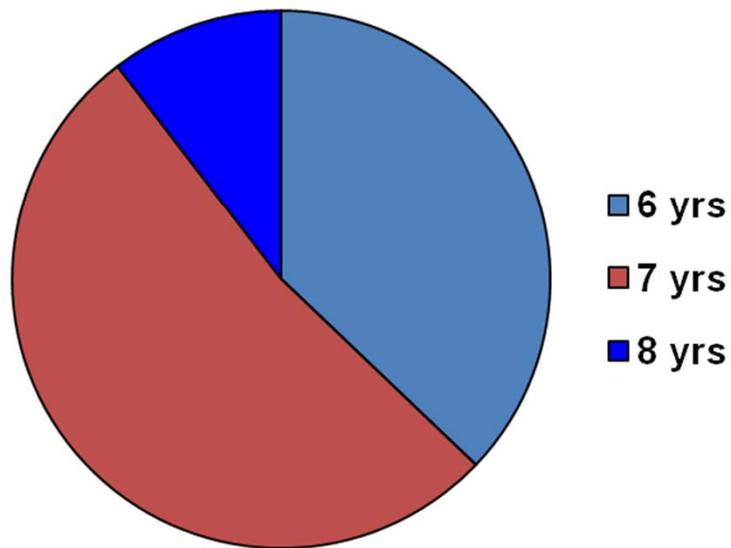


Aim: To examine the determinants of puberty in girls, integrating how genetic, biologic, environmental, lifestyle, and socioeconomic factors act together and independently.

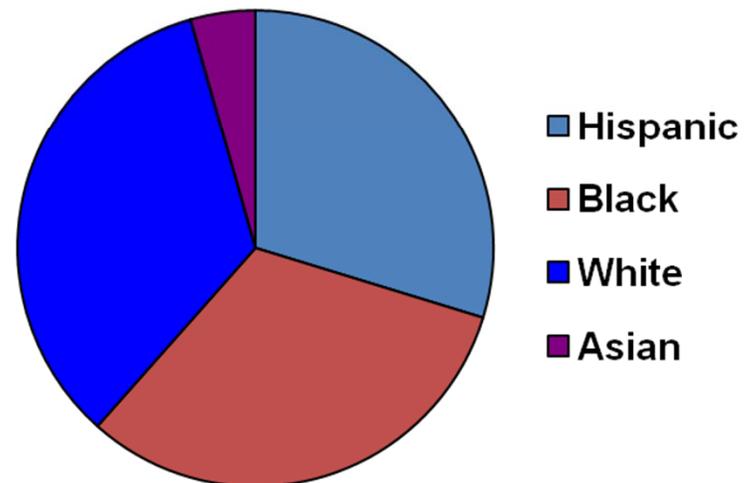


Study Participants at Enrollment

Age at enrollment



Race/ethnicity at enrollment





Breast Maturation Status at Baseline

BCERC Site	Fox Chase Cancer Center	Bay Area	University of Cincinnati	
Study Site	NYC	CA	OH	Total (%)
Breast stage 1	329	408	324	86%
Breast stage 2 (Puberty)	87	33	54	14%
Total	416	441	378	



Assessments at Visits

Questionnaire

- Demographics
- Socioeconomic status
- Physical activity
- Personal care products
- Household products
- Residential histories
- Psychosocial assessment
- Family environment

Clinical Examination

- Height, weight, BMI
- Waist, hip circumference
- Bioelectrical impedance
- Maturation staging



Assessments at Visits (continued)

Biospecimen Collection

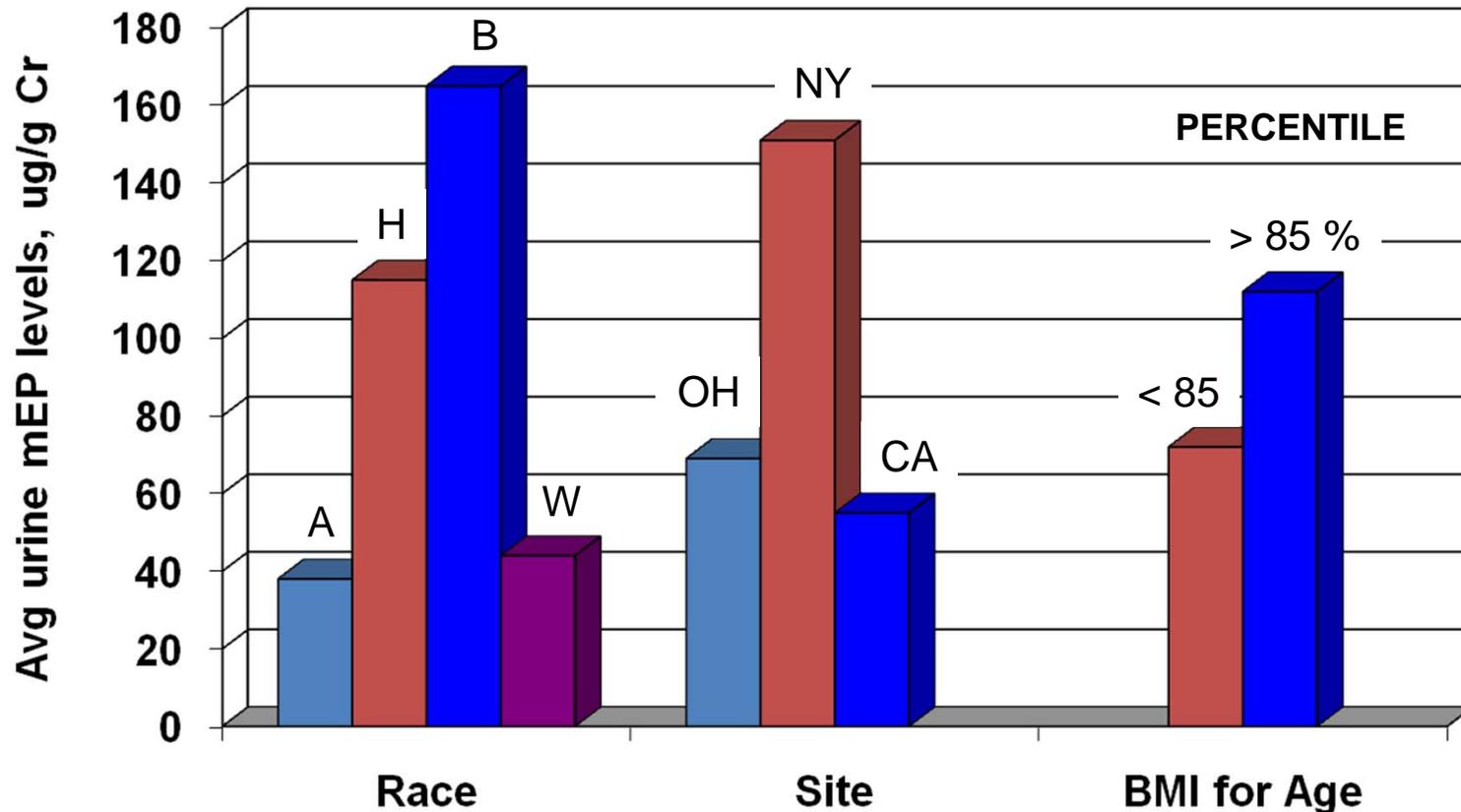
- Blood for biomarkers, DNA
- Blood endogenous factors
- Urine for biomarkers
- Urine endogenous factors
- Saliva or buccal swabs for DNA

Other Special Collections

- Diet (24-hour recall)
- Pedometer



Distribution for the Phthalate mEP



51 biomarkers measured, including phthalates, phenols, phytoestrogens, cotinine, PCBs, PBDEs, organochloride pesticides, PFCs, lead, cadmium



Selected Research Findings

- **Biomarker Analyses**

- Variability of phthalate, phenol, phytoestrogens across sites, race/ethnicity
- Reproducibility of biomarker levels over 6 months
- Associations of phthalates with certain personal products (shampoos, nail polish) and vinyl flooring; canned foods associated with higher BPA
- In addition, > 98% of participants above LOD for cotinine

- **Perfluorochemicals in Serum Findings**

- One community with levels over 95th percentile; impact on BMI and maturation; interactions with COTC (to inform families) and with Biology Projects to understand mechanisms



Selected Findings (continued)

- **PBDE levels higher in Bay Area than UC; flammability laws**
- **Association of nutrient intake with pubertal status**
 - Girls with breast development had greater intake of sugar, animal protein; lower intake of dietary fiber and phytoestrogens
- **Genetic susceptibility studies**
 - 129 novel SNPs chosen from pathways involving hormones, obesity, and neuroendocrine function; 41 genotypes completed on 808 girls at two sites
 - Associations observed with BMI or breast stage, parallel effects noted to be dysregulated by BPA, phthalates, or TCDD in the Biology Projects



Maturation Outcomes: 2009 and 2015

	2009	2015
Attainment breast stage 2	45%	100%
Attainment menarche	9%	> 97%
Establish maturation tempo (B2 to menarche)	5%	90%
Attainment peak height velocity	0%	95%
Achievement of adult height	0%	90%
Ovulation	0%	75%



Working Together

- **Three centers located across the U.S.**
 - Sample size, racial and ethnic diversity; expertise
 - Rich biodepository; > 4,460 visits; 3,300 annual urine specimens; 2,500 serum specimens
- **Interactions with Biology Projects and COTC have helped to direct the science of Epi Projects**
- **Recruitment and excellent retention through the combined efforts of the Epi Projects and COTC**