Mercury induced growth cone collapse: another reason for flossing

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Cases where exposure to heavy metals in the domestic and work environment have contributed to human disease extend back to antiquity with the use of lead in water pipes and wine storage vessels. It has been proposed that pandemic lead poisoning, resulting in mental incompetence and declining birth rate, especially amongst the ruling class, contributed to the fall of Rome [1] (see [2] for another view). More recent lead poisoning in the general population has arisen from lead-based paints and lead-additives in petrol. A well-documented case of occupational poisoning arose in workers of the 19th century felt hat industry due to the use of mercury as a stiffener of rabbit fur. Increased irritability, mood swings, tremulousness, ataxia and impairment in intellectual capacity characterize Mad Hatter's disease [3]. Currently there is ongoing public health debate on whether low level chronic exposure to mercury due to dental repair work results in subclinical behavioral changes associated with CNS damage (see [4] for review). For example, in the USA the most common material used in dental fillings is a mercury/silver mixture (amalgam) in which an estimated 70 000 kg is used in 100 million fillings/year. Furthermore, evidence indicates that mercury vapor is continuously released from tooth fillings where it is breathed in by the lungs and converted into mercuric ions. Although there is no debate on the toxic effects of high concentrations of mercury (i.e. associated with urinary concentrations $>50\,\mu g/l$), a challenge exists to demonstrate more subtle, preclinical effects associated with chronic low level mercury exposure in the general population with fillings. At least consistent with this notion is the study published in this issue [5] showing that exposure to mercury concentrations of $<0.1\,\mu M$ results in rapid (i.e. within 10 min) retraction of growth cones in snail neurons and is correlated with disruption of microtubules. Interestingly, the authors point out that similar disruption of microtubules is associated with Alzheimer's disease. These recent findings give added impetus for the development and implementation of alternative materials for fillings and may provide parents with added ammunition in teaching their children to floss.

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