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Reproductive System and Sexual Disorders: Current Research

Commentary

Sex-Dependent Variations in Epigenetic Markers Prolonged Morphine Therapy in Rodent Organs

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ABOUT THE STUDY

Age, lifestyle, early life events, and exposure to chemicals or medicines, such as opioids, can all have an impact on epigenetic imprints. Previous research has concentrated on how morphine epigenetically modulates several brain areas implicated in tolerance, dependence, and other mental illnesses connected to the physio-pathological effects of opioids. Nonetheless, there is a substantial information gap about the effect of continuous therapy on various organs and biological systems. As a result, the goal of this study is to learn more about the effects of chronic morphine exposure on DNA methylation and histone modification levels in each organ of male and female model mice *in vivo*. For the first time, our findings show that prolonged morphine therapy causes alterations in DNA methylation/hydroxymethylation and histone modification at the systemic level, indicating a potential physiological influence on gene expression regulation. Notably, morphine-induced epigenetic alteration happens in a sex-dependent way, indicating the existence of distinct epigenetic modification underlying processes in male and female mice. Silver nanoparticles are increasingly being created and hence discovered in aquatic systems. However, some parameters (for example, organism sex) continue to be disregarded in the field of nano-toxicological evaluation. To investigate the effect of sex in nontoxicity, researchers conducted a study. Adult male and female zebrafish were exposed to 100 g/L of two uncoated commercial AgNPs with primary diameters of 20 nm and 80 nm for two weeks before the effects of AgNPs on their intestines and livers were examined using a set of biomarkers. The results showed that the intestinal Na/K-ATPase activity and superoxide dismutase activity in male zebrafish differed considerably (p 0.05) between 20-nm AgNPs and 80-nm AgNPs treatments, indicating that 20-nm AgNPs were more hazardous to zebrafish than 80-nm AgNPs. Furthermore, we discovered that the AgNPs employed had sex-dependent impacts on growth indices, oxidative/anti-oxidative status, brain signalling, and hepatic lipid metabolism, with male zebrafish being more susceptible to AgNPs than females. Furthermore, the studied AgNPs harmed the intestine far more than the liver, as demonstrated by disturbances of Na/K-ATPase and the antioxidant system in the gut but not in the liver. These data suggest that persistent AgNPs exposure may cause size-related, sex-dependent, and organ-specific toxicity in adult zebrafish, thereby expanding our understanding of the harmful consequences of AgNPs in aquatic environments. The blind mole rat is a perception ally blind fossorial rodent that breeds seasonally. The influence of photoperiod on the morphology and histology of the male mole rat reproductive system is investigated in this study. Three groups of male mole rats were kept in the laboratory under three settings: Short Day (SD) conditions (9L:15D); long day (LD) conditions (15L:9D); and long night (LD) and permanent darkness (CD), as well as animals imprisoned in the Field (FL). When compared to the other three groups, the field animals had greater testes and prostate gland weights, higher prostate tubuli volume (v*), and lower testes tubuli volume (v*). The FL group had a lower distribution of tubuli in the testes (Vv) than the SD and LD groups, but it was still greater than the CD group. The CD group had a larger distribution of lumen in the testes (Vv) than the other three groups. The FL group had a larger distribution of interstitial tissue in the testes (Vv) than the other three groups. The four groups did not vary in terms of electrolytes and elements released by the prostate gland. When compared to the other three groups, the FL group had a modest distribution of tubuli (Vv) in the prostate gland and a high lumen ratio (Vv). The distribution of connective tissue in the prostate gland was the same in all four groups. The FL group had the greatest testosterone levels and total sperm count. Sperm generation was seen in all groups; however, the FL group produced more spermatid and spermatozoa cells. This study found that while photoperiod may be crucial in beginning timing throughout the mating season, additional factors that are not present in the laboratory appear to be key for effective breeding in the field. DNA methylation is an epigenetic mark used to control gene expression. DNA Methyltransferases (DNMTs) catalyze cytosine methylation by transferring a methyl group from S-adenosyl methionine to the 5th carbon of a cytosine residue, resulting in 5-methylcytosine (5 mC). Because of the covalent C-C bond in 5 mC, this mark is stable and hence difficult to remove directly. While DNMT1 maintains this modification, de novo cytosine

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methylation patterns are mostly created by the methyltransferases DNMT3A and DNMT3B. Although this change is thought to be a long-lasting epigenetic imprint, it can be gradually and passively lost if the methylation pattern is not maintained during replication across generations of cells. Furthermore, the Ten-Eleven Translocation (TET) protein family, which includes TET1, TET2, and TET3, is in charge of active DNA demethylation. These proteins act as oxygenases, converting 5 mC to 5hmC, a DNA methylation removal intermediate. The Methyl-CpG-Binding Domain (MBD) protein family is another essential family. These proteins interact with various protein partners, providing a connection between cytosine derivatives, functional chromatin states, and their control.