The Potential Role of Epigenetics in SGA
Sample Scenario

1. Case

**History and Physical Examination:**
Infant Girl Jones was born to a 17 year old primagravida mother at 39 weeks gestation weighing 5 # 3 oz. Mild hypertension was noted late in the third trimester along with trace proteinuria. The delivery was vaginal after the spontaneous onset of labor. No labor or delivery complications were noted. The placenta was noted to be “small.” The newborn exam was normal except for the SGA weight.

**Family and Social History:**
Mother weighed 105 pounds before pregnancy, struggled to gain weight during pregnancy and smoked 1 pack of cigarettes daily throughout pregnancy. There was no prenatal care until late in the third trimester at which time mild hypertension and trace proteinuria were found. Onset of labor was spontaneous with normal vaginal delivery; there were no postpartum complications. Placenta was described as “small”.
Mother dropped out of High School at age 16, lost her job when she became pregnant and is currently temporarily living with her mother.

2. What Role Does Epigenetics Play in this Case?

Possible reasons for the SGA presentation may include a combination of:

- Maternal size
- Decreased weight gain during the pregnancy
- Mild hypertension
- Mild pre-eclampsia as manifested by hypertension and proteinuria
- Decreased fetal blood flow secondary to pre-eclampsia and “documented” by the decreased placenta size
- Tobacco exposure

These factors are now known to be associated with a variety of health issues later in childhood and adulthood, and can be considered to be of significant importance for the overall health of the individual. These factors which have epigenetic effects, can alter the short-term and long-term of expression of genes and have a dramatic effect on the expression of various disease states. For example, it is known that maternal size and age, pre-eclampsia, and decreased placenta size can predispose an individual to an increased risk of obesity, diabetes, and/or hypertension in adulthood.

Remember, the genes have not been altered. The expression of the genes is potentially altered and that may be just as important as inheriting a genetic predisposition for a certain problem. It actually may be more important.
### 3. Epigenetic and Prevention Messages

This common presentation should lead to significant concerns on the part of the pediatrician. Routine health care, anticipatory guidance, and attention to acute illnesses will provide the road map for the health and development of this infant.

In this scenario, the longitudinal transmission of the prenatal and perinatal information for this patient can have a significant impact for the rest of her life. Knowledge of potential epigenetic risk factors going forward will assist the pediatrician in their anticipatory guidance and prevention of various problems for their patients. These risk factors might be just as important as the standard risk factors currently used in office visits.

Given the social history, screening for maternal depression is important - with referral, if appropriate.
**Messages for Mother:**

Physicians may counsel families that there are several things we can talk about that you can do to help your baby grow and develop well. “We now know that being born small can affect the health of the child when they become an adult. This may be caused by several things like tobacco, high blood pressure, or low weight gain that were present during your pregnancy. I and all of your child’s health providers need to know and help watch for and prevent these problems. You can help by being sure as your child grows that health care providers are aware of the possible risks.”

Appropriate screening, prevention, and treatment of environmental factors are critically important in the care of a mother and infant. Screening for social factors during the pregnancy, and counseling or appropriate community referral for the mother regarding smoking cessation may have provided long-term health benefits for the child. With regard to counseling a mother who smokes, pediatricians can offer to help her quit through an effective 30-second intervention easily remembered as, 2 As + R (Ask, Advise, Refer): Physicians Ask patients if they smoke, Advise them to quit, and Refer them to cessation services (1-800-QUIT NOW or to community based/ internet quit resources).

A discussion about the importance of prenatal care throughout pregnancy: “It is important that you know there are things you can do to prevent this problem from occurring in your next pregnancy and that it is important your baby be watched and treated if necessary for these problems that could possibly occur in the future.”

As usual, a discussion with the mother regarding growth and development, and the importance of well child care is critical. The pediatrician will “follow your child’s growth and development carefully with you throughout childhood to early adulthood as some problems seen during this time and in adulthood can relate to perinatal issues.”