

## THE INFLUENCE OF ENVIRONMENTAL FACTORS ON SEMINAL MATERIAL EPIGENETICS

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Parental effects can influence offspring through mechanisms dependent and independent of genetic factors, including sperm. Sperm factors contribute to the modulation of offspring development through epigenetic modification of gametes under the influence of the environment. Epigenetic changes in gametes, determined by the environment at the molecular level, explain the transmission of hereditary developmental potential across generations. The evolutionary implication of epigenetic variation as a source of genetic variation is very appealing because it reconciles two theoretical models of species evolution that often present themselves in opposing ways. First, evolution by epigenetic inheritance of the genome directly modified by environmental stressors, and second, evolution by continuous genetic variation within a population and selection at the extremes of the phenotype. The influence of environmental factors on the epigenetics of the semen is controlled by the genetic information, but also dictated by the epigenetic information contained in the spermatozoa. At the same time, more experimental scientific evidence is needed, which addresses, at the level of reproductive cells, the structural and functional mutagenicity of regions subject to epigenetic variations, induced by environmental factors and evolutionary implications. Environmental factors influence the phenotype of subsequent generations through epigenetic inheritance, that is, the gametic transmission of epigenetic information, determined by the environment, to offspring. Epigenetic remodeling of reproductive cells at the structural and functional level (DNA, chromatin, RNA) in the process of spermatogenesis influences the phenotype of the next generation through dynamic reactivity to environmental stressors. At the same time, the functional consequence on embryogenesis and the phenotype of the next generation remains largely unknown, even though there is genuine evidence of environmentally influenced sperm epigenetic factors capable of modifying the phenotype of the next generation.

Thus, the elucidation of the role of epigenetic changes, determined by environmental factors in gametes on the offspring phenotype, is not only a fascinating biological question, but also a moral obligation of research for the health of future generations.

***Key words: chromatin, DNA, environmental factors, epigenetics, RNA, seminal material.***