

## **PRESS RELEASE**

**EMBARGOED UNTIL SATURDAY 11 MAY 2024 AT 00:05 CETA**

### **Chronic stress during adolescence may reduce fertility in adulthood**

Male rats exposed to moderate and repeated stress during adolescence may have reduced fertility, according to research presented at the 26th European Congress of Endocrinology in Stockholm. This study sheds light on the harmful effects that early-life stress has on health and could help to uncover future prevention strategies for children and adolescents.

While hormone levels fluctuate pathologically — especially during life stages such as puberty — stress can cause too much or too little of a hormone in the bloodstream. This hormonal imbalance negatively impacts puberty and the reproduction system, with effects on libido, ovulation function and sperm cell production. However, the long-term reproductive effects of chronic stress in adolescents are largely unknown.

In this study, researchers from the V.P. Komisarenko Institute of Endocrinology and Metabolism of the National Academy of Medical Science of Ukraine, examined male and female rats, aged 6 months, after individually placing about half of them in enclosed spaces for one hour every morning for two weeks during adolescence (30–45 days old). They compared the rats who had been exposed to these stressful conditions to the control group and found that chronic stress during puberty delayed sexual maturity in females, and males gained weight more slowly. In adult males, sperm count fell by 25.9%, some sperm were abnormally shaped and sluggish or became immobile, and the breathing process by which sperm cells derive energy slowed down. Additionally, males had almost two times lower levels of corticosterone – the main stress hormone in rats, equivalent to cortisol in humans.

“Our work is the first to report to show that even moderate and repetitive stress in adolescence has a long-lasting negative impact on the endocrine system of reproduction and adaptation of the body to changing living conditions,” said lead investigator, Professor Aleksander Reznikov.

“Our results make it possible to predict the development of anomalies in reproduction and bodily adaptation systems and are the basis for finding methods for their prevention.”

Professor Reznikov added: “We discovered for the first time that lipid peroxidation (a process in which oxidants like free radicals attack lipid membranes of cells and eventually damage them) in the ovaries and testes was significantly increased. This, however, needs further investigation.”

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## **Abstract**

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### **Endocrine and reproductive consequences of pubertal stress in rats**

Adolescence is one of the most dynamic periods of development, which is highly sensitive to changes induced by stressors. Disruption in hormonal balance associated with stress have a negative impact on puberty and reproductive function. **The aim** of the work was to study the long-term endocrine effects of chronic pubertal stress in rats. On the 22 postnatal day (PND), the Wistar rats were separated from their mothers and sorted by sex into individual cages, so that animals from different litters were in both the control and experimental groups. The animals were subjected to stress daily in the morning hours from 30 to 45 PND by placing them in cylinders with a diameter of 4.5 cm and a length of 10 cm, equipped with breathing holes. During the stress period and upon its completion, the onset of sexual maturation was recorded in both the control and experimental animals, while observing somatic development. After the stress period ended, the animals were housed in cages in groups of five individuals each. All investigations were conducted on sexually mature rats at the age of 6 months. The weights of gonads and the adrenal glands, and the morphology of the reproductive organs were studied. The quantitative and qualitative indices of the spermatozoa in epididymal washes were determined. The plasma corticosterone levels were measured both at baseline and after one hour of tight restriction. The pubertal chronic stress significantly delayed the sexual maturation of females and adversely affected weight gain in males. In adult animals, pubertal stress did not change the weight and morphology of the gonads, except for slight vacuolation of the spermatogenic epithelium compared to intact ones. The index of spermatogenesis in the experimental group was significantly lower than in the control, due to a decrease in the number of late spermatids, which indicates inhibition of spermatogenesis. Pubertal stress resulted in a 25.9% decrease in sperm count and a 2.4-fold slowing of oxidative-reductive processes in spermatozoa. These animals showed an increase in the number of pathological forms of spermatozoa. A significant decrease in adrenal weight in females and a tendency to a decrease in males were observed. The basal corticosterone levels reduced by 1.7 times in males. Stress reactivity in females and males did not differ from the control. Thus, chronic pubertal stress, under the selected experimental conditions, resulted in adverse long-term sex-specific effects on the reproductive and adaptive systems of adult animals.

## Notes for Editors:

1. For further information about the study, and to arrange an interview with the authors, please contact the ECE 2024 press office:

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2. The study “**Endocrine and reproductive consequences of pubertal stress in rats**” is an e-poster presentation that will take place on Saturday 11 May 2024 at the European Congress of Endocrinology at the Stockholm International Fairs (Stockholmsmässan) in Stockholm, Sweden.
3. The 26th European Congress of Endocrinology (ECE) is held at the Stockholm International Fairs (Stockholmsmässan) in Stockholm, Sweden, on 11-14 May 2024. See the full scientific programme here: <https://ese-hormonesapps.m-anage.com/ece2024/en-GB/pag>
4. The [European Society of Endocrinology](#) (ESE) is at the centre of Europe's endocrine community. Its vision is to shape the future of endocrinology to improve science, knowledge and health. Through its events, publications, grants and advocacy work, ESE shares the best knowledge in endocrine science and medicine across Europe and beyond. ESE and its partner societies jointly represent a community of over 20,000 endocrinologists. ESE informs policymakers on health decisions at the highest level through advocacy efforts across Europe.