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No Cancer and Higher Fertility

A common gene: p53

What's the connection between cancer and pregnancy? A protein already known to fight cancer has been found to be involved in embryos implant in the uterus, according to a research published in Nature. The p53 protein was known to act in many anticancer processes, like DNA repair and apoptosis (cell death, impeding the development of tumors). Its inactivation through mutation in the p53 gene exposes the organism to cancer. But the p53 protein's role under normal situations was still a puzzle. In 2006 a team led by reproductive endocrinologist Carolyn Coulam of the Rinehart Center for Reproductive Medicine in Evanston, Illinois, encountered a connection between women presenting mutations of p53 and the impossibility of remaining pregnant. Another team led by cancer biologist Arnold Levine (who discovered p53) of the Institute for Advanced Study in Princeton, New Jersey, too, found the same connection. In mice, the presence or absence of the gene determined if female mice could become pregnant. The new research compared mice bred lacking p53 with normal mice. Normal mice females remained all pregnant after breeding and delivered litters of 5-6 infants, while the p53 lacking group remained pregnant only in proportion of 63% and had litters of 1-2 offspring. Another strain missing p53 gave birth just in proportion of 27%. In its anti-cancer fight, p53 protein turns on several genes; in its reproductive role, one gene was involved: that for the leukemia inhibitory factor (LIF) protein. LIF protein increases embryos' ability to implant in the uterus, while eliminating leukemia cells. Females without the p53 gene displayed decreased amounts of LIF in their wombs, correlated to less implanted embryos. When researchers gave to that females LIF, the pregnancy rate went up to 100%, also boosting the litter size, but LIF administration had no effect on mice having the p53. "The newfound role of p53 may explain infertility cases that involve a failure of the embryo to implant." said Coulam. "The findings also suggest a new role for cancer-treating drugs that target p53. Some of these drugs may turn out to be useful in helping women conceive by improving the function of p53 in the uterus. ... Others may turn out to be possible contraceptives by blocking p53's function in the uterus." said developmental biologist Colin Stewart of the Institute of Medical Biology in Singapore.