Translating Breast Cancer and Environmental Research into Action

Environmental and Genetic Determinants of Puberty
A Mid-Project Report from the CYGNET Study

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Dr. Lawrence Kushi provided an update of the CYGNET Study (Cohort Study of Young Girls' Nutrition, Environment, and Transitions), which is one of three prospective epidemiology studies nationwide to examine environmental, lifestyle and genetic determinants of puberty.

The Bay Area study participants (440 girls) were enrolled at 6 to 7 years of age, live in Alameda, Marin, and San Francisco counties, are members of Northern California Kaiser Permanente, and are being followed longitudinally. The study seeks to understand why some girls develop earlier than others. The underlying rationale is that early menarche (first menstrual period) and earlier sexual maturation may be associated with future risk of breast cancer.

From previous studies, we know there is wide variation in age at onset of puberty. Some girls develop relatively early and some girls develop relatively late. In addition, there are substantial differences in age of onset of puberty among the different racial/ethnic groups. This study hopes to shed light on some of the reasons for the variability and diversity.

The participants in the CYGNET study are seen at about the same time each year and are entering the third year of data collection. Most girls have agreed to participate in Tanner Staging assessments, which is a sexual maturity rating system based on breast and pubic hair development. Ninety-five percent of the girls have given urine samples. Not as many girls (slightly over 70%) have agreed to give blood samples. Urine and blood are the biospecimens we are using to measure environmental exposures. We have DNA (for genetic testing) from either saliva or blood from the vast majority of girls in the study.

Other information, some of which was collected earlier in the study but has not been ongoing due to budgetary constraints, was derived from pedometer logs and dietary assessments. Psychosocial information is continuing to be collected from questionnaires.
In order to explain one of this study's initial findings, Dr. Kushi first explained that Tanner stage is assessed from stage one (totally immature breast) to stage five
(totally mature breast). Stage two is the first evidence of breast budding or mammary

gland development. Sometimes stage two is visually noticeable but sometimes can only be detected through palpation.

The data presented by Dr. Kushi showed some ethnic variation in the Tanner Staging. African American girls showed the earliest onset of pubertal signs, followed next by Hispanic girls, then Caucasian girls, girls categorized as “Other”, and concluding with Asian girls, who were lowest on the Tanner scale. This follows expected patterns, although onset of puberty in all racial/ethnic groups is occurring earlier at all study sites.

Since the project is funded by NIEHS, there is a strong interest in the role of chemical exposures. Dr. Kushi presented data recently received from the Centers for Disease Control (CDC), which showed levels of various chemical compounds secreted in the urine of study participants. Some of these compounds are used in nail polish, printing inks, fragrances, dental sealants, plastics, antimicrobial agents and other commonly used products.

A series of slides on various chemicals tested were shown. For each chemical Dr. Kushi compared the levels of the CYGNET girls with national levels from NHANES. For the various phthalates tested and for bisphenol A, CYGNET girls' levels were not much different from the 6-11 year old girls from NHANES. Adult phthalate levels were somewhat lower than the young girls. Only triclosan (found in antibacterial soaps) levels were relatively high in CYGNET girls in comparison to the 2001-2002 group. It is not clear at the moment what these findings mean.

For all of these chemicals there were wide variations in individual exposure levels. There are girls with high levels and some girls with low levels, relatively speaking. The variation will allow us to ask: "are these girls with high levels different from these girls with low levels?"

The participants of the study will continue to be followed in the upcoming years, as long as funding for the project continues. It is hoped that the data in hand and that which will be collected in the future will help us to understand why some girls are developing earlier than others.

In closing, Dr. Kushi emphasized that the CYGNET study is not studying breast cancer. Rather, it is studying one part of the life span that may have some implications in the long-term risks for breast cancer. This is, he said, “one of the pioneering studies about why there is a variation of time and age in the onset of puberty.”