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REPRPDUCTIVE BIOLOGY

Wolfgang Holzgreve's team

FROM THE HISTORY FETAL DNA

Wolfgang Holzgreve, an obstetrician and geneticist at the University of Basel, Switzerland, was working—as Bianchi had been in Boston—on developing a way to isolate fetal cells from maternal blood for prenatal diagnosis. In the course of that study, his team made an unexpected discovery: Women with a serious complication of pregnancy called preeclampsia had manyfold more circulating fetal cells than healthy pregnant women had. "In normal pregnancy, the level of fetal cells is about one in 1 million cells in maternal circulation," Holzgreve says. "In preeclampsia, it could be one in 1000 or more."

Preeclampsia, which causes dangerously high blood pressure, impaired kidney function, and edema, usually occurs in the third trimester of pregnancy and often forces an immediate delivery of the child to save the mother's life. The health and survival of babies born this way would be improved if physicians could prepare them in advance for a premature birth—for example, by administering treatments to accelerate lung maturation. Holzgreve wondered if the high numbers of fetal cells could be used as a predictor of preeclampsia. Together with his co-worker Sinuhe Hahn, he chose a group of women who, because of placental abnormalities detected by ultrasound, were thought to be at increased risk of preeclampsia. At the 20th week of pregnancy, the researchers drew blood from the women and analyzed it for fetal DNA. "There was a strong correlation between the level of fetal DNA and the likelihood of developing preeclampsia," Holzgreve says.

Holzgreve's team also found a parallel between the amount of fetal DNA in the mother's blood and the severity of the disease. Researchers have long suspected that in preeclampsia, some toxin in the blood damages endothelial cells lining organs such as the kidneys. Now Holzgreve suspects that the fetal cells or free fetal DNA are that toxin. Preliminary studies with endothelial cell cultures suggest that fetal cells and DNA are toxic to endothelial tissue, he says: "It could be a very direct effect of the [fetal] material on the maternal tissue."

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