Influence of Prenatal Administration of Nicotine/Thiocyanate on the Morphology of Exocrine Pancreas of 1–Month-Old Rat Offspring

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Background: Prenatal exposure to cigarette smoking is associated with harmful effects which might result in impaired pancreatic functions in the offspring. Cigarettes contain many ingredients, such as nicotine (NC) and thiocyanate (TC). NC has been proven to have variable hazardous effects. The exocrine pancreas has been found to be affected by NC. This effect might be related to the activation of pancreatic stellate cells (PSC).

Objective: To evaluate the effects of nicotine/thiocyanate on the exocrine pancreas of developing rats.

Design: An Experimental Animal Study.

Setting: Animal House, Faculty of Medicine, Assiut University, Egypt.

Method: Fifteen pregnant female rats were divided into three groups: group I (control), group II (nicotine-treated NC), and group III (thiocyanate-treated TC). Both male and female offspring of each group were sacrificed 1 month postnatal. The exocrine pancreatic tissues were processed for light microscopic evaluation and immunohistochemical detection of α-smooth muscle actin.

Result: In the NC-treated group, there was an increase in the spaces between the acini and vacuolation of the cytoplasm and darkening of the nuclei. There was an increase in collagen fibers in the NC-treated group. Immunohistochemical evaluation revealed an increase in the staining of α-smooth muscle actin (marker of PSC). On the other hand, the TC-treated group revealed minimal histomorphological effect, no increase in collagen fibers, as well as minimal α-SMA-immunostaining.

Conclusion: The prenatal nicotine administration resulted in marked structural changes, fibrosis as well as activation of PSC. Thiocyanate treatment resulted in minimal changes. This highlights the role of nicotine as the major player in cigarette smoking, especially during pregnancy.