SAY NO TO DENTAL MERCURY NOW
TEN REASONS PHASE OUT DENTAL AMALGAM NOW

DR LISA MATRISTE
REASON 1 / Dental amalgam has the highest concentration of mercury of all mercury added products listed in Article 4, Annex A

Composition of dental amalgam

- 50-54% Liquid mercury
- 35% Silver
- 9% Tin
- 6% Copper (non-gamma-2 amalgam fillings release 50X mercury)
- Zinc trace
**REASON 1 / Dental amalgam has the highest concentration of mercury of all mercury added products listed in Article 4 Annex A**

<table>
<thead>
<tr>
<th>Mercury-added products</th>
<th>Date after which the manufacturer, importer or exporter of the product shall not be allowed (phase-out date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries, except for button zinc–silver oxide batteries with a mercury content ≤ 2% and button zinc-air batteries with a mercury content ≤ 2%</td>
<td>2020</td>
</tr>
<tr>
<td>Switches and relays, except very high accuracy capacitance and loss measurement bridges and high frequency radio-frequency switches and relays in monitoring and control instruments with a maximum mercury content of 20 mg per bridge, switch or relay</td>
<td>2020</td>
</tr>
<tr>
<td>Compact fluorescent lamps (CFL) for general lighting purposes that are ≥ 10 watts with a mercury content exceeding 1 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>Linear fluorescent lamps (LFL) for general lighting purposes:</td>
<td>2020</td>
</tr>
<tr>
<td>(a) Triband phosphor ≤ 40 watts with a mercury content exceeding 1 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>(b) Halophosphate phosphor ≤ 40 watts with a mercury content exceeding 1 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>High-pressure mercury vapour lamps (HPMV) for general lighting purposes</td>
<td>2020</td>
</tr>
<tr>
<td>Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EFL) for electronic displays:</td>
<td>2020</td>
</tr>
<tr>
<td>(a) short length (≤ 500 mm) with mercury content exceeding 1.3 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>(b) medium length (≥ 500 mm) and ≤ 1,500 mm with mercury content exceeding 5.0 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>(c) long length (&gt; 1,500 mm) with mercury content exceeding 15.0 mg per lamp/burner</td>
<td>2020</td>
</tr>
<tr>
<td>Cosmetics (with mercury content above 1 ppm), including skin-lightening soaps and creams, and not including eye area cosmetics where mercury is used as a preservative and no effective and safe substitute preservatives are available</td>
<td>2020</td>
</tr>
<tr>
<td>Pesticides, biocides and topical antiparasitics</td>
<td>2020</td>
</tr>
<tr>
<td>The following non-electronic measuring devices except non-electronic measuring devices installed in large scale equipment or those used for high precision measurement, where no suitable mercury-free alternative is available:</td>
<td>2020</td>
</tr>
<tr>
<td>(a) barometers; (b) hygrometers; (c) manometers; (d) thermometers; (e) sphygmomanometers.</td>
<td>2020</td>
</tr>
</tbody>
</table>

- **304 mg mercury per capsule**
- **1 spill**

- **736 mg mercury per capsule**
- **3 spill**
REASON 2 / Dental amalgam measures are inadequate

The cost of managing the millions of mercury contaminated plastic capsules

Over 200 million successful GS-80 restorations have been placed since its release worldwide in 1986 = **100 tonnes of mercury**

Over 30 million successful Lojic+ restorations have been placed since its release worldwide in 1988 = **15 tonnes of mercury**

Over 400 million successful Permite restorations have been placed since its release worldwide in 1975 = **200 tonnes of mercury**

SDI Australia

**Ultraconservative estimate = 315 tonnes of mercury and 630 million plastic capsules**

<table>
<thead>
<tr>
<th>Mercury-added products</th>
<th>Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental amalgam</td>
<td>Measures to be taken by a Party to phase down the use of dental amalgam shall take into account the Party's domestic circumstances and relevant international guidance and shall include two or more of the measures from the following list:</td>
</tr>
<tr>
<td></td>
<td>(i) Setting national objectives aiming at dental caries prevention and health promotion, thereby minimizing the need for dental restoration;</td>
</tr>
<tr>
<td></td>
<td>(ii) Setting national objectives aiming at minimizing its use;</td>
</tr>
<tr>
<td></td>
<td>(iii) Promoting the use of cost-effective and clinically effective mercury-free alternatives for dental restoration;</td>
</tr>
<tr>
<td></td>
<td>(iv) Promoting research and development of quality mercury-free materials for dental restoration;</td>
</tr>
<tr>
<td></td>
<td>(v) Encouraging representative professional organizations and dental schools to educate and train dental professionals and students on the use of mercury-free dental restoration alternatives and on promoting best management practices;</td>
</tr>
<tr>
<td></td>
<td>(vi) Discouraging insurance policies and programmes that favour dental amalgam use over mercury-free dental restoration;</td>
</tr>
<tr>
<td></td>
<td>(vii) Encouraging insurance policies and programmes that favour the use of quality alternatives to dental amalgam for dental restoration;</td>
</tr>
<tr>
<td></td>
<td>(viii) Restricting the use of dental amalgam to its encapsulated form;</td>
</tr>
<tr>
<td></td>
<td>(ix) Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury compounds to water and land.</td>
</tr>
</tbody>
</table>

Article 4 Annex A
REASON 3 / Mercury free alternatives are readily available

All the excuses...

- It’s cheap
- It’s strong
- It’s safe
- It’s inert
- It’s easy
- It lasts
REASON 4 / Mercury free fillings cost less than dental amalgam
### REASON 4 / Mercury free fillings cost less than dental amalgam

**Comparative costings**

<table>
<thead>
<tr>
<th>Description</th>
<th>Metallic 1 Surface Filling</th>
<th>Adhesive 1 Surface Filling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of materials</td>
<td>AU$2.70</td>
<td>AU$31</td>
</tr>
<tr>
<td>Charge to patient</td>
<td>AU$150</td>
<td>AU$169</td>
</tr>
<tr>
<td>Profit margin for dentist</td>
<td>98%</td>
<td>82%</td>
</tr>
</tbody>
</table>

**Negative externality - cost of health and environmental impact:**
- Low cost (separators etc): $60.00
- High cost (no separators etc): $395.00

<table>
<thead>
<tr>
<th>Societal Profit:</th>
<th>AU-$247.70</th>
<th>AU$138</th>
</tr>
</thead>
<tbody>
<tr>
<td>Societal Profit Margin:</td>
<td>-165%</td>
<td>82%</td>
</tr>
</tbody>
</table>
The costly legacy of mercury based dentistry

Approximately 40% of General Practitioners provided Metallic Restoration services;

- Single surface, AU$150
- Three surface with a pin, AU$280
- Five surface with another pin, AU$355
- Root canal filling, AU$1500
- Crown, AU$1600
- Extraction, AU$250
- Bridge, AU$4400 → 10 years later → another extraction → 2 implants
- Implant, AU$4000

Customer lifetime value per tooth = AU$8,135 – $16,535
REASON 4 / Mercury free fillings cost less than dental amalgam

The dental amalgam manufacturers position

Our management is strong and our teams around the world are dedicated, knowledgeable and experienced. **SDI is no longer just an amalgam company and has been evolving to be a well-recognised dental innovator.** We are very motivated and have a solid pathway to long-term sustainable growth.

September 2018 – SDI
REASON 5 / Cost benefit to countries by reducing public health burden

Mercury is a known health hazard

- Public Health Burden
- Global oral health crisis;
  - Periodontal disease is the leading cause of tooth loss in adults
  - A clear link between loosening of teeth & chronic exposure to mercury

WHO Statement on Periodontal Disease

Dr. Yoshihide Hagiwara, developed powdered barley grass as a product to cure his occupationally induced mercury poisoning.

Chronic Health Effects:
- Inhalation of mercury vapours, dusts or organic vapours, or skin absorption or mercury over long periods can cause mercurialism. Symptoms include tremors, inflammation of mouth and gums, excessive salivation, stomatitis, blue lines on gums, pain and numbness in extremities, weight loss, mental depression, and nervousness. Exposure may aggravate kidney disorders, chronic respiratory disease and nervous system disorders. May cause damage to blood, kidneys, liver, brain, peripheral nervous system, central nervous system.

SDI pre-dosed amalgam capsules permite, lojic+ & gs-80, MSDS

Tytin, Precapsulated, MSDS
REASON 5 / Cost benefit to countries by reducing public health burden

The connection between dental amalgam and anti-microbial resistance (AMR)

Installing mercury dental amalgam restorations resulted in an increase in the proportion of their GI tract (oral and faecal) bacteria able to produce volatile Hg(0). 80 to 90 percent of the mercury transforming bacteria were also resistant to several antibiotics because selection for the mercury transformation genes results in co-selection for whatever antibiotic resistances happen to be on the same plasmid; i.e. they are genetically linked.

Anne O. Summers, Department of Microbiology, The University of Georgia
REASON 5 / Cost benefit to countries by reducing public health burden

Anti-microbial resistance AMR: a global multifaceted phenomenon

- By 2030, antimicrobial resistance could force up to 24 million people into extreme poverty.
- By 2050, 10 million deaths each year and damage to the economy as catastrophic as the 2008-2009 global financial crisis.

**UN Ad hoc Interagency Coordinating Group on Antimicrobial Resistance**

- In the US, the CDC estimated the cost of AMR as $55 billion per year overall
  - $20 billion in excess for direct healthcare costs, with additional society costs for lost productivity as high as $35 billion a year.

*Francesca Prestinaci, Patrizio Pezzotti, and Annalisa Pantosti, 2015*
REASON 6 / Phase out or phase up

A growing population means more mercury

By 2050, global population is projected to increase to around 9.8 billion.
REASON 7 / Dental mercury is diverted to ASGM
The ethical response

For thousands of years, mercury has been used to transform earth into precious metals of gold and silver. Whether it was the ancient practice by alchemists or artisanal miners, gold and silver artifacts have been desired throughout time. The accumulation of these objects have become the measure of one’s worth. The trade of gold and silver has been the basis of our currency and the foundation of modern societies’ financial sectors. Contemporary gold lust produces both a parallel toxic mercury environmental footprint and transgenerational damage to human health.
REASON 7 / Dental mercury is diverted to ASGM

The solution and benefits

The solution
Assign discrete Harmonized System (HS) codes to track transboundary transport of the two forms of dental mercury ie bulk and encapsulated plus hazardous dental amalgam waste.

The benefits
• Assist countries in quantifying the use of dental amalgam in their countries as a starting point for a phase down of dental amalgam.
• The other benefit will be to quantify the use that is used legitimately for the dental sector and identify amount that is being illegally diverted toward ASGM
• Tracking the dental amalgam waste so it can end its lifecycle

<table>
<thead>
<tr>
<th>TABLE 1. TOP 5 EXPORTERS OF MERCURY IN 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Mexico</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>Indonesia</td>
</tr>
<tr>
<td>Singapore</td>
</tr>
<tr>
<td>India</td>
</tr>
</tbody>
</table>

Source: UN Comtrade database, accessed by 3 October 2018

REASON 8 / Dental mercury waste management

Dental Amalgam Manufacturer recommendations for waste disposal

- SDI were found to have contaminated several areas with metallic mercury as a result of poor operational practices.
- EPA served two clean-up notices and instituted legal proceedings for land pollution against the company

Report of the Environment Protection Authority for the year ended 30 June 1988

**WASTE DISPOSAL:**

1. Waste material and all primary containers that have held mercury shall be disposed of following appropriate management practice and in accordance with national regulations, and that all amalgam waste products, including spillage, amalgam residues, particles, fillings, and teeth, or anything contaminated by dental amalgam, is handled and collected by an authorised waste management establishment.
2. Amalgam waste shall never be released, either directly or indirectly, into the environment.

SDI pre-dosed amalgam capsules permit, lojic+ & gs-80, MSDS
REASON 8 / Dental mercury waste management

Current practices of dental amalgam waste management are not adequate

Option 1: Into the bin → landfill or open burning of waste

Option 2: Down the sink → waste water

Option 3: Into Mediwaste → incineration creates mercury emissions

Option 4: Collected or posted in the mail by metal scrap recycler or an authorized recycler

Where does the recovered dental mercury go?

Option 1: resold as a commodity to dental amalgam manufacturers, chlor-alkali plants, ASGM

Option 2: stabilized > final disposal into safe, long-term storage
REASON 8 / Dental mercury waste management

Recovered mercury should not be recycled as a commodity

Contract Resources have identified an ethical end user within Australia as an end user for the recovered mercury. In the event that demand from this procurer is no longer large enough to keep up with supply or if commercial conditions no longer become viable. **Contract Resources will look to export the recovered mercury overseas.**

EIA

Moreover, the end product is no longer waste. Instead, processed mercury is sent to Melbourne for use in dental amalgam fillings.

Woodside
REASON 8 / Dental mercury waste management

Penalties for polluters and phoenixing

It wasn’t until the company collapsed into insolvency six months later, that the warehouse doors were opened to reveal a potential health and environmental disaster on Melbourne’s suburban fringe: pallets of steel drums and plastic tubs, stacked to the ceiling, filled with mercury, contaminated powders, leaking batteries, and suspected X-ray machine parts. Almost 800 containers of highly toxic material, abandoned by a company that no longer operated.

- the estimated clean-up bill was more than $1 million.

The Age
REASON 9 / Social inequalities and injustice

Socio-Economic Inequality

Dumping dental amalgam disguised as humanitarian dental projects.

The Balibo Project, East Timor
Dr Lisa Matriste & Rotary International

Mercury-free Philippines—One dentist is making a difference,
Dr Lillian Lasaten-Ebuen

Africa Mercy Ship, in partnership with Saremco, a biocompatible & mercury free dental manufacturer
REASON 9 / Social inequalities and injustice

Dental amalgam manufacturers target populations of low socio-economic status

Sales of Amalgam products Amalgam sales currently represent approximately 22.8% of total sales and continues to show a decreasing sales trend as markets are moving to Aesthetic products. **SDI has existing strategies and controls in place to increase its focus on replacement products, but also to continue to promote its Amalgam products to lower socio-economic markets.**

30 June 2019 - SDI Limited Directors’ report
REASON 9 / Social inequalities and injustice

Gender & age discrimination

Introduction of a European Union directive;

Amalgam should not be used in the treatment of deciduous teeth, in children under 15 years old, and in pregnant or breastfeeding women, unless it is deemed strictly necessary by a dentist based on the specific medical needs of the patient

If you're not a child or a pregnant or breastfeeding mother you are being discriminated against by dental regulation and recommendations.

Mercury is a documented reproductive and developmental toxin in humans.

- Some of mercury's documented hormonal effects at very low levels of exposure include;
  - effects on the reproductive system resulting in lowered sperm counts
  - defective sperm cells
  - and lowered testosterone levels in males.
REASON 9 / Social inequalities and injustice
Workers rights

What do these women have in common?
REASON 9 / Social inequalities and injustice
Workers rights

We are both innocent victims of Mercury poisoning.
REASON 9 / Social inequalities and injustice

Workers rights

8. Work activities that may represent a high risk exposure

Mercury exists in three forms: liquid and vapour states (\(\text{Hg}^0\)) and inorganic mercury salts (\(\text{Hg}^+\) and \(\text{Hg}^{2+}\)).

Examples of work activities involving inorganic mercury and its compounds which require special attention when assessing exposure include:

- manufacture of amalgams, for example tin amalgam, amalgam of gold, copper and zinc used in dentistry for filing teeth, amalgamated zinc used in electric batteries and sodium amalgam used in the laboratory in conjunction with water as a reducing agent
- **dental work involving mercury**
- manufacture of pigments and antifouling paints (mercuric oxide) and vermilion (mercuric sulphide) in the paint and colour industry
- extraction of gold and silver from roasted pyrites (mercuric sulphate)
- extraction of gold from tailings
- laboratory work with mercury in closed or confined spaces
- the use of mercury-containing fungicides
- exploration/production, refining and processing of natural gas
- the use of fluorescent lamps and electrical meters.

Special attention should be given to acute exposures, including mercury spills that may occur in the above processes.

It is recommended testing should occur one month, three months, six months and thereafter at regular intervals.

Hazardous Chemicals Requiring Health Monitoring Guide, SafeWork
REASON 9 / Social inequalities and injustice
Workers rights – Introducing the SMART protocol

| Personal protection | Safety glasses with side shields. |
| Eye and face protection | Chemical goggles. |
| | Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate chemicals in use and an account of injury experience. Medical and first-aid personnel should be readily available. In the event of chemical exposure begin eye irrigation immediately and remove at the first signs of eye redness or irritation - lens should be removed in a clean environment. Current Intelligence Bulletin 56 [AS/NZS 1336 or national equivalent] |
| Skin protection | See Hand protection below |
| Hands/feet protection | Wear impervious gloves. |
| Body protection | See Other protection below |
| Other protection | Overallis. |
| | PVC Apron. |
| | PVC protective suit may be required if exposure severe. |
| | Eyewash unit. |
| | Ensure there is ready access to a safety shower. |

SDI pre-dosed amalgam capsules permite, lojic & gs-80, MSDS
REASON 10 / Charlie Brown is getting old
A ROAD MAP TO END THE MERCURY AGE IN DENTISTRY

Source Reduction

• Switch to alternatives
• Support the African Amendment to Annex A for the universal phase out of dental amalgam by 2024
• Support the Review of Annex A and B

Dental Mercury Waste Management

• Government development of regulation for programs for mandatory installation of BAT dental amalgam separators.
• Government development of regulation for mandatory programs for installation of BAT to capture mercury emissions in dental clinics and crematoria
• Allocate discrete HS codes to dental amalgam and dental amalgam waste
  • Dental amalgam waste must be processed locally and not transported over water bodies

Recovery, stabilization and final disposal of dental mercury

Awareness Raising, Capacity Building and Technical Assistance

• Implementing reforms in dental profession to include occupational and environmental protection.
• Government development of regulation for making SMART protocol mandatory and integrat within University curriculum.
For follow up and access to source documents come and visit us at our booth

contact@saynotomercury.com