



In Practice

WITH DR. RONALD E. GOLDSTEIN

The “Risk-Benefit Ratio” of Nickel Containing Alloys



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All dental alloys that are cast and used in dental procedures will eventually release metal ions into the oral cavity [QA: Is this common knowledge or should this be referenced?]. While using noble alloys were common in early years, recent trends have been directed toward less costly metals and alloys. It is easy to understand the movement made in the early 1970s—using alternative alloys rather than gold when its price reached \$800 an ounce. However, it is becoming less clear that the cost of gold has decreased to a point that noble alloys are at times more expensive. The principle theme of this column is to contrast the cost

efficiency the dental profession has gained as it relates to the biological interactions (risk-benefit ratio) of nickel cast alloys with our patients.

CAST ALLOYS

The American Dental Association (ADA) classified cast alloys into three categories:¹

- High Noble Alloys (greater or equal to 60% gold, platinum, and palladium, and greater or equal to 40% gold).
- Noble Alloys (greater or equal to 25% gold, platinum, and palladium).
- Predominately Base Metal Alloys (less than 25% gold).

A critical element of this classification is the concept of

“noble” or the corrosion resistance of an alloy. The more noble an alloy is, the less likely it will release alloy constituents into the patient’s tissues, thus relating directly to the biocompatibility of a cast alloy material. The diffusion of metal ions into the soft tissues and bone may create an adverse local reaction, which might result in developing a system response causing a delayed allergic reaction because of toxicity.

Whereas the ADA may classify and scientists may measure and publish the corrosion behavior of various casting alloys, it is the US Food and Drug Administration (FDA) that is actually the oversight to the public on what materials will be used in dentistry as cast alloys. Under the FDA’s Center for Devices and Radiological Health Division, companies must submit a specific alloy’s specific data to them before the interstate commercialization. These guidelines do not normally require clinical trials to establish the safety and efficacy of an alloy. An obvious point to consider is if a previous alloy

that has the potential to cause toxic reactions in patients was approved then, any new formulation may also carry the same risk as the previous alloys. This is because many companies will submit data on an alloy and request approval under a “substantially equivalent” process where the physical properties, laboratory toxicity data, and animal testing are contrasted to previously approved cast alloy materials. This “equivalency” format may provide an avenue where casting alloys with significant risks to patients may appear on the market. Having been involved in several legal cases involving the use of nickel containing alloys, I heard testimony whereby an alloy manufacture stated that the alloy they were selling to a dental distributor was never intended for health care use. The source for the nickel in this specific case originated from scrap-metal that came from old railroad cars [QA: This is a very controversial statement. Can you back up this claim?].

DENTIST MUST TAKE CONTROL

In view of the oversight process in place in this and other countries, treating dentists must have the power to select the process for casting alloys [QA: Edit okay?]. Only by a comprehensive review of the data presented by the alloys’ manufacturers combined with the unique parameters presented by patients, can a sound clinical decision be



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made regarding an alloy for casting procedures. For example, a thorough medical and dental history is essential when selecting an alloy. Patients are not educated enough to know what elements are present in casting alloys. Further, they may not make a connection between a known allergy and the use of a specific alloy proposed by the

dentist. This is making an assumption that every practicing dentist knows the composition of the alloys used in his/her practice. Only the dentist is positioned where this potential risk can be minimized to the patient. Making inquiries as to any reaction to metals, jewelry, and especially ear piercing may reveal a potential allergy that should be

considered in treatment options.

While most dentists know that “junk” jewelry is high in nickel content, the public is usually unaware of their jewelry’s composition. To simply ask, “Are you allergic to anything,” often will not bring out such allergies or potential adverse reactions to alloys in common use. This issue was emphasized by the ADA as



Figure 1—Two mandibular porcelain-fused-to-base-metal restorations with gingival recession and bone defects present.



Figure 2—First maxillary molar with a porcelain-fused-to-base-metal restoration with gingival recession and bone defects present.

early as 1985 when it was recognized that less noble alloys were being used with the increased frequency of high nickel content alloys in dental practice.² Further, publications have shown severe reactions of soft tissues and bone loss around nickel-containing alloys in patients who were found to be allergic to nickel.^{3,4} While these severe reactions are not commonly reported, it appears to be related on how a patient will react to an alloy and how severe their allergy is to the nickel in the alloy. Observations I have made may be more common and are illustrated in Figures 1 and 2 where gingival recession and initial bone loss is present in patients who subsequently tested positive to nickel allergies.

This issue of nickel allergy needs to be stressed because of an apparent increase in allergic incidences reported throughout the world [QA: Edit okay?]. Initial studies reported that approximately 1% of men and 10% of women were allergic to nickel.⁵ More current literature has raised these values where specific populations may be as high as 30% nickel sensitive when previously sensitized such as ear piercing.⁶ With the value at such a rate and constantly increasing, maybe it is time to re-

examine the cost-benefit ratio of nickel use in dentistry? Or further, is there any need for the use of cast nickel alloys at all in dentistry? It may be that dental laboratories or insurance companies have not realized the changes regarding the benefits and cost. It is certainly in the commercial laboratories' interests to work with noble alloys because they are less hazardous, easy to use, and result in less remakes [QA: Edit okay?]. The insurance companies should also see the benefits of longevity vs cost with noble casting alloys.

All dentists should take the time to assess the evidence and draw their own conclusions on using nickel in dentistry.

High noble gold alloys have an established history in dentistry.⁷ With the current price of gold and the long history of favorable mechanical and physical properties and high level of biocompatibility, it becomes obvious that the risk-benefit ratio has become unacceptable to the public who rely on our judgment to restore their oral health. In questioning several hundred dentists during the past few years, I have not found a single dentist who said their first choice in their own mouth would be a base metal cast alloy. Should we not offer the same standard of care to our patients that we demand in our own dental care? Or, have we forgotten the original oath we all took on graduation (Above All, Do No Harm) when we are treating the public. Many dentists want to place the blame on a third party or Health Maintenance Organization (HMO) for the selection of nickel-chrome alloys when they encounter an adverse reaction that ends up in litigation. Such a statement implies that the HMO is making the decision of what is in the patient's best health interests.

CONCLUSION

Let's not forget who is holding the license and legal responsibility for providing care to our patients. All dentists should take the time to assess the evidence and draw their own conclusions on using nickel in dentistry. You may come to the conclusion that the time has past because we must put our patient's health

interests ahead of our small economic gains that may, or may not be realized in using cast nickel alloys [QA: Edit okay?]. ○

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