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JOURNAL ARTICLE

Dibromoacetic acid, a prevalent by-product of drinking water disinfection, compromises the synthesis of specific seminiferous tubule proteins following both in vivo and in vitro exposures

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Dibromoacetic acid (DBA) is a by-product of drinking water disinfection that alters spermatogenesis in adult male rats. To identify a mechanism by which DBA alters spermatogenesis, seminiferous tubules representing specific groups of spermatogenic stages were exposed either in vivo or in vitro, and structural and functional consequences were evaluated. Seminiferous tubules representing stages I-V, VI-VIII, and IX-XIV were isolated from testes of adult rats and cultured overnight in conditions of reduced oxygen and temperature. For in vivo exposures, seminiferous tubules were recovered from animals that had received 250 mg/kg DBA via gavage for 5 days. For in vitro exposures, 180 and 600 microM concentrations were tested; these concentrations bracket the concentration of DBA observed within the testis following in vivo exposure. Protein synthesis was evaluated by 35S-methionine labeling overnight and quantitative analysis of radiolabeled proteins in mini, 2-dimensional (2D) sodium dodecyl sulfate-polyacrylamide gel electrophoresis gels. Radio-inert cultures were processed for light and electron microscopy. Morphologicaf evaluation indicated that all spermatogenic stages of the seminiferous tubules from control animals were well maintained during the isolation and culture period. Although no treatment-related lesions were observed following in vivo exposure, histological alterations were observed at the lowest in vitro exposure. There was a significant diminution ($P < .05$) in the synthesis of 4 cytosolic proteins following both in vivo and in vitro exposures. Diminution in these proteins was restricted to stages I-V and IX-XIV of spermatogenesis, suggesting that proteins involved in the early stages of spermiogenesis are uniquely sensitive to DBA exposure. Because histology and protein synthesis were affected by relevant in vitro exposures, this indicates that DBA is capable of altering spermatogenesis directly.

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