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Impact of Cadmium on Male Fertility

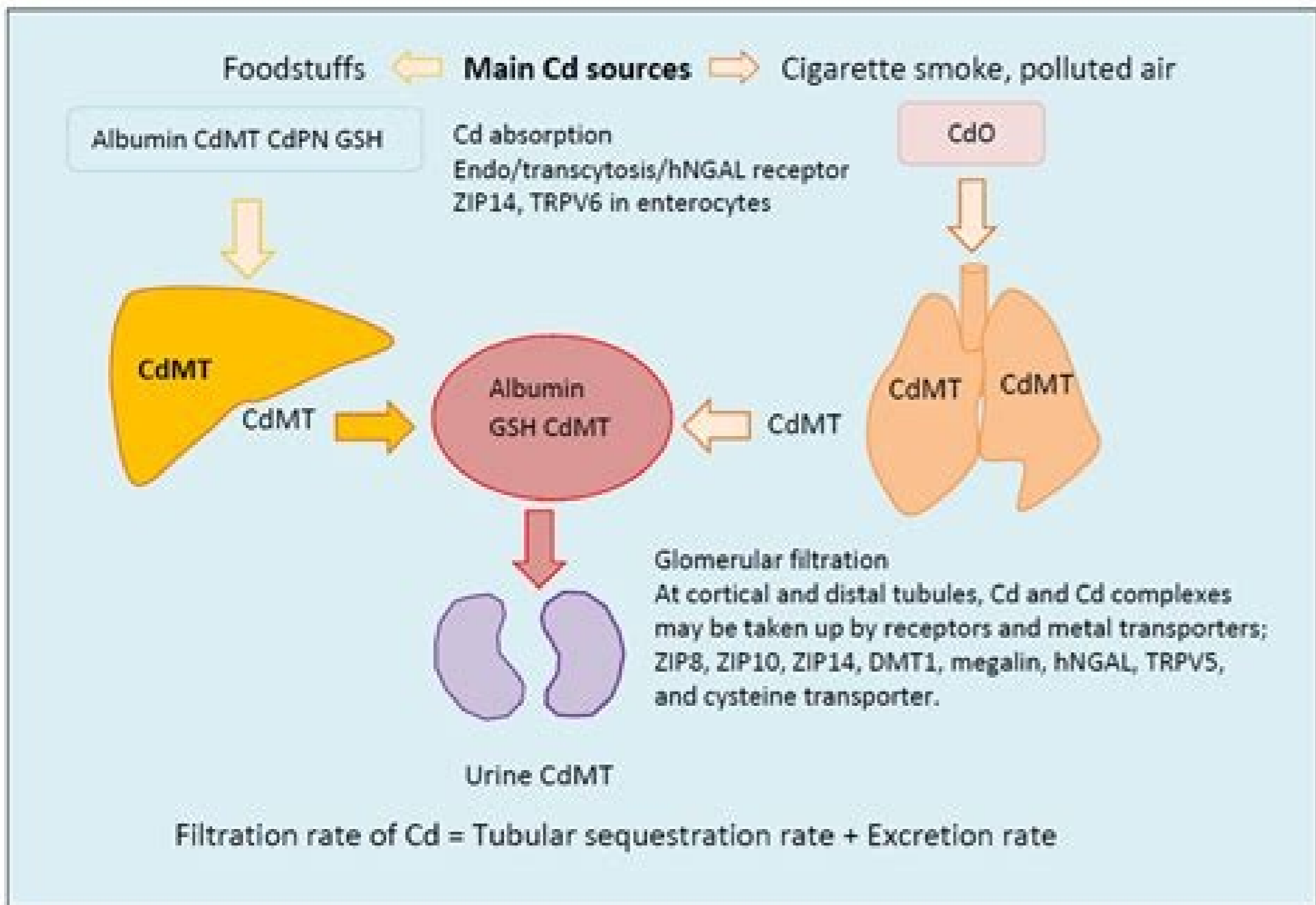
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Cadmium (Cd) is a heavy metal and a major environmental pollutant. The general population is exposed to Cd mainly via drinking water and food products. It accumulates and is proved to cause severe damage to a variety of organs such as lung, brain, testis, kidney, liver, blood system and bone. Cd exerts direct cytotoxicity within the testis, mainly targeting two specific cell populations, the Sertoli cells and the Leydig cells, with consequent impairment of spermatogenesis and endocrine function. Cd induced oxidative stress in somatic and germ cells, mainly mediated by mimicy and interference with essential ions, beyond apoptosis occurring in germ cells. After Cd treatment disturbance of the hypothalamus-pituitary-gonadal axis is also reported.

Key words: cadmium, testis, fertility

Cadmium, in its pure form, is a soft silver-white metal, which is present in the earth crust in association with multiple different metals. Cd is indeed extracted as a secondary product, during the processing of different metals, such as zinc (Zn), lead (Pb), or copper (Cu). The presence of Cd and Cd compounds in the environment is a consequence of both natural and anthropic processes. Natural sources of Cd include volcanic activity, weathering consumption of rocks, sea aerosols, forest fires and mobilization from soils and landfills. As a derivative of anthropic activities, Cd and Cd compounds, such as Cd-chloride (CdCl<sub>2</sub>), Cd-acetate and Cd-carbonate, derive from batteries, pigments, plastic stabilizers, pesticides and fertilizers, and photovoltaic devices, as well as from rubber processing, galvanization process, fossil combustion and waste incineration [6]. For the majority of animal species tested, the absorption of Cd can range from 0.5% to 3.0%, while in humans from 3.0% to 8.0% of the dose administered [20]. Factors influencing the uptake are chemical components of the diet, the body's nutritional status, age and gender proportionally to dosage used and time exposure to Cd [44]. Independently from the dietary Cd uptake, women seem to be more prone to Cd-related health effects, suggesting that a gender difference might exist in the susceptibility to Cd toxicity or in the body burden of Cd, probably because of differences in Cd absorption [13]. Indeed, the gastrointestinal absorption of dietary Cd is influenced by dietary intake of essential nutrients, including iron (Fe), Zn and selenium (Se) [6]. Cd concentration in blood is a marker of both recent and cumulative exposure, whereas urinary concentration mainly mirrors cumulative exposure [6, 13]. Among environmentally exposed population, to-





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