

ALUMINIUM AND HEALTH

Fact sheet 3

WHAT IS ALZHEIMER'S DISEASE?

Alzheimer's Disease (AD) is a chronic condition that is characterised by progressive loss of memory and other brain functions of daily living. It is the most common type of dementia and most cases occur after the age of 65. The characteristic changes in the brain occurring with A.D are both the accumulation of unusual protein substances associated with damage to nerve cells called Neurofibrillary tangles (NFT) and scars called Senile Plaques (SP). It is only possible to definitively confirm the presence of these by brain biopsy, but other techniques like MRI could possibly detect early signs.

More than half of all cases of dementia are considered to be AD, and about 5% of the population at the age 70-80 years is affected by AD.

AD appears to be a multi-factorial disease that involves genetic and environmental factors. Despite over twenty years of extensive research, no clear cause has yet been found. Current emphasis is on a genetic linkage, which was formerly considered important only for Alzheimer's disease of early onset. Recent research has also linked several genetic factors to late onset Alzheimer's disease. It is likely that also environmental risk factors contribute to the development of AD, but much less is known about these. Known risk factors are cerebrovascular disease, high blood pressure and brain injuries.

The "dialysis dementia" that in earlier times were seen in dialysis patients given dialysis fluid with high aluminium content is quite different from Alzheimer's Disease, and it can usually be reversed, in contrast to AD.

DOES ALUMINIUM PLAY A ROLE IN ALZHEIMER'S DISEASE?

A research project published in 1965 found that injection of aluminium salts directly into the brain of rabbits produced microscopic changes in the brain, but these changes were shown to be quite different from the changes found in Alzheimer's Disease.

Subsequent research on the presence of aluminium in specific lesions or areas of the brain has produced conflicting results.

A research group in Newcastle, UK, found aluminium in the core of the senile plaques associated with AD.

Researchers at the Institute of Basic Research and Developmental Disabilities, N.Y. found varying levels of aluminium and silicon co-localised in about half the tangles and plaques studied in the brains of Alzheimer patients.

The variability of detection and the low levels of aluminium present indicated to them that aluminium is not necessary for the formation of the structural abnormalities within the brains of Alzheimer patients.

A group at Oxford University, UK, using advanced analytical techniques on unstained samples did not find aluminium in the core of the senile plaques.

A Norwegian study, set up to eliminate several of the earlier difficulties, found no difference in the aluminium content in selectively affected areas of the brain between Alzheimer patients and a control group.

The latest comprehensive report was produced in 1997 by a Task Group of the International Programme on Chemical Safety, under the auspices of the World Health Organisation (WHO) and the United Nations Environment Programme (UNEP). This report concludes that "There is no evidence to support a primary causative role of aluminium in Alzheimer's disease and aluminium does not induce Alzheimer's disease pathology in vivo in any species, including humans. The hypothesis that exposure of the elderly population in some regions to higher levels of aluminium in drinking water may exacerbate or accelerate Alzheimer's disease is not supported by available data".

This has been confirmed since that time by several national or international collective expertise groups or national health agencies (see references), and epidemiological studies on the link between aluminium in water and AD continues to show conflicting results.

During the International Conferences on Alzheimer and related disorders held at regular intervals and attended by more than one thousand specialists, aluminium has not been considered to be one of the factors involved AD. The current focus continues to be research into genetic factors. The Alzheimer's Association (www.alz.org) and the Alzheimer's Society (www.alzheimers.org.uk) web sites have useful general information about AD and risk factors for AD.

The aluminium industry has always taken a responsible attitude to health concerns about aluminium. It has provided considerable resources to key centres with eminent researchers in this field to help improve knowledge of the causes of this disease.

Reference list:

- IPCS (1997) – International Programme on Chemical Safety Report N°194 – Environmental Health Criteria - Aluminium – World Health Organization.
- Krewski D, Yokel RA, Nieboer E, et al. Human health risk assessment for aluminium, aluminium oxide, and aluminium hydroxide. The Journal of Toxicology and Environmental Health 2007; 10 (Suppl.1) 1 – 269.
- BfR Health Assessment N° 033/2007, 13 December 2005. No risk of Alzheimer disease from aluminium in consumer products. Federal Institute for Risk Assessment (Germany).
- National Institute of Aging (US): 2010 Progress report on Alzheimer's Disease.
- Willhite C C, et al.: Systematic review of potential risks posed by pharmaceutical, occupational and consumer exposures to metallic and nanoscale aluminium, aluminium oxides, aluminium hydroxide and its soluble salts. Crit Rev Toxicology, 2014;44:1-80.