IMMUNOTOXICOLOGY OF CADMIUM: INSIGHT FROM ACUTE INTRAPERITONEAL AND INTERMEDIATE PERIOD OF ORAL EXPOSURE OF RATS

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Conflicting data exist concerning cadmium effects on immune system depending on the experimental model, exposure or tissue/activity examined. In this study immunotoxicity of acute intraperitoneal and oral cadmium administration was investigated in rats. The use of the inflammation-prone inbred Dark Agouti (DA) and less reactive Albino Oxford (AO) rats showed differential (immune activity-related and/or strain-related) effects of cadmium (1 mg of Cd/kg, i.p.) on spleen immune responses. A decrease in ConA-induced proliferation (related to altered spleen cells responsiveness to IL-2) and of IFN-γ (independently of IL-4 and IL-10) was more pronounced in DA rats. Increased innate immunity splenocyte activity (granulocyte CD11b+ cells, iNOS mRNA and NO production, myeloperoxidase MPO activity, IL-1β mRNA and IL-1β protein product levels) were observed in both strains (some of them more pronounced in DA rats), while a decrease in respiratory burst (dihydrorhodamine/DHR oxidation) was similar. 30-day oral intake of 5 ppm and 50 ppm of cadmium by DA rats resulted in reduction of some probiotic bacteria, villous damage and intestinal inflammation [(increased levels of High Mobility Group Box1/HMGB1, antioxidant enzyme (superoxide dismutase/SOD and catalase/CAT) activity and proinflammatory cytokine (TNF, IL-1β, IFN-γ, IL-17) in gut homogenates]. Stimulation of both adaptive (increased cellularity, proliferation, IFN-γ and IL-17cytokine responses) as well as innate immune activity (increases in numbers of NK cells and M1-like macrophages, oxidative cell activities, IL-1β) of gut draining (mesenteric) lymph nodes was associated with decreased or unchanged antiinflammatory cytokine (IL-10) cell response. Differential (immunosuppressive and immunostimulatory) effects noted in the same tissue (spleen) should be taken into account when exploring immunotoxicity of this metal. Stimulation of gut immune responses imply dietary cadmium as health risk factor.

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