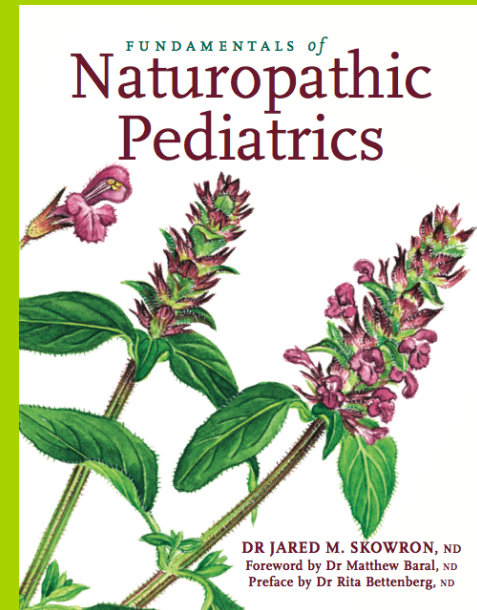
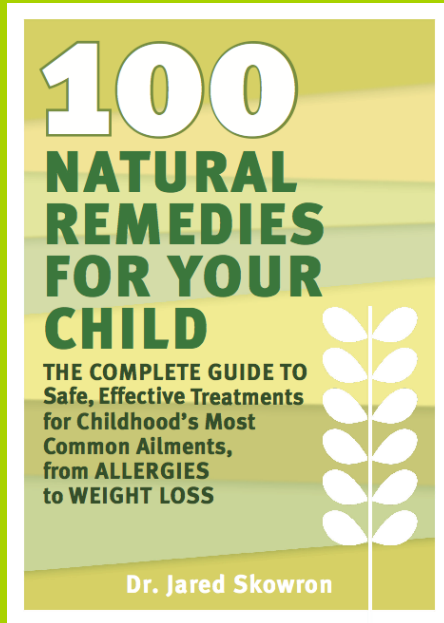




# The Toxicity of Aluminum

Jared M. Skowron, ND  
Amazon Best-Selling Author



AUTISM HOPE



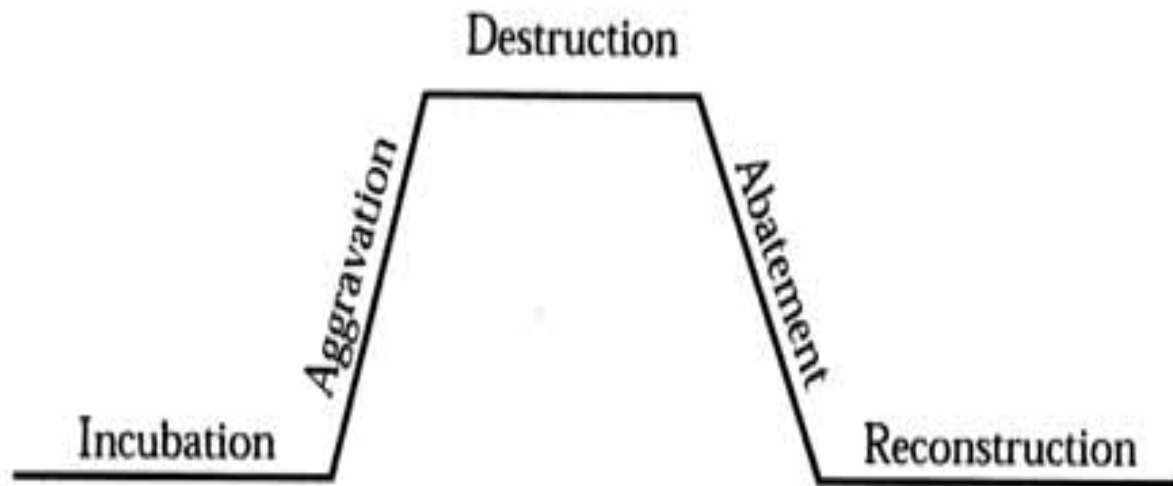
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# Order of Disease

- Symptom Presentation
  - Physiological creation of symptoms
  - Homeostatis (inflammation)
  - Etiological stressor
- ↑
- ↑
- ↑





# Kent's Lectures

- That is to say, there is a confusion of mind, a confusion of ideas and thoughts.... The consciousness of his personal identity is confused... He is in a dazed condition of mind. He makes mistakes in writing and speaking; uses words not intended; uses wrong words. Confusion and obscuration of the intellect. Inability to follow up a train of thought.



# Homeopathic - Aluminum

- MIND; ANGER, irascibility; difficult expression of
- MIND; ANGUISH
- MIND; CONFUSION of mind
- MIND; COWARDICE
- MIND; FEAR; pain; of
- MIND; INDIFFERENCE, apathy
- MIND; REPEATS same things
- MIND; RESTLESSNESS, nervousness



# Aluminum is Everywhere

- Aluminum metal - cans, pots, house siding
- Aluminum powder - fireworks, explosives
- Aluminum salts - furnaces, abrasives
- Aluminum diet - processed cheese and prepared bread, cake, pancake mixes
- Aluminum OTC - antacids, buffered aspirin
- 3rd most abundant element in Earth's crust
- 8.8% of rocks by weight





# Exposure

- Food
- Air
- Water
- OTC substances
- Vaccines



# Food Exposure

- Unprocessed foods - very low levels
- Processed foods
  - Flour, Baking powder
  - Coloring agents, anti-caking agents
  - Processed American cheese
- The major contributors to aluminum in the diet are
  - grain products (24–49%)
  - dairy products (17–36%)
  - desserts (9– 26%)
  - beverages (5–10%)



# Air Exposure

- Factory pollution
- Mining areas
- Industrial areas
- Areas that process aluminum from the earth
- OSHA – work air max 15mg/m<sup>3</sup> total dust
  - 5mg/m<sup>3</sup> respirable fraction



# Water Exposure

- Aluminum salts added to drinking water
- Natural aluminum in ponds, lakes
  - <0.1mg/L
- EPA Max - 0.05-0.2 mg/L
  - based on taste, not safety
- FDA bottled water Max - 0.2mg/L



# OTC Substances

- Antacids 300-600mg Aluminum Hydroxide
  - (104-208mg Aluminum)
- Buffered aspirin - 10-20mg Aluminum
- 126–728mg and 840–5,000 mg were possible daily doses of aluminum consumed in buffered aspirins and antacids products, respectively.
- These doses are from 6 to almost 40 times and 42–250 times greater, respectively, than aluminum doses obtained from consumption of food.



# Vaccines

- <0.85mg Aluminum / dose
- Hib 0.225 mg
- Hep B - 0.25mg
- DTaP - 0.17 - 0.625mg
- Pneumococcus - 0.125mg
- Hep A - 0.25mg
- HPV - 0.225mg
- DTaP, Hib, Polio - 0.33mg
- DTaP, Hep B, Polio - 0.85mg
- - Dr. Sears Vaccine Book



# Absorption

- Aluminum is poorly absorbed through all sources
- Ingestion/Oral/GI - 0.1-0.4% absorption
  - Aluminum Citrate - 0.5 - 5.0%
  - Aluminum Hydroxide - <0.01%
  - More is absorbed with citric/lactic/ascorbic acid
- Inhalation - poorly absorbed
- Dermal/skin - poorly absorbed



# Avg Intake -1993 FDA data

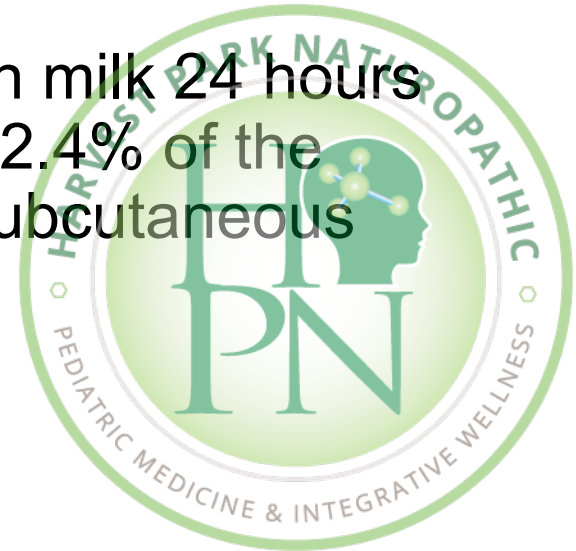
- 6-11 month infant: 0.10 mg Al/kg/day
- 2-6 yo children: 0.30–0.35 mg Al/kg/day
- 10-14 yo children: 0.11 mg Al/kg/day
- 14-16 yo children: 0.15–0.18 mg Al/kg/day
- Adults: 0.10– 0.12 mg Al/kg/day (7-9mg)
- Antacid intake: 12–71 mg Al/kg/day
- Buffered aspirin intake: 2–10 mg Al/kg/day





# Childhood Intake

- Breastmilk 0.0092-0.049 mg/L
- Soy formula 0.46-0.93mg/L
- Dairy formula 0.058-0.15mg/L
- The amount of aluminum detected in milk 24 hours after exposure was estimated to be 2.4% of the intravenous dose and 3.3% of the subcutaneous dose



# Anti-perspirant

- The active ingredient is usually an aluminum chlorhydrate salt
- Forms an obstructive plug of aluminum hydroxide within the sweat duct (Hostynek et al. 1993; Reiber et al. 1995)
- Estimated that 0.012% of the applied aluminum is absorbed through the skin



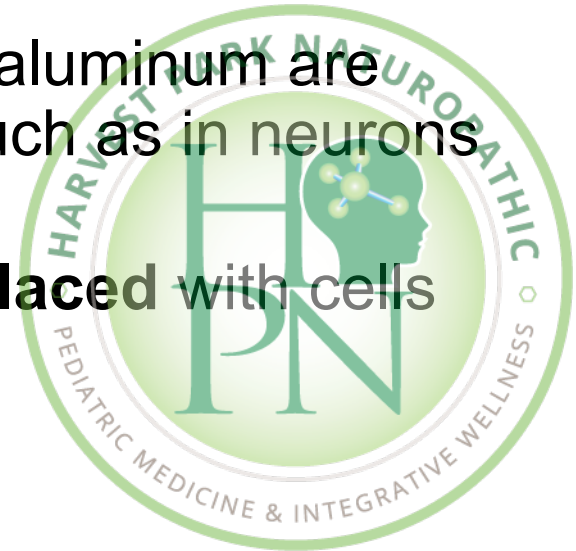
# Total Body Burden

- Total Body burden: 30-50mg
- Serum: 1-3 micrograms/L
- 1/2 stored in bones
- 1/4 stored in lungs



# Excretion

- Majority of aluminum excreted through the stool
  - Due to very poor GI absorption
- Excretion through urine
- Mild excretion through bile
- The cells that accumulate the most aluminum are large, long-lived postmitotic cells, such as in neurons (Ganrot 1986).
- Cells with aluminum toxicity are **replaced** with cells that contain less aluminum
- (remember, neurons don't replace)



# Binding in Body

- Aluminum can form complexes with many molecules in the body (organic acids, amino acids, nucleotides, phosphates, carbohydrates, macromolecules)
- Aluminum can be filtered at the renal glomeruli and excreted
- Aluminum in a high-molecular-weight complex (aluminum transferrin) is not



# Half-Life

- Aluminum cannot be destroyed
- It can only attach to different particles
- The half-life of aluminum in the brain of rats receiving an intravenous dose of aluminum citrate was approximately 150 days



# Health Problems

- Majority of health problems
  - Neurological
  - Pulmonary - mining/factory workers
  - Bone - Aluminum prevents phosphate absorption
- Most neurological research:
  - Animal
  - Those with kidney disease on dialysis



# Patients on Dialysis

- Dialysis encephalopathy syndrome (also referred to as dialysis dementia)
- Results from accumulation of aluminum in the brain.
- Dialysis encephalopathy is a degenerative neurological syndrome, characterized by the gradual loss of motor, speech, and cognitive functions.





# Deadly Dose

- Oral intakes of 230 mg/kg/day causes neurological damage in animal studies
- 230mg/kg/day causes blood dyscrasias
- 155mg/kg/day causes increase susceptibility to infection
- 53mg/kg/day causes delayed maturation
- 103mg/kg/day causes decreased weight gain
- 330mg/kg/day oral = decreased mylenation
- (53mg/kg at 0.1-0.4% absorption = 0.05-0.25mg/kg in blood, vaccine have 0.85mg)



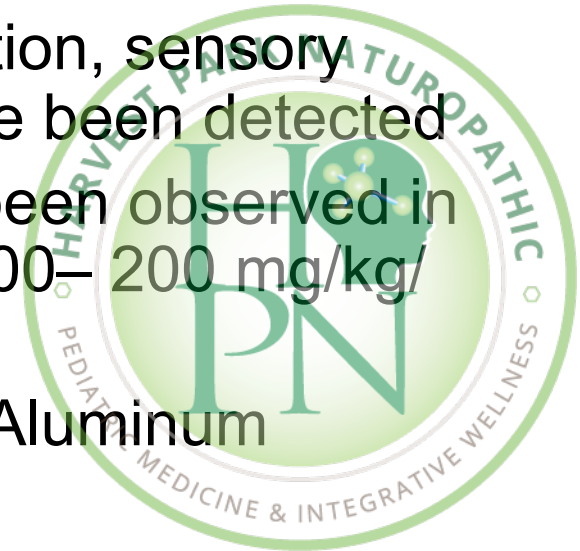
# Do the Math

- Oral ingestion of aluminum is poorly absorbed
- Avg 0.1-0.4% absorption depending on form
- $250\text{mg/kg/day} = 0.2 - 1.0 \text{ mg/kg/day}$
- 12 pound baby (5kg) getting vaccines
- Toxic dose is  $0.2-1.0\text{mg/kg} = 1-5\text{mg}$  total dose
- Vaccines have approx 1mg aluminum PER vaccine



# Neurological damage

- Neurodegenerative changes in the brain manifest as intraneuronal hyperphosphorylated neuro-filamentous aggregates
- This is a characteristic response to aluminum
- Significant alterations in motor function, sensory function, and cognitive function have been detected
- Adverse neurological effects have been observed in rats and mice at doses starting at 100– 200 mg/kg/day
- Absorption 0.1-0.4% = 0.1 - 0.4mg Aluminum



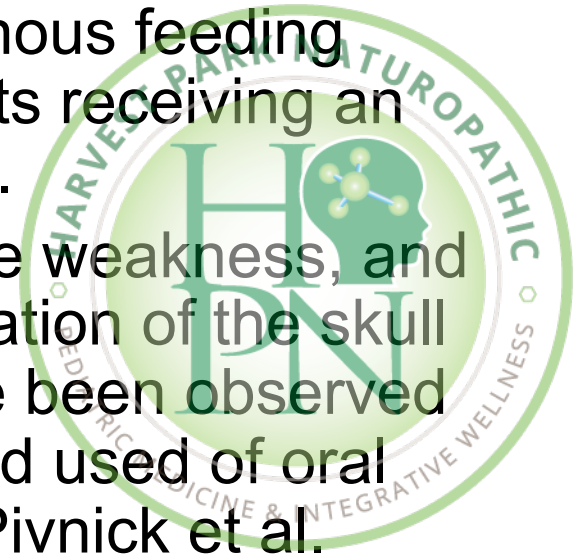
# Neurological damage

- The normal level of aluminum in the human brain ranges from 0.25 to 0.75 mg/kg
- Gray matter contains about twice the concentration found in the white matter
- There is evidence that with increasing age of humans, aluminum concentrations may increase in the brain tissue



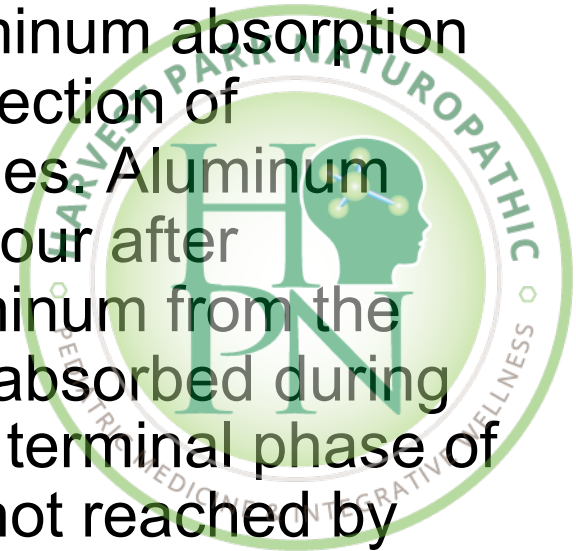
# Children Specifically

- The infant also has an immature blood-brain barrier (Adinolfi 1985; Johanson 1980)
- Bishop et al. (1997) found significant decreases in the Bayley Mental Development Index in pre term infants receiving a standard intravenous feeding solution compared to pre term infants receiving an aluminum-depleted feeding solution.
- Growth reduction, hypotonia, muscle weakness, and craniosynostosis (premature ossification of the skull and obliteration of the sutures) have been observed in healthy infants following prolonged use of oral antacids for the treatment of colic (Pivnick et al. 1995).



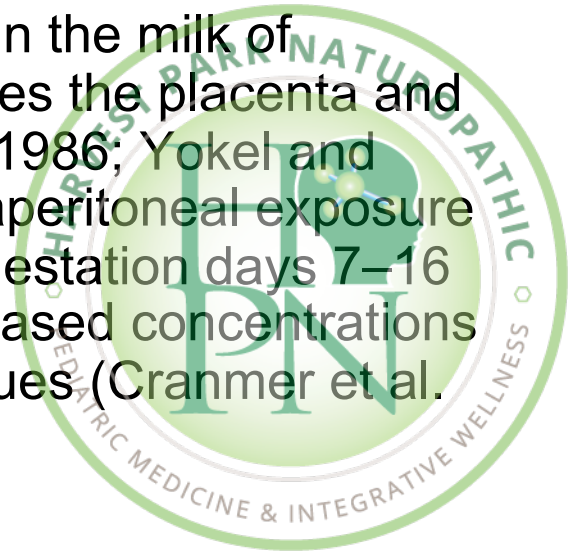
# Vaccine Problems

- An *in vivo* study also found significant increases in chromosome aberrations in the bone marrow cells of mice receiving an intraperitoneal dose of aluminum chloride (Manna and Das 1972).
- Flarend et al. (1997) estimated aluminum absorption in rabbits following intramuscular injection of aluminum adjuvants used for vaccines. Aluminum appears in the blood as early as 1 hour after injection. Three times as much aluminum from the aluminum phosphate adjuvant was absorbed during the first 28 days after exposure; the terminal phase of the blood concentration curve was not reached by that time



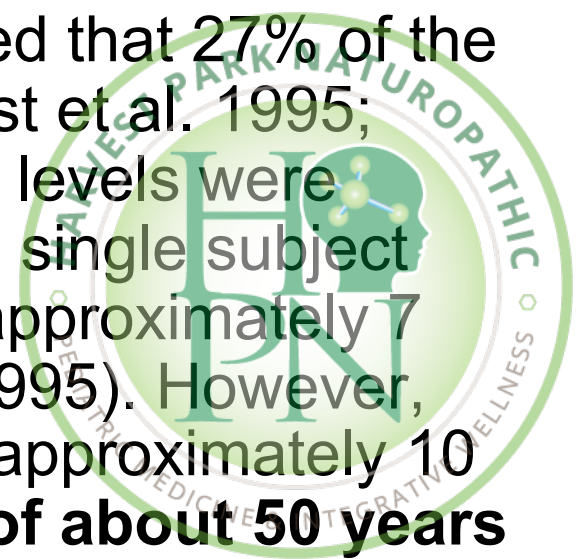
# Vaccine Problems

- Following intramuscular administration of aluminum vaccine adjuvants in rabbits, increased levels of aluminum were found in the kidney, spleen, liver, heart, lymph nodes, and brain (Flarend et al. 1997).
- There is also evidence indicating that aluminum administered parenterally accumulates to a small extent in the milk of lactating mothers, and that aluminum crosses the placenta and accumulates in fetal tissue (Cranmer et al. 1986; Yokel and McNamara 1985; Yumoto et al. 2000). Intraperitoneal exposure of pregnant mice to aluminum chloride on gestation days 7–16 has been associated with significantly increased concentrations of aluminum in both placental and fetal tissues (Cranmer et al. 1986).



# Vaccine Problems

- Within the first day of receiving a single injection of aluminum, approximately 59% of the dose was excreted in the urine, during the first 5 days (Talbot et al. 1995).
- At the end of 5 days, it was estimated that 27% of the dose was retained in the body (Priest et al. 1995; Talbot et al. 1995). When aluminum levels were monitored more than 3 years after a single subject received the injection, a half-life of approximately 7 years was calculated (Priest et al. 1995). However, when the subject was re-examined approximately 10 years after the injection, **a half-life of about 50 years was estimated** (Priest 2004).



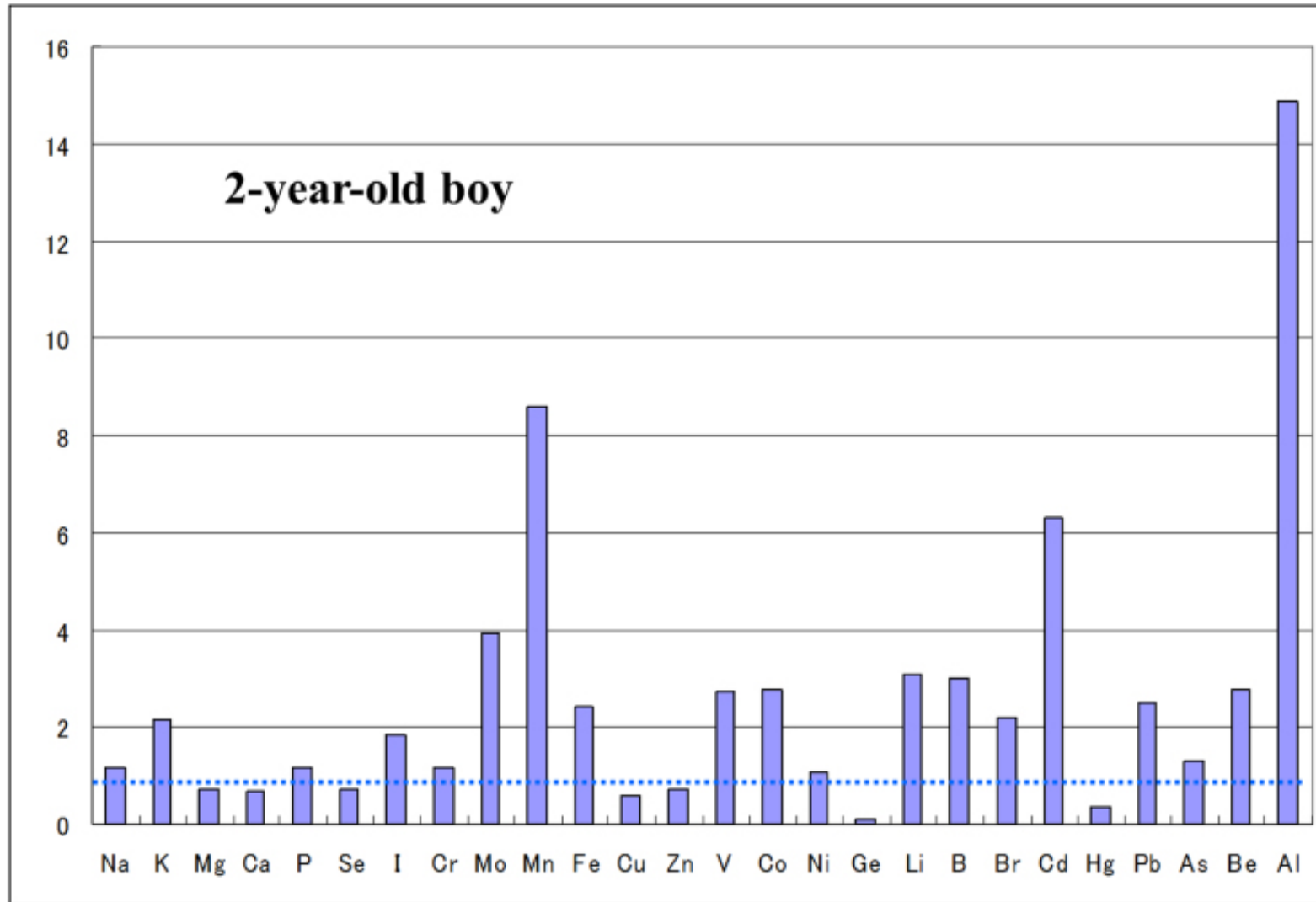


# Vaccine Problems

- Animals receiving aluminum injections from vaccines show neurological symptoms similar to autism
- Hair analysis shows heavy metals
  - (chart is 2yo diagnosed with autism)
- Why in vaccines anyway?
  - Acts as antigen aggregate to get greater immune response compared with dissolved antigen
  - Potentially keeps antigen at injection site for immune system to return to
  - Causes Macrophage Myofasciitis



The Toxicity of Aluminum - Jared M. Skowron, ND



# Minimum Risk Limit

- A minimum risk limit (MRL) has been created 1mg/kg/day when exposed for 15-364 days
- A MRL of 1 mg Al/kg/day has been derived for chronic-duration oral exposure (365 days or longer) to aluminum.
- Antacids - 12-71mg/d
- 110 pound person = 50 kg = MRL 50mg/day



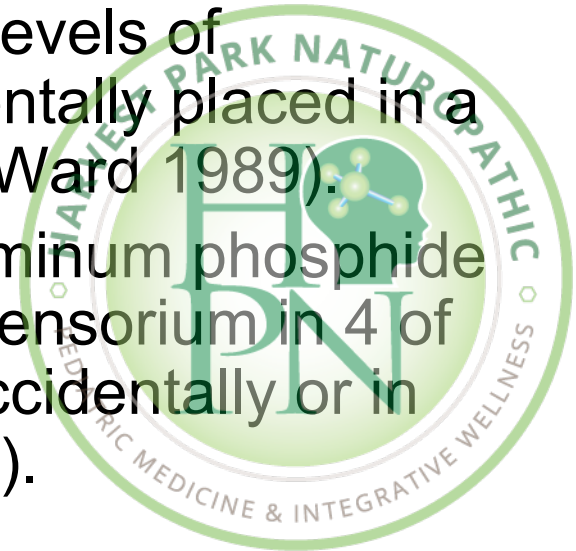
# Genotoxicity

- Aluminum complexes with DNA causing
  - DNA damage
  - DNA cross-linking
  - Micronuclei formation in human peripheral lymphocytes
  - Chromosome aberrations
- Happens more at lower pH



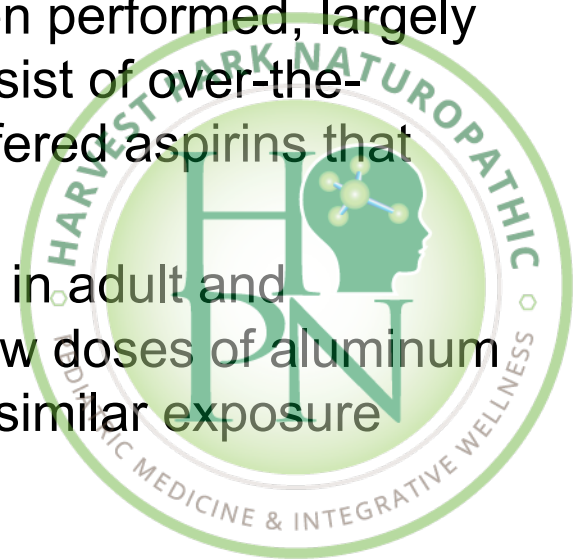
# Human Studies

- Mostly performed on renal failure patients
- Memory loss, fatigue, depression, behavioral changes, and learning impairment were reported in five children who, over a 5-day period, consumed drinking water containing unknown levels of aluminum sulfate, which was accidentally placed in a water-treatment facility in England (Ward 1989).
- Acute-duration oral exposure to aluminum phosphide (19–157 mg Al/kg) caused altered sensorium in 4 of 16 persons who ingested it either accidentally or in suicide attempts (Khosla et al. 1988).



# But... they told me...

- “The **assumed** safety of aluminum is also partly due to the FDA-approved GRAS status of aluminum-containing food additives.
- No clinical studies on health effects of aluminum medicinals in people with normal renal function have been performed, largely due to the fact that exposures typically consist of over-the-counter products such as antacids and buffered aspirins that have been **assumed** to be safe.
- Whether the subtle neurotoxic effects seen in adult and developing animals exposed to relatively low doses of aluminum would definitely manifest in humans under similar exposure conditions remains to be determined.



# Testing

- Urine - acute intake
- Blood - acute intake
- Stool - acute intake
- Tissue biopsy - bone - Body burden
- Erythrocyte levels - potentially
- No body markers identified



# Treatment

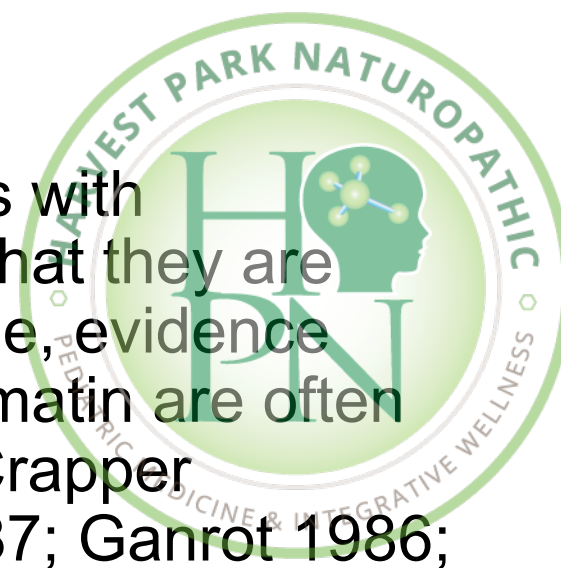
- Avoid exposure - impossible
  - Aluminum is ubiquitous on the earth
- Minimize exposure
  - Avoid processed foods
  - Cook in non-aluminum containers
  - Water filtration at home
  - Avoid antacids, buffered aspirin
  - Avoid vaccines with aluminum
  - Avoid intake with citric and ascorbic acid





# Removal

- Because aluminum has a very high affinity for proteins, polynucleotides, and glycosaminoglycans, much of the aluminum in the body may exist as physically bound macromolecular complexes with these substances.
- Aluminum may also form complexes with macromolecules that are so stable that they are essentially **irreversible**. For example, evidence suggests that the nucleus and chromatin are often sites of aluminum binding in cells (Crapper McLachlan 1989; Dyrssen et al. 1987; Ganrot 1986; Karlik et al. 1980).



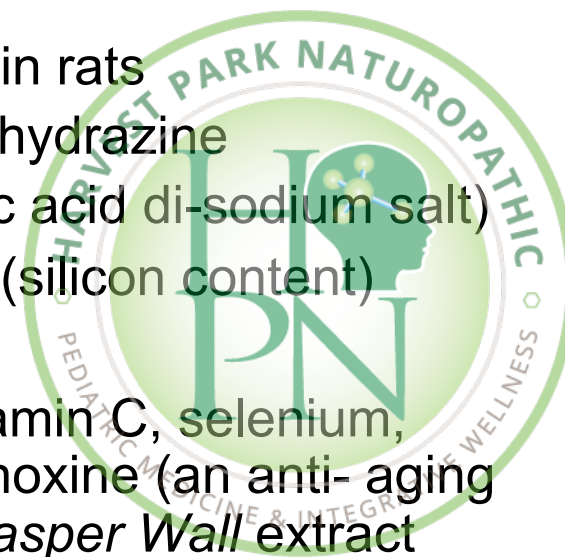
# Removal

- Aluminum is primarily excreted via citrate-binding via the kidneys into the urine
- A minor excretion path is transport of transferrin-bound aluminum of plasma via the liver into the residual intestinal tract.



# Detoxification

- Deferoxamine (DFO) reduces brain aluminum half-life from 150 to 55 days
  - Mostly used for hemochromatosis, kidney failure/acute
  - Side effects: hypotension and cataracts
- EDTA
- 1,2-Dimethyl-3-hydroxypyrid-4-one – used in rats
- 4-methyl-6-trifluoromethyl-6-pyrimidin-2-il)-hydrazine
- Tiron (4,5-dihydroxy-1,3-benzene disulfonic acid di-sodium salt)
- Folic acid, melatonin, silicic acid, and beer (silicon content)
- Toxic effects decreased with vitamin E, vitamin C, selenium, beer (due to its silicon content), centrophenoxine (an anti-aging drug), and the herbal medicines *Dipsacus asper* Wall extract and *Bacopa moniera*



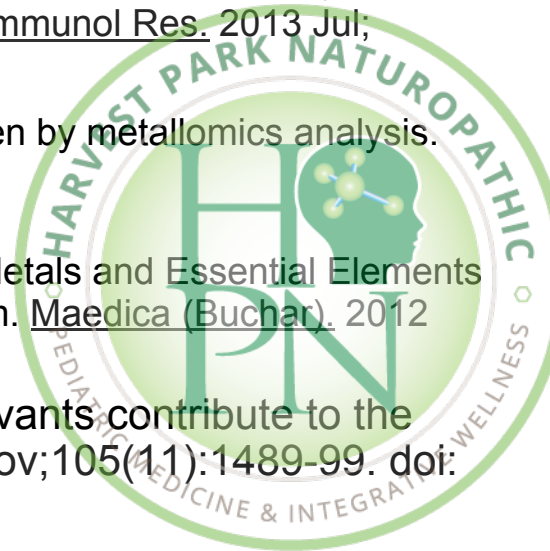
# Detoxification

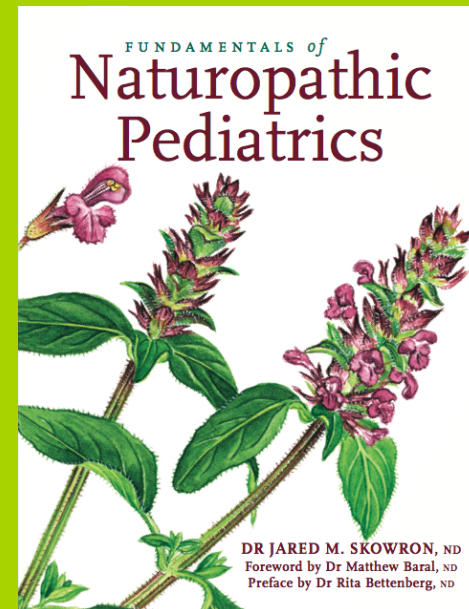
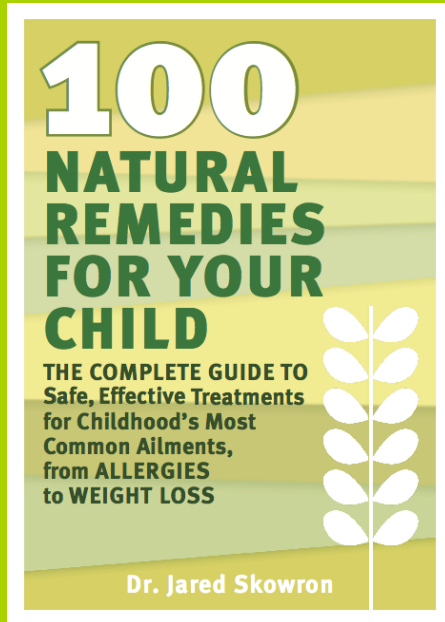
- Poorly researched aluminum detox options
- Sulphur
- Silica
- Curcumin
  - Reverses aluminum induced toxicity.



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