

# Ovarian transplantation restores fertility to old mice and also lengthens their lives

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Scientists have discovered that when they transplant ovaries from young mice into aging female mice, not only does the procedure make the mice fertile again, but also it rejuvenates their behaviour and increases their lifespan. The question now is: could ovarian transplants in women have the same effect?

Dr Noriko Kagawa will tell the 26th annual meeting of the European Society of [Human Reproduction](#) and Embryology in Rome today (Tuesday) that successful ovarian transplants increased the [lifespan](#) of the mice by more than 40%. "At present ovarian transplants are performed with the aim of preserving a woman's fertility after cancer treatment for instance, or of extending her reproductive lifespan. However, the completely unexpected extra benefit of fertility-preserving procedures in our mouse studies indicates that there is a possibility that carrying out similar procedures in women could lengthen their lifespans in general," she said.

A very small number of women in the world have had ovarian transplants, and some have been more successful than others. Dr Kagawa stressed that there was still a lot of research to be carried out before it would be known whether ovarian transplants had similar, rejuvenating effects in women, particularly as it would involve waiting for many years until the patients became older.

Dr Kagawa, Associate Director for Research at the Kato Ladies' Clinic in Tokyo (Japan), told the conference that she and her colleagues had

conducted two mouse experiments. In the first, both ovaries were removed from young female mice (about 140 days old), and transplanted in to six older mice (aged over 525 days) that were too old to be fertile any more. In the second experiment, only one ovary was removed from the young mice (about 170 days old) and transplanted into eight aged mice (over 540 days old). The average normal lifespan for this particular breed of mice (C57BL/6J) is 548 days, and they normally reach a mouse "[menopause](#)" at about 525 days old.

All the mice that received transplants in both experiments became fertile again, while control mice that had not received transplants did not. In the first experiment the mice resumed normal reproductive cycles that lasted for more than 80 days, and in the second experiment, they lasted for more that 130 days.

Dr Kagawa said: "All the mice in both experiments that had received transplants resumed the normal reproductive behaviour of young mice. They showed interest in male mice, mated and some had pups. Normally, old mice stay in the corner of the cage and don't move much, but the activity of mice that had had ovarian transplants was transformed into that of younger mice and they resumed quick movements. Furthermore, the lifespan of the mice who received young ovaries was much longer than that of the control mice: the mice that had received two ovaries lived for an average of 915 days, and the mice that had received one ovary, for an average of 877 days. The newest of our data show the life span of mice that received transplants of young ovaries was increased by more than 40%.

"The results show that transplanted normal ovaries from young mice can function in old, infertile mice, making them fertile again, but, in addition, extending their lifespan. Women who have ovarian tissue frozen at young ages, perhaps because they are about to embark on cancer treatment, can have their young ovarian tissue transplanted back

when they are older. Normally we would be doing this simply to preserve their fertility or to expand their reproductive lifespan. However, our mice experiment suggests that this might also improve overall longevity. Further research has to be conducted before we can know whether or not this is the case."

Dr Kagawa said it was not known why the ovarian [transplant](#) increased the lifespan of the mice, but it might be because the transplants were prompting the continuation of normal hormonal functions.

She and her colleagues have been collaborating for the past six years with Dr Sherman Silber, from St Luke's Hospital, in St Louis, Missouri (USA), who has performed a number of successful ovarian transplants in women, either because they were about to be treated for cancer or because they had not yet found the right partner in life. Their future collaborative research will include investigating whether it is possible for a woman to have a transplant using an [ovary](#) that is not her own and with minimal drugs to suppress the body's natural immune response to what it perceives as a "foreign" body. They are also looking at culturing follicles in ovarian tissue in the laboratory in order to obtain mature eggs that can be used for IVF.

In the meantime, the researchers believe it is very important for doctors and patients to know that women have options when faced with cancer treatment that could destroy their fertility. "We have been successful in getting frozen ovaries to function completely normally after thawing and transplantation," said Dr Kagawa. "So this should no longer be considered an 'experimental' procedure. Ovarian transplantation is the proper and necessary accompaniment to otherwise sterilising treatment for young cancer patients. We must not neglect to freeze and save at least one of their ovaries before [cancer treatment](#)."

Provided by European Society of Human Reproduction and Embryology

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