

Antioxidants may cause fertility problems in females

Antioxidants are sold over the counter everywhere. They're added to food, drink and face cream. However, according to Prof. Nava Dekel of the Biological Regulation Department, we still don't have a complete understanding of how they act in our bodies. New research by Dekel and her team, recently published in the *Proceedings of the National Academy of Sciences USA (PNAS)*, has revealed a possible unexpected side effect of antioxidants: They might cause fertility problems in females.

Common antioxidants include Vitamins C and E. These work by eliminating molecules called reactive oxygen species that are produced naturally in the body. Stress can cause these chemically active molecules to be overproduced; in large amounts they damage cells indiscriminately. By neutralising these potentially harmful substances, antioxidants may, theoretically, improve health and slow down the aging process.

However, when Dekel and her research team including her former and present Ph.D. students Dr. Ketty Shkolnik and Ari Tadmor applied antioxidants to the ovaries of female mice, the results were surprising: ovulation levels dropped precipitously. That is, very few eggs were released from the ovarian follicles to reach the site of fertilization, compared to those in untreated ovaries.

Helping to paint a picture

To understand what lies behind these initial findings, the team asked whether it is possible that the process of ovulation might rely on the very 'harmful' substances destroyed by antioxidants - reactive oxygen species.

Further testing in mice showed that this is, indeed, the case. In one experiment, for instance, Dekel and her team treated some ovarian follicles with luteinising hormone, the physiological trigger for ovulation, and others with hydrogen peroxide, a reactive oxygen species. The results showed hydrogen peroxide fully mimicked the effect of the ovulation-inducing hormone. This implies that reactive oxygen species that are produced in response to luteinising hormone serve, in turn, as mediators for this physiological stimulus leading to ovulation.

Among other things, these results help fill in a picture that has begun to emerge in recent years of fertility and conception, in which it appears that these processes share a number of common mechanisms with inflammation. It makes sense, says Dekel, that substances which prevent inflammation in other parts of the body might also get in the way of normal ovulation, and so more caution should be taken when administering such substances.

Much of Dekel's research has focused on fertility - her previous results are already helping some women become pregnant. Ironically, the new study has implications for those seeking the opposite effect. Dekel: 'On the one hand, these findings could prove useful to women who are having trouble getting pregnant. On the other, further studies might show that certain

antioxidants might be effective means of birth control that could be safer than today's hormone-based prevention.'

Dekel and her team are now planning further studies to investigate the exact mechanics of this step in ovulation and to examine its effect on mice when administered in either food or drink. In addition, they plan to collect data on the possible link between females being administered antioxidant supplements and the difficulty to conceive.

Source: Weizmann Institute of Science

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