



2008). “Fitness is a way to prevent maternal complications and, secondarily, to prevent fetal complications,” explains Artal.

Likewise, Catalano recommends that women get into a regular fitness program before becoming pregnant and then continue it throughout and after delivery.

Men wanting to become fathers might also consider upping their exercise, since their health might also play a part in fetal development. Some studies have hinted that male obesity has damaging effects on sperm, and there is a suggested correlation between male BMI and sperm quality (*Fertil. Steril.* doi:10.1016/j.fertnstert.2007.10.011; 2008).

Men who are obese seem to also produce less testosterone and, subsequently, less sperm. The reason might be that peripheral fat, such as belly fat, produces the enzyme aromatase, which converts androgens, such as testosterone, into estrogens (*Nat. Clin. Pract. Endocrinol. Metab.* 4, 415–419; 2008). Men normally have low blood levels of estradiol, a form of estrogen. But according to Tracy Rankin, program director of the male reproductive health sciences branch at the US National Institute of Child Health and Human Development, elevated levels of estradiol prompt the pituitary gland to stop sending testosterone-promoting signals to the testes, causing sperm count to drop.

Scientists hope that by blocking the effects of aromatase, they can stop this chain of events from happening. The first prospective clinical trial studying the effects of an aromatase inhibitor on sperm health in obese men is underway. The results, due in 2009, could provide insight into this negative feedback loop that decreases testosterone and sperm production as men become more overweight and obese.

At the same time, however, some researchers have failed to find strong evidence that obesity lowers sperm count (*Fertil. Steril.* 90, 619–626; 2008). As the number of obese adults continues to climb, fertility experts say that further investigations will help clarify the real effects of fitness on reproduction.

*Genevive Bjorn, Maui, Hawaii*

## As obesity epidemic grows, research shows fitness benefits fetal development

As the obesity epidemic rages on in the US and around the world, scientists have begun to piece together clues about the impact of parental fitness on the developing fetus. Obesity is associated with a laundry list of negative affects on the developing fetus. Now there's mounting evidence suggesting that exercise during pregnancy might directly benefit the fetus.

Obesity (defined as a body mass index, or BMI, greater than 30) in pregnant women is a high-risk condition associated with neural tube defects, delayed organ maturation, premature labor and stillbirths. It can also cause the fetus to grow larger than usual, requiring risky cesarean delivery (*Postgrad. Med.* 120, E01–E09; 2008).

According to Raul Artal, chairman of the department of obstetrics at St. Louis University School of Medicine, the stress hormones norepinephrine and epinephrine might mediate the effect of obesity on fetal development. Pregnant women with hypertension have elevated levels of these hormones, which promote fat accumulation.

Patrick Catalano, chairman of Obstetrics and Gynecology at the MetroHealth Medical Center in Cleveland, Ohio, explains that women who exercise during pregnancy and gain less weight appear to develop larger placentas to support the fetus (*Placenta* 27, 527–534; 2006). One theory is that when

pregnant women exercise, blood flows away from the uterus into other areas, such as muscles and skin, which might stimulate the placenta to grow to gain better blood access.

The presence of a larger placenta could perhaps improve the fetus's nutrient uptake: Babies born to women with this feature tend to be born with healthy levels of body fat.

According to Catalano, about 40% of pregnant women gain more weight during pregnancy than the national guidelines published by the US Institute of Medicine recommend. He is on the committee updating these guidelines, which were published in 1990. Their preliminary update report is due in June 2009.

Studies have found a causal relationship between maternal obesity and childhood obesity, leading to a continuous cycle that's important to break (*Matern. Child Health J.* doi:10.1007/s10995-008-0413-6;

### Effect of weight on pregnancy outcome

	Cesarean section (odds ratio)	Neural tube defect (odds ratio)	Stillbirth (per 1,000)	Neonatal deaths (per 1,000)
Underweight	—	—	5.5	3.9
Normal weight	1	1	4.1	2.8
Overweight	1.46	1.22	4.7	2.7
Obese	2.05	1.70	11.6	7.4
Severely obese	2.89	3.11	—	—

Sources: *Obes. Rev.* 8, 385–394; 2007; *Am. J. Obstet. Gynecol.* 198, 611–619; 2008; *BJOG* 112, 403–408; 2005