The law is already strict on rapamycin and metformin, requiring a prescription. In comparison, alcohol and tobacco do not require a prescription or medical supervision. Smoking has no health benefits and dramatically reduces life span, accelerating all diseases. While smoking causes cancer, rapamycin prevents it, including smoke-induced lung cancer. Is it then paradoxical that alcohol and tobacco are sold without prescription, while rapamycin and metformin are not.
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Theme of the month: Fertility, longevity & menopause

While men are fertile every day, women's fertility is cyclical. In fact, most girls are born with a certain stock of oocytes from birth, and even a little before. This stock varies between 300,000 and 500,000, of which an average of 400 will actually mature. From puberty onwards, an oocyte is released at each cycle and then eliminated by menstruation when there is no fertilization and over the years, this stock of oocytes decreases.

And when they’re gone... they’re gone... It marks the end of a woman's fertility cycle and the arrival of **menopause!**

Nature is such that, spontaneously, around the age of 50, a woman's body undergoes a major hormonal change. The health consequences attributed to this change are multiple and variable, both in frequency and in severity. Symptoms include climacteric disorders (hot flashes, chills, feelings of discomfort and dizziness, etc.), mood and sexual disorders (decreased libido, pain during sexual intercourse, vaginitis, etc.), as well as an increased risk of cardiovascular disease and osteoporosis.

When the ovaries quit ...

However, for some women, menopause strikes very early. Even before blowing out 40 candles, their lives are turned upside down. A report published on the American website Health explains the 5 reasons why some

women are subject to early menopause. Among the factors influencing the age of menopause, there is the genetic factor. In 20% of the cases, a woman who went through menopause very early was not the only one in her family to suffer from this problem. Certain treatments such as chemotherapy and radiotherapy can also affect the genetic material of ovarian cells. But not only that, smoking and being overweight can also be responsible. Several studies state that on average, menopause occurs 2 years earlier in smokers. On the other hand, an overall improvement in diet, hygiene and quality of life in Western countries has put off the average age of menopause.

And among the animals?

Menopause seems to be unique to women... and to cetaceans. This early cessation of reproduction is rare in the animal world. On Earth, only women and four other animal species (the beluga, the narwhal, the killer whale and the pilot whale) experience menopause, a phenomenon among mammals that intrigues scientists. For example, female orcas can expect to live to over 90 years of age, but astonishingly they reach menopause between the ages of 30 and 40.

But why should a female stop reproducing before the end of her life? This physiological cessation is often described as an evolutionary paradox, as it appears that females derive no benefit from ending their reproductive careers well before death. In a recent study published in Scientific Reports, conducted by researchers from the University of Exeter (UK) and the Center for Whale Research (USA), Dr. Samuel Ellis explains that "For menopause to make sense in evolutionary terms, a species needs both a reason to stop reproducing and a reason to live afterwards".

The British researcher suggests the "grandmother effect" as an explanation. This hypothesis had been formulated by the anthropologist Kristen Hawkes and her colleagues to understand why menopause occurred during the evolution of humanity. Menopause would have been selected by natural evolution to allow females of very sociable species with a long life expectancy to devote themselves to their direct offspring and those of their children without running the risk of dying during a late pregnancy. After a few generations, a post-menopausal female will therefore have passed on her genes to more offspring than a female who has continued to give birth.

In tribes of hunter-gatherers, it has been found that the chances of survival of the young until the age of reproduction, is positively correlated to the presence of one or two of their grandmothers, certainly because they relieve the mothers in the burdens of child-rearing.

Inmost animals, as in our pets (dogs, cats, mares, cows...), we observe that over the years, the cycle becomes more irregular, that fertility decreases and health concerns can appear because of the drop in sexual hormones, but we cannot call this a real menopause.

Paradoxically, this phenomenon does not exist in any primate. Our closest cousins can become pregnant until the very end of their lives because their reproductive organs slow down with the rest of their bodies. Chimpanzees can remain reproductively viable for more of their lifespan than women. Although research published in 2011 on captive chimpanzees indicates that females go through menopause in their final years.

More surprisingly, in elephants we observe this "grandmother effect" which may explain the usefulness of menopause. However, the females can reproduce until the end of their lives. Scientists do not yet know why cetaceans have a menopause and elephants do not. More studies are needed to solve the mystery...
Birds do not experience menopause either. Some can remain fertile for a very long time. Wisdom, a female Laysan albatross defies nature. The oldest wild bird in the world had a chick at the age of 70!

Pregnancy after 50? Is it possible to reverse menopause?

Menopause can be considered either as a natural part of aging or as a pathology that needs to be treated.

It is often said that pregnancy after menopause is impossible. However in 2016, scientists at the Fertility Clinic in Athens managed to reverse the menopause process in a 45-year-old woman even though she had been menopausal for 5 years!

The scientific team injected the ovaries of about 30 menopausal women with platelet-rich plasma (PRP). It is widely used to speed up the repair of damaged bones and muscles. The women who received the PRP treatment were all between 45 and 49 years old and had not had a period for several months. Six months after receiving a PRP injection, the 45-year-old woman noticed her period returning. The newly released eggs can be collected and fertilized in vitro. This offers a new window of hope for women suffering from early menopause.

In 2020, Dr. Konstantinos Pantos and his scientific teams obtained even more astonishing results: menopausal women gave birth after a PRP injection! Their fertility is said to have been restored thanks to the PRP treatment. Among the 30 menopausal volunteers, four became pregnant and three had children.

Cryopreservation to delay menopause by 20 years!

This is at least what specialists in *in vitro* fertilization in Great Britain affirm. Their method has already been tested on nine women. The procedure consisted of taking ovarian tissue which is then frozen to be preserved. Later on as they enter menopause, the frozen tissue can be defrosted and transplanted back into the body to restore declining hormone levels.
However, experts believe that it is possible to delay the onset of menopause by up to 20 years, but this depends on the age at which the tissue is removed and when it is put back in. For example, tissue taken from a 25-year-old woman could delay menopause by 20 years, while tissue taken from a 40-year-old could delay its onset by only five years.

Conversely, some beauty products bring forward the age of menopause...

According to Dr. Amber Cooper and her team (United States), exposure to chemical molecules, contained in particular in beauty products, can advance the age of menopause by 4 years. Between 1999 and 2008, they conducted blood and urine tests on 31,500 women to check for the presence of chemicals. The researchers found that women with high levels of chemicals in their bodies went through menopause 1.9 to 3.8 years earlier than women with lower levels.

The value of rodents in the fundamental understanding of key elements in the reproductive and aging processes...

We wrote earlier that only a few animals experience menopause. However, rats (and mice), at least in the laboratory, gradually cease to be fertile well before their maximum lifespan. Indeed, a rat can live more than three years, but its fertility decreases sharply after 10 months.
As we have seen, the effect of platelet-rich plasma (PRP) has had a positive effect in postmenopausal women in Greece.

In 2018, scientific teams wanted to evaluate the effect of PRP on ovarian structures and function in cyclophosphamide (Cy)-induced ovarian failure in female rats using a stereological method. The researchers concluded that it appears that PRP has a protective effect on ovarian failure in the infertile female rat model.

Rats and mice are imperfect but extremely useful models to better understand and combat the mechanisms of aging. However, to be certain of the effectiveness of a treatment, the maximum lifespan with or without treatment must be compared. This can take a long time since a rat can live more than 3 years.

By examining the fertility of rats with anti-aging treatments, the information in the laboratory can be obtained much faster. An "ordinary" laboratory rat is 6 months old when experiments begin. After only 4 months of treatment, it will be possible to see if treated rats, compared to control rats, remain more fertile and therefore age less.

It should be noted that longevity experiments are done with a much more pleasant treatment of the animals than the life of sewer rats. This can be explained by the demanding protective legislation and because the goal is to make them live longer, good treatment favors it.

The (relatively) good news of the month: The fight against Covid through vaccination is making progress

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To speak of good news about this disease is very relative. There are nearly 3 million deaths recorded. New mutations are appearing more and more. The fine declarations concerning the vaccine, a common good of humanity, have been followed by little effect. Collaboration across financial, social and political barriers is difficult. Finally, populations are exhausted by restrictive measures.

But all is not bleak. By the first quarter of 2021, a big year after the pandemic broke out, more than 100 million people worldwide will have been vaccinated. About 10 vaccines are now being administered worldwide. The vaccines seem to be effective against the different variants of the disease. As the elderly are the first victims, they are also very often the first to be vaccinated. Never in the history of mankind have we been so concerned about the weakest people in society and about research on this subject. This is progress for all of humanity. Finally, the realization that Covid is just one of the many age-related diseases is gradually growing. And research to end Covid is sometimes extended to research against other age-related conditions.

For more information, please visit:

- *heales.org*, *sens.org*, *longevityalliance.org* and *longecity.org*.
- Source of the image