



Community Health Commission

ACTION CALENDAR

July 16, 2013

To: Honorable Mayor and Members of the City Council
 From: Community Health Commission (CHC)
 Submitted by: Linda Franklin, Chairperson, CHC
 Subject: Reducing Exposure to Mercury in Dental Amalgam by Informed Consent

RECOMMENDATION

Adopt a Resolution requiring dentists practicing in Berkeley to:

1. Avoid or limit use of mercury dental amalgam,
2. Obtain documented informed consent from the patient before placement of each dental amalgam, and
3. Follow applicable regulations regarding dental amalgam practices and separators preventing mercury from reaching the environment.

SUMMARY

A legitimate scientific debate exists over whether mercury dental amalgam is safe and whether this issue should be disclosed to patients. The community is sharply divided. The FDA has failed to respond to concerns by its science advisory panel and to legal petitions by consumers and dentists. A state-mandated dental materials fact sheet is currently inadequate, out-of-date, and unenforced. The role of local government in the face of state and federal inaction is open to debate, but the Commission recommends adoption of a strong informed consent resolution to communicate the risks and uncertainties that have previously been downplayed.

FISCAL IMPACTS OF RECOMMENDATION

The fiscal impacts would be minimal for the City — except to continue any current dental health education, with a focus on prevention of dental caries and promotion of overall dental health. The incremental cost for dentists would be the minor expense associated with preparation and administration of an informed consent form prior to placement of each dental amalgam. Denti-Cal requirements/limitations for reimbursement allow dentists to recoup most of the extra cost of applying composite as opposed to amalgam.

CURRENT SITUATION AND ITS EFFECTS

1. The public is generally aware that mercury is toxic; however, there are certain subpopulations, particularly for whom English is a second language, that may have little awareness and may need written materials in their language. In

addition, there is little awareness that mercury is used in dentistry. Historically, mercury dental amalgam was presumed safe; however the potential for exposure to mercury from dental amalgams, as well as the range of potential health risks associated with exposure are not well understood and recent science suggests cause for concern. Information about these potential health risks is not routinely conveyed to patients before each amalgam placement.

2. Dental amalgams are the most significant source of exposure to mercury in the general population in the absence of fish consumption or industrial sources. The World Health Organization estimates that the typical mercury exposure for individuals with dental amalgams can range from 3-17 micrograms per day, whereas the US Food and Drug Administration (FDA) estimates that the typical mercury exposure for individuals with dental amalgams is 5 or less micrograms per day .
3. About half of dental cavities in posterior teeth are filled with dental amalgam, known as "silver fillings". Dental amalgam is approximately 53% mercury and about 30% silver. The mercury vapors emitted by dental amalgam are absorbed during installation and over many years or decades after installation. High levels of mercury vapor are also emitted during removal of dental amalgams. This is not a recommendation for removal. Safe removal is a topic of debate and not covered herein.
4. Patients are not always given adequate information on the potential health effects of mercury so that they can understand implications, and potential future consequences of the use of dental amalgam. A state mandated Fact Sheet on dental materials, required to be given once to each patient, contains inadequate and outdated information. Historically, the Dental Board of California has been slow in issuing and updating the Fact Sheet.
5. The United States Environmental Protection Agency (U.S. EPA) and the California Environmental Protection Agency (Cal/EPA) have conducted risk assessments to determine estimates for which adverse effects are not expected to occur. In 1995, the U.S. EPA determined a tolerable dose of 4.8 micrograms of mercury per day. In 2008, Cal/EPA determined a tolerable dose of 0.48 micrograms of mercury per day. Based on FDA estimate of exposure from amalgams of 5 micrograms per day or less, this means that many people will exceed the US EPA tolerable dose, and most will exceed the Cal/EPA tolerable dose.

BACKGROUND

At its regularly scheduled meeting on May 9, 2013, the CHC took the following action: "To accept the report "Reducing Exposure to Mercury in Dental Amalgam by Informed Consent" as written."

M/S/C: (Stein/Lee)

Ayes: Fang, Lee, Rosales, Speich, Stein, Tempelis

Noes: None

Abstain: Franklin, Kwanele, Straus

Absent: Lewis-Hatheway, Namkung (both excused)

Humans can be exposed to mercury in multiple forms. Elemental mercury is found in dental amalgam and some common household products such as compact fluorescent light bulbs. Methylmercury is present in some fish. The U.S. EPA summarized potential acute effects from both forms of mercury, which may include tremors, emotional changes, insomnia, neuromuscular changes, headaches, and loss of cognitive function. For fetuses, infants, and children the primary health effect from methylmercury is impaired neurological development. The health effects from chronic low-dose exposure to elemental mercury, such as from dental amalgam, are not well understood.

Mercury's toxic mechanism is unusually insidious—it stimulates general oxidative damage and it blocks sulfur, which plays a key role in numerous biochemical reactions involving enzymes, hormones, and neurotransmitters, thus mercury can disrupt key processes in many organ systems and can cause a variety of nonspecific symptoms which are difficult to diagnose. The CHC evaluated sources of mercury exposure in the City of Berkeley and concluded that the largest potential sources are from dental amalgam and dietary fish.

Mercury dental amalgam has been used throughout the world since the 1800s. Until about 30 years ago, it was the only material widely available for use, aside from gold, a prohibitively expensive alternative. The primary alternative to dental amalgam is resin-based composite (also known as "white fillings"), which are somewhat more expensive than dental amalgam.

The U.S. Food and Drug Administration (FDA) regulates dental amalgam under the 1976 Medical Device Amendments to the federal Food, Drug, and Cosmetics Act. As a "pre-amendment" device, amalgam was grandfathered into the regulatory system and was Generally Regarded as Safe (GRAS) by the FDA based on its historic use. According to the FDA's most recent labeling instructions to dentists on mercury amalgam, "Very limited to no clinical information is available regarding long-term health outcomes in pregnant women and their developing fetuses, and children under the age of six, including infants who are breastfed." Since the safety of amalgam for children and fetuses is unknown, and as mercury is listed as a developmental toxin under California's Proposition 65, it should be the position of the City of Berkeley that this information bears disclosure to patients and parents.

In general, most human epidemiology studies do not show a clear association between dental amalgams and adverse health effects. Two of the most comprehensive human epidemiology studies are the New England Children's Amalgam Trial and the Portugal Children's Amalgam Trial. Initial publications of these trials in 2006 found no significant

difference in neurological outcomes between the amalgam versus the composite group. These studies have been widely cited as evidence for the safety of dental amalgam. However, a recent publication using a subset of children from the Portugal Children's Amalgam Trial reported a highly consistent and statistically significant association between mercury levels in urine and adverse neurological effects in boys with a common genetic variant. In addition, studies in laboratory animals and cell cultures exposed to mercury at doses equivalent to what humans may receive from dental amalgams show potential for harm.

Despite the lack of consistent evidence in the scientific literature on potential health risks of dental amalgam, use of the Precautionary Principle is warranted. The Precautionary Principle supports a reduction in the use of mercury in dental amalgam and obtaining informed consent if dental amalgams are needed.

The CHC reviewed other sources of mercury exposure in Berkeley. They found that exposure to methylmercury both from fish caught at the Berkeley Marina and from commercial fish are significant sources of exposure. Currently the City has 13 signs located throughout the marina warning fisherman of the risks and these are posted in multiple languages. For commercially available fish, the mercury content varies by species and origin. Many health authorities now recognize that some common species of fish contain unhealthy levels of methylmercury and the Community Environmental Advisory Commission (CEAC) is currently reviewing sustainable seafood labeling practices for Berkeley merchants to inform consumers of fish species that are low in methylmercury.

RATIONALE FOR RECOMMENDATION

The resolution addresses the need to provide routine and timely information to patients regarding the use of dental amalgams by requiring dentists to provide patients with complete information including an acknowledgement of the potential risks of amalgam.

This would be required to be signed at each office visit prior to placement of each dental amalgam. In addition, the resolution attempts to disseminate information about the potential risks and benefits of mercury amalgam use, as well as its removal, and the need for leadership and consensus on this issue.

Since the patient may be faced with extensive paperwork at the initial dental office visits regarding Business and Professions Code 1648, only the paragraph containing the above information shall require an additional signature or initials by the patient each time an amalgam is placed.

The dentist will review and convey the benefits and risks of the restorative options and will include the risks of chronic inhaled mercury vapor. The cost differential for the patient, if any, will also be discussed.

ALTERNATIVE ACTIONS CONSIDERED

A full ban on mercury dental amalgam was considered.

Recommendations from the California Dental Association were that dentists need the option to choose the material that is most suitable for the patient both for their health and overall well-being, including financial considerations. Dental amalgam is a less costly alternative to other materials used for fillings such as gold and composites, therefore the above recommendation was decided upon.

There were numerous discussions regarding the fact that the California Dental Board Fact Sheet needs to be updated, but based on past experience, this is likely to take many years. If the update were to be pursued, it is suggested that the Berkeley Toxics Division develop an interim Fact Sheet for dentists to distribute until the California Dental Board's updated Fact Sheet is available.

Informed consent is a universal right that everyone can support.

However, there were some discussions regarding resources for enforcement of the informed consent requirement. One option would be to consider implementation of medical regulations enforcement that uses monitoring of mandatory posted signage similar to that of Proposition 65. There was also discussion regarding increasing public awareness of reporting to the Dental Board episodes of nondisclosure of the fact sheet by dentists and possible fines for documented consumer complaints.

Norway, Sweden and Denmark have banned mercury dental amalgam. Germany and Canada advise pregnant women against its use. The World Health Organization recommends a phase-down of mercury dental amalgam and encourages the use of non-mercury alternatives. The cities of Philadelphia, PA, Costa Mesa, CA, and Malibu, CA, have passed local ordinances aimed at discouraging amalgam use.

In addition, the Health Commission wishes to support any and all actions that the Community Environmental Advisory Commission has recommended—including requesting that the California Dental Board update its Fact Sheet, writing to the UN, FDA, WHO and providing copies of the resolution to the Berkeley's state and federal representatives, continuing public education and commencing professional education and new enforcement.

The Health Commission appreciates the hard work and research that CEAC put into this project, including the attached powerpoint on the Science of Dental Amalgam, and wishes to affirm its belief that the residents of the City of Berkeley need their health to be protected by being informed of and consenting to the placement of mercury into their bodies.

CITY MANAGER

See companion report.

CONTACT PERSON

Linda Franklin, Chair CHC, (510) 919-8715

Janet Berreman, Health Officer, Secretary to the CHC (510) 981-5301

Attachments:

1: Resolution

2: Power Point, Introduction to the Science Surrounding Mercury from Dental Amalgam

3: State Dental Materials Fact Sheet

4: February 2013 CHC motion

RESOLUTION NO. ##,###-N.S.

REDUCING EXPOSURE TO MERCURY IN DENTAL AMALGAM BY INFORMED
CONSENT

WHEREAS, a legitimate scientific debate exists over whether mercury dental amalgam is safe and whether this issue should be disclosed to patients; and

WHEREAS, the FDA has failed to respond to concerns by its science advisory panel and to legal petitions by consumers and dentists; and

WHEREAS, the state-mandated dental materials fact sheet is currently inadequate, out-of-date, and unenforced; and

WHEREAS, the Precautionary Principle supports a reduction in the use of mercury in dental amalgam and obtaining informed consent if dental amalgams are needed.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Berkeley that dentists practicing in Berkeley are required to avoid or limit use of mercury dental amalgam.

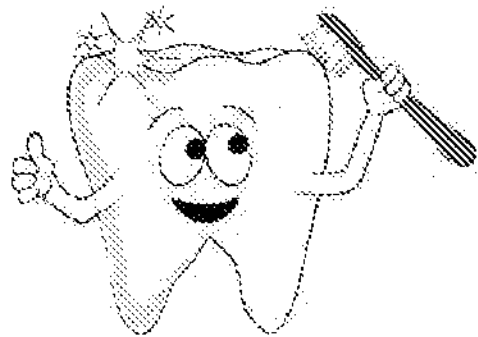
BE IT FURTHER RESOLVED that dentists practicing in Berkeley are required to obtain documented informed consent from the patient before placement of each dental amalgam. Dentists implanting mercury dental amalgams in the mouths of patients in Berkeley will obtain written informed consent in advance of each placement. The informed consent shall include the following language:

Dental amalgam, which is approximately 50% mercury, continuously releases low levels of mercury vapor. Mercury is a neurotoxicant at low doses. Current science suggests that mercury from dental amalgams may pose a risk to the developing fetus, children, and to susceptible individuals. This statement is not intended to imply that other dental materials are without risk. These issues are currently under review by the U.S. Food and Drug Administration.

BE IT FURTHER RESOLVED that dentists practicing in Berkeley are required to follow applicable regulations regarding dental amalgam practices and separators preventing mercury from reaching the environment.

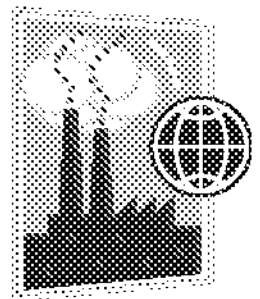
Introduction to the science
surrounding mercury from
dental amalgam

February 14, 2013



Environment

- Mercury is a volatile toxic metal that does not decompose in the environment and is readily absorbed by animals
- Metallic mercury vapor is readily absorbed, inorganic mercury is not readily absorbed.
- Mercury bio-accumulate in the food chain, and many fish contain methylmercury.
 - Fish consumption is a significant source of exposure to mercury for many people.
 - In the absence of fish, amalgam is a major source of mercury body burden.
- Sources of mercury in the environment other than dental amalgam include coal fires, cement kilns, incinerators, releases from fluorescent lights, and gold mining and from naturally occurring minerals.



Toxicity of elemental mercury

- ◊ Mercury is a neurotoxicant and may affect many areas of the brain
- ◊ Toxicity from elemental mercury via:
 - ◊ oxidative damage of the cells and sulfur blockage
- ◊ Chronic mercury toxicity is associated with many nonspecific symptoms
 - ◊ Impaired detoxification
 - ◊ Developmental impacts
- ◊ Toxicity of low level, chronic mercury exposure is not well understood and many developmental and neurodegenerative disease may involve a combination of environmental exposures and genetic susceptibilities.

Evidence for toxicity

- The State of California through Proposition 65 recognizes mercury as a chemical known to the state of California to cause birth defects or other reproductive harm.
 - Dental offices with more than 10 employees are required to post notice

- Health effects from mercury in the environment are well recognized by the U.S. Environmental Protection Agency and the California Environmental Protection Agency and include impacts on neurological development, especially on the developing brains of fetuses, infants and children.

Laboratory and animal data

- ◊ A series of studies from sheep and monkeys found that mercury from amalgam migrates quickly into organs, including the fetus.
- ◊ Adverse behavioral effects (ex. altered levels of spontaneous motor activity) were observed in adult rats whose mothers were exposed to mercury vapor during pregnancy into adulthood.
- ◊ Cell culture studies show clear effects on nerve growth using mercury concentrations that would be found in infants of amalgam-bearing mothers

Lorscheider, Fritz L., Murray J. Virny, and Anne C. Summers. "Mercury exposure from "silver" tooth fillings: emerging evidence questions a traditional dental paradigm." *The FASEB Journal* 9.7 (1995): 504-508.

Danielsson, B R , et al. 1993 "Behavioural effects of prenatal metallic mercury inhalation exposure in rats." *Neurotoxicol Teratol.* 15(6):391-396.

Fredriksson, A., et al. 1992. "Behavioural effects of neonatal metallic mercury exposure in rats." *Toxicology* 74(2-3):151-160.
Berlin 2007

Human epidemiology studies

- ◊ Numerous human epidemiology studies of amalgam and various health outcomes have been published. Many have not shown significant associations; some have found associations.
- ◊ Key studies: Portuguese and New England Children's amalgam trials
 - ◊ Randomized control clinical trials
 - ◊ Initial publications found no significant results between neurobehavioral outcomes and amalgams.
 - ◊ Children with amalgams did have higher urinary mercury levels than the controls.

Bellinger, D. C., et al. "Neuropsychological and renal effects of dental amalgam in children: a randomized clinical trial *JAMA* 295 (15): 1775-1783." *Find this article online* (2006).

DeRouen, Timothy A., et al. "Neurobehavioral effects of dental amalgam in children." *JAMA: the journal of the American Medical Association* 295.15 (2006). 1784-1792.

Children's amalgam clinical trials cont.

- Re-analysis of the Portugal clinical trial looked for a relationship between mercury levels (from amalgams) and neurological test performance grouped by a genetic variant (CPOX4)
 - Data was analyzed by a genetic variant (CPOX4). CPOX4 is hypothesized to modify the ability to detoxify mercury, impacting neurobehavioral functions
- Used better exposure assessment (measured urinary mercury levels unlike amalgam or no-amalgam grouping used before)
- Results: statistically significant dose-related adverse neurobehavioral effects in boys with the CPOX4 gene

Woods, James S., et al. "Modification of neurobehavioral effects of mercury by a genetic polymorphism of coproporphyrinogen oxidase in children." *Neurotoxicology and Teratology* (2012).

Exposure

- Estimates of the amount of mercury released from dental amalgams range from 3 to 17 micrograms per day ($\mu\text{g}/\text{day}$).
- Dental amalgams are the most significant source exposures to mercury (*in the absence of fish consumption or living next to a waste site or incinerator*) and amalgams can contribute **75%** of your total daily mercury exposure (ToxProfiles from Agency for Toxic Substances & Disease Registry, CDC)
- The FDA assumes an average exposure of 5 ug per day.

Mercury standards and exposure

- ◊ The US EPA's Reference Concentrations (RfCs) is **0.3 ug/m³** of air (1995).
- ◊ The California EPA's chronic Reference Exposure Level (REL) is **0.03 ug/m³** of air (2008).
- ◊ Using the Cal/EPA standard, the exposure would no longer be safe
 - ◊ The FDA does not explicitly take into account sensitive populations or the range of variability in exposures reported in the scientific literature.

Children and Sensitive Populations

Exposure among children:

- Children in the 2003-2004 National Health and Nutrition Examination Survey had mean urinary levels of mercury of **0.358 ug/g**
 - In contrast, the boys from the Portuguese amalgam trial (Woods *et al.* 2012) had **1.4 ug/g** when they started the study and **2.2 ug/g** in the year 2 study follow up
- Higher blood mercury concentrations were found in children with dental amalgams who also grind their teeth or chew gum, compared with those who do not (Hertz-Picciotto).

Exposure among pregnant women:

- Dental amalgams and pregnant women have been studied. The number of amalgam fillings in women during pregnancy was significantly associated with mercury concentrations in neonatal hair (Razagui) but not in amniotic fluid (Luglie).

Hertz-Picciotto, Irva, et al. "Blood mercury concentrations in CHARGE study children with and without autism." *Environmental health perspectives* 118.1 (2010): 161.

Razagui, I.B., and S.J. Haswell. 2001. "Mercury and selenium concentrations in maternal and neonatal scalp hair: Relationship to amalgam-based dental treatment received during pregnancy." *Biol.Trace Elem.Res.* 81(1):1-19.

Luglie, P.F., et al. 2005. "Effect of amalgam fillings on the mercury concentration in human amniotic fluid." *Arch.Gynecol.Obstet.* 271(2):138-142.

Dental Materials -- Advantages & Disadvantages

PORCELAIN FUSED TO METAL

This type of porcelain is a glass-like material that is "enameled" on top of metal shells. It is tooth-colored and is used for crowns and fixed bridges

Advantages

- ∞ Good resistance to further decay if the restoration fits well
- ∞ Very durable, due to metal substructure
- ∞ The material does not cause tooth sensitivity
- ∞ Resists leakage because it can be shaped for a very accurate fit

Disadvantages

- More tooth must be removed (than for porcelain) for the metal substructure
- Higher cost because it requires at least two office visits and laboratory services

GOLD ALLOY

Gold alloy is a gold-colored mixture of gold, copper, and other metals and is used mainly for crowns and fixed bridges and some partial denture frameworks

Advantages

- ∞ Good resistance to further decay if the restoration fits well
- ∞ Excellent durability; does not fracture under stress
- ∞ Does not corrode in the mouth
- ∞ Minimal amount of tooth needs to be removed
- ∞ Wears well; does not cause excessive wear to opposing teeth
- ∞ Resists leakage because it can be shaped for a very accurate fit

Disadvantages

- Is not tooth colored; alloy is yellow
- Conducts heat and cold; may irritate sensitive teeth
- High cost; requires at least two office visits and laboratory services

DENTAL BOARD OF CALIFORNIA

2005 Evergreen Street, Suite 1550, Sacramento, CA 95815


www.dbc.ca.gov

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5/04

The Facts About Fillings

The Facts About Fillings



DENTAL BOARD OF CALIFORNIA
2005 Evergreen Street, Suite 1550, Sacramento, CA 95815
www.dbc.ca.gov



Dental Materials Fact Sheet

What About the Safety of Filling Materials?

Patient health and the safety of dental treatments are the primary goals of California's dental professionals and the Dental Board of California. The purpose of this fact sheet is to provide you with information concerning the risks and benefits of all the dental materials used in the restoration (filling) of teeth.

The Dental Board of California is required by law* to make this dental materials fact sheet available to every licensed dentist in the state of California. Your dentist, in turn, must provide this fact sheet to every new patient and all patients of record only once before beginning any dental filling procedure.

As the patient or parent/guardian, you are strongly encouraged to discuss with your dentist the facts presented concerning the filling materials being considered for your particular treatment.

* *Business and Professions Code 1648.10-1648.20*

Allergic Reactions to Dental Materials

Components in dental fillings may have side effects or cause allergic reactions, just like other materials we may come in contact with in our daily lives. The risks of such reactions are very low for all types of filling materials. Such reactions can be caused by specific components of the filling materials such as mercury, nickel, chromium, and/or beryllium alloys. Usually, an allergy will reveal itself as a skin rash and is easily reversed when the individual is not in contact with the material.

There are no documented cases of allergic reactions to composite resin, glass ionomer, resin ionomer, or porcelain. However, there have been rare allergic responses reported with dental amalgam, porcelain fused to metal, gold alloys, and nickel or cobalt-chrome alloys.

If you suffer from allergies, discuss these potential problems with your dentist before a filling material is chosen.

PORCELAIN (CERAMIC)

Porcelain is a glass-like material formed into fillings or crowns using models of the prepared teeth. The material is tooth-colored and is used in inlays, veneers, crowns and fixed bridges.

Advantages

- ✧ Very little tooth needs to be removed for use as a veneer; more tooth needs to be removed for a crown because its strength is related to its bulk (size)
- ✧ Good resistance to further decay if the restoration fits well
- ✧ Is resistant to surface wear but can cause some wear on opposing teeth
- ✧ Resists leakage because it can be shaped for a very accurate fit
- ✧ The material does not cause tooth sensitivity

Disadvantages

- Material is brittle and can break under biting forces
- May not be recommended for molar teeth
- Higher cost because it requires at least two office visits and laboratory services

NICKEL OR COBALT- CHROME ALLOYS

Nickel or cobalt-chrome alloys are mixtures of nickel and chromium. They are a dark silver metal color and are used for crowns and fixed bridges and most partial denture frameworks.

Advantages

- ✧ Good resistance to further decay if the restoration fits well
- ✧ Excellent durability; does not fracture under stress
- ✧ Does not corrode in the mouth
- ✧ Minimal amount of tooth needs to be removed
- ✧ Resists leakage because it can be shaped for a very accurate fit

Disadvantages

- Is not tooth colored; alloy is a dark silver metal color
- Conducts heat and cold; may irritate sensitive teeth
- Can be abrasive to opposing teeth
- High cost; requires at least two office visits and laboratory services
- Slightly higher wear to opposing teeth



Dental Materials -- Advantages & Disadvantages

GLASS IONOMER CEMENT

Glass ionomer cement is a self-hardening mixture of glass and organic acid. It is tooth-colored and varies in translucency. Glass ionomer is usually used for small fillings, cementing metal and porcelain/metal crowns, liners, and temporary restorations.

Advantages

- ✧ Reasonably good esthetics
- ✧ May provide some help against decay because it releases fluoride
- ✧ Minimal amount of tooth needs to be removed and it bonds well to both the enamel and the dentin beneath the enamel
- ✧ Material has low incidence of producing tooth sensitivity
- ✧ Usually completed in one dental visit

Disadvantages

- Cost is very similar to composite resin (which costs more than amalgam)
- Limited use because it is not recommended for biting surfaces in permanent teeth
- As it ages, this material may become rough and could increase the accumulation of plaque and chance of periodontal disease
- Does not wear well; tends to crack over time and can be dislodged

RESIN-IONOMER CEMENT

Resin ionomer cement is a mixture of glass and resin polymer and organic acid that hardens with exposure to a blue light used in the dental office. It is tooth colored but more translucent than glass ionomer cement. It is most often used for small fillings, cementing metal and porcelain metal crowns and liners.

Advantages

- ✧ Very good esthetics
- ✧ May provide some help against decay because it releases fluoride
- ✧ Minimal amount of tooth needs to be removed and it bonds well to both the enamel and the dentin beneath the enamel
- ✧ Good for non-biting surfaces
- ✧ May be used for short-term primary teeth restorations
- ✧ May hold up better than glass ionomer but not as well as composite
- ✧ Good resistance to leakage
- ✧ Material has low incidence of producing tooth sensitivity
- ✧ Usually completed in one dental visit

Disadvantages

- Cost is very similar to composite resin (which costs more than amalgam)
- Limited use because it is not recommended to restore the biting surfaces of adults
- Wears faster than composite and amalgam

Toxicity of Dental Materials

Dental Amalgam

Mercury in its elemental form is on the State of California's Proposition 65 list of chemicals known to the state to cause reproductive toxicity. Mercury may harm the developing brain of a child or fetus.

Dental amalgam is created by mixing elemental mercury (43-54%) and an alloy powder (46-57%) composed mainly of silver, tin, and copper. This has caused discussion about the risks of mercury in dental amalgam. Such mercury is emitted in minute amounts as vapor. Some concerns have been raised regarding possible toxicity. Scientific research continues on the safety of dental amalgam. According to the Centers for Disease Control and Prevention, there is scant evidence that the health of the vast majority of people with amalgam is compromised.

The Food and Drug Administration (FDA) and other public health organizations have investigated the safety of amalgam used in dental fillings. The conclusion: no valid scientific evidence has shown that amalgams cause harm to patients with dental restorations, except in rare cases of allergy. The World Health Organization reached a similar conclusion stating, "Amalgam restorations are safe and cost effective."

A diversity of opinions exists regarding the safety of dental amalgams. Questions have been raised about its safety in pregnant women, children, and diabetics. However, scientific evidence and research literature in peer-reviewed scientific journals suggest that otherwise healthy women, children, and diabetics are not at an increased risk from dental amalgams in their mouths. The FDA places no restrictions on the use of dental amalgam.

Composite Resin

Some Composite Resins include Crystalline Silica, which is on the State of California's Proposition 65 list of chemicals known to the state to cause cancer.

It is always a good idea to discuss any dental treatment thoroughly with your dentist.

Dental Materials -- Advantages & Disadvantages

DENTAL AMALGAM FILLINGS

Dental amalgam is a self-hardening mixture of silver-tin-copper alloy powder and liquid mercury and is sometimes referred to as silver fillings because of its color. It is often used as a filling material and replacement for broken teeth.

Advantages

- ☞ Durable; long lasting
- ☞ Wears well; holds up well to the forces of biting
- ☞ Relatively inexpensive
- ☞ Generally completed in one visit
- ☞ Self-sealing; minimal-to-no shrinkage and resists leakage
- ☞ Resistance to further decay is high, but can be difficult to find in early stages
- ☞ Frequency of repair and replacement is low

Disadvantages

- Refer to "What About the Safety of Filling Materials"
- Gray colored, not tooth colored
- May darken as it corrodes; may stain teeth over time
- Requires removal of some healthy tooth
- In larger amalgam fillings, the remaining tooth may weaken and fracture
- Because metal can conduct hot and cold temperatures, there may be a temporary sensitivity to hot and cold.
- Contact with other metals may cause occasional, minute electrical flow

The durability of any dental restoration is influenced not only by the material it is made from but also by the dentist's technique when placing the restoration. Other factors include the supporting materials used in the procedure and the patient's cooperation during the procedure. The length of time a restoration will last is dependent upon your dental hygiene, home care, and diet and chewing habits.

COMPOSITE RESIN FILLINGS

Composite fillings are a mixture of powdered glass and plastic resin, sometimes referred to as white, plastic, or tooth-colored fillings. It is used for fillings, inlays, veneers, partial and complete crowns, or to repair portions of broken teeth.

Advantages

- ☞ Strong and durable
- ☞ Tooth colored
- ☞ Single visit for fillings
- ☞ Resists breaking
- ☞ Maximum amount of tooth preserved
- ☞ Small risk of leakage if bonded only to enamel
- ☞ Does not corrode
- ☞ Generally holds up well to the forces of biting depending on product used
- ☞ Resistance to further decay is moderate and easy to find
- ☞ Frequency of repair or replacement is low to moderate

Disadvantages

- Refer to "What About the Safety of Filling Materials"
- Moderate occurrence of tooth sensitivity; sensitive to dentist's method of application
- Costs more than dental amalgam
- Material shrinks when hardened and could lead to further decay and/or temperature sensitivity
- Requires more than one visit for inlays, veneers, and crowns
- May wear faster than dental enamel
- May leak over time when bonded beneath the layer of enamel



The following motion was made and carried at the CHC meeting of February 14, 2013. The motion is reproduced in its entirety from the approved minutes of that meeting:

2. *M/S/C (Stein/Tempelis)* Move to request Council to adopt a resolution to require dentist in Berkeley to:

- a. Avoid or limit use of dental amalgam
- b. Obtain documented Informed consent from the patient before each placement of amalgam
- c. Follow applicable regulations-regarding dental amalgam practices including separators.

Ayes: Commissioners Kwanele, Lee, Straus, Speich, Stein, Tempelis, Williams.

Noes: Commissioners Franklin, Lewis-Hatheway

Abstain: Commissioner Fang

Absent from vote: Commissioner Rosales

Excused: Commissioner Lam

Motion carried.