Aluminum-from industry to modern medicine

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Aluminum is the third most widespread element in the Earth's crust after oxygen and silicon, and the first abundant metal. For a long time, aluminum was considered as a non-toxic element, which has found its prevalent use in industrial production, materials, but also in the food, cosmetic and pharmaceutical industries [1]. Despite its rich application in various sectors of life, aluminum is not a biogenic metal and has no biological function in living organisms. However, nowadays it is wildly known that aluminum affects more than 200 different biological reactions [2]. The increased exposure of this metal is related to the level of exposure of organisms. An increasing number of scholarly articles and studies links the occurrence of aluminum and its salts in organisms with various diseases of a predominantly neurodegenerative nature, such as Alzheimer's disease, Parkinson's disease, dementia, encephalopathy and the like, appear. The hypothesis, that aluminum is a high risk factor for the development of these diseases has led to a sharp reduction, sometimes even a ban, on the use of aluminum cutlery and cooking utensils in the seventies. Despite these factors, aluminum is used as part of many drugs. Vaccination, one of the main pillars of contemporary medicine, has come into controversy between its proponents and opponents. Aluminum, as one of the essential components of vaccines, is also the subject of these expert polemics. Its main task is to strengthen the body's immune response. Although aluminum has been used as an adjuvant for more than 80 years, its mechanism of action in the human body and its neurotoxicity are still not sufficiently understood. Furthermore the way in which aluminum enters the body is very important. While the body absorbs only 0,3% of aluminum by the oral route [3], when injected intramuscularly (inoculation), the absorbability is almost 100% [4]. Where does non-excluded aluminum end? Does it have a cumulative and synergistic effect? Do we have enough information of aluminum neurotoxicity? The present paper attempts to bring the knowledge of aluminum from the industrial field through to the chemistry and biochemistry of aluminum up to modern medicine.

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