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Is mercury inhalation triggering the NF-KB pathway in the lungs? A histochemical study in rat model

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Statement of the Problem: Mercury is an element that is available in batteries, thermometers, barometers, light bulbs by inorganic form and also in pillars; fish, mussels and some seafood by organic form. It is visible in tooth fillings used in dental treatment, in certain vaccinations and also in antiseptic solutions. It is thought that mercury vapor released from all these compounds is harmful for human health. NF-κB is a silent factor in the cytoplasm of all cells and passes to the nucleus only when it is active, where it regulates the immune system growth and inflammation (Figure 1). The object of the study is to detect the immunohistochemical expression levels of the nuclear factor kappa B (NF-kB) in the mercury vapor exposed rats and evaluate the possible association between the expression levels and histological structure of the lung.

Methodology & Theoretical Orientation: In this study, 12 adult Wistar albino rats (12 female, weighing 200 g) were used for the above-mentioned purpose. The rats were placed in specially designed lantern. Following this procedure, subjects were exposed to 1 mg/m3/day of mercury vapor for 45 days. Subjects who did not have any application were used for control group. At the end of the experiment, lung samples obtained from all subjects were followed up according to routine procedure and evaluated histologically at light microscopic levels and immunohistochemically with NF-κB marker.

Findings: In the lungs of the subjects exposed to mercury vapor, alveolar edema and enlarged inter alveolar connective tissue septa were found. Erosion of bronchial epithelium and mononuclear cell infiltration on the wall of the conductive structures occurred. The alveoli in these lung specimens were collapsed. In addition, NF-κB immunostaining in lung tissues of exposed to mercury vapor had increased significantly.

Conclusion & Significance: Although the mercury element is liquid at normal room temperature, it evaporates after a certain period of time, causing humans to suck up from the lungs as a result of the breathing of the air. In this study, it has been shown that chronic exposure to mercury vapor may cause lung damage and NF-KB pathway may play a role in this damage.

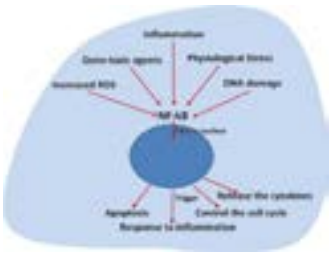

Figure 1: Regulation of the cell functions by the activity of the NF-kB.

Recent Publications

1. Yahyazedeh A, Altunkaynak B Z, Akgül N and Akgül H M (2017) A histopathological and stereological study of liver damage in female rats caused by mercury vapor. Biotech Histochem. 92(5):338–346.
2. Akgül N, Altunkaynak B Z, Altunkaynak M E, Deniz Ö G, Ünal D, et al. (2016) Inhalation of mercury vapor can cause the toxic effects on rat kidney. Ren Fail. 38:465–473.
3. Altunkaynak B Z, Akgül N, Yahyazadeh A, Altunkaynak M E, Turkmen A P, et al. (2016) Effect of mercury vapor inhalation on rat ovary: stereology and histopathology. J Obstet Gynaecol Res. 42(4):410–416.

4. Bohuslav J, Kravchenko V V, Parry G C, Erlich J H, Gerondakis S, et al. (1998) Regulation of an essential innate immune response by the p50 subunit of NF-κB. J Clin Invest. 102:1645–1652.
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Biography

Bayçu C is Professor in Histology and Embryology. He has his expertise in toxicological studies in the animal models. Also, he studies on new pathways for improving healthcare. He uses light and electron microscopy and also histochemical and molecular techniques for his studies.

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