DENTAL AMALGAM - CURRENT EVENTS AROUND THE WORLD

In the past year, considerable progress has been made in the opposition to the use of silver/mercury amalgam dental fillings. More and more condemning research has appeared and the world scientific community has taken notice. The controversy has spread beyond the dental profession. Renowned toxicologists, medical researchers, and even the World Health Organization’s (WHO) select committee are now considering exposure to mercury from dental amalgam fillings.

Even more dramatically, the public is becoming alarmed. The progress made in Sweden by the anti-amalgam public organization has stimulated similar movements in the United States and elsewhere. These highly motivated individuals are determined that the public and governments be made aware of the facts in the controversy. Their activities are stimulating media interest and even governmental investigation around the world.

AUSTRALIA: The Australian edition of television’s ‘60 minutes’ recently featured the controversy over the use of mercury amalgam dental fillings. This represents a major breakthrough in media interest of the subject.

CANADA: Soon to be published research, conducted in the medical school at Calgary by responsible researchers led by Dr. Murray J. Vimy, will contribute dramatic evidence to the amalgam controversy.

GREAT BRITAIN: The following newspaper report, entitled "Tooth Tale" was recently sent to us: "When Princess Dianna’s usually radiant smile dimmed a bit recently, Buckingham Palace told concerned subjects her wisdom teeth had been yanked. But when she easily downed a four-course charity luncheon just days after surgery, oral surgeons raised a collective eyebrow. Was the Crown covering up a toothy secret? Word is that Her Highness had her metal fillings changed to new ceramic ones after reading about potential danger from mercury in the old fillings. But since British socialized medicine pays only for metal fillings, the palace allegedly crafted the wisdom-tooth tale so the entire populace wouldn’t feel endangered."

This report emanated from a series of articles that appeared in newspapers in London, England from the 19th to the 26th of June. The first report was filed by a reporter named Chris Hutchins on June 19th, 1989. He stated that Princess Diana had her amalgams replaced with composites after being urged by the Queen to read...
a book on the subject. The article stressed the potential harmful effects of mercury exposure from dental amalgam fillings, particularly on behavior and the immune system. The official statement from Buckingham Palace was that the Princess had her wisdom teeth extracted. The article stressed the widespread skepticism of this explanation since the Princess showed absolutely no signs of having extractions performed. A follow up story appeared in the same publication, London’s "Today", on the following day.

A subsequent article appeared in the London Sunday Times on 25 June 1989. The reporter, Neville Hodgkinson, began with the disclaimer from Buckingham Palace but decided to investigate the issue of toxicity from dental amalgam fillings nonetheless. Stressing the current research the reporter condemned the use of amalgam fillings.

**JAPAN:** A forthcoming, August 1989, world congress will feature two prominent amalgam biocompatibility researchers, both of whom are members of The International Academy of Oral Medicine and Toxicology. IAOMT founder and president emeritus Murray J. Vimy, D.M.D. and Karolinska Institute researcher Magnus Nylander, D.D.S. Dr. Nylander will be a day Chairman and both he and Dr. Vimy will be presenting papers to the congress on their recent research.

**SWEDEN:** Effective July 1, 1989 the State health insurance program will pay for the exchange of amalgam fillings for a non-amalgam restoration if the patient does not have medical problems that may be exacerbated by amalgam replacement. Further, the insurance program will now also pay for the complete replacement of amalgam fillings when directed by the patient’s physician.

The health department of the Swedish government had previously issued a public warning against the use of amalgam fillings in pregnant women. In addition, the Swedish Parliament had conducted a hearing on the controversy and issued a statement that the use of dental amalgam fillings should be stopped as soon as suitable replacements are available. Anti-amalgam forces in Sweden are now providing Parliament with the documented research demonstrating that composites are a suitable material. A chapter of the IAOMT is being formed in Sweden.

**WEST GERMANY:** A petition calling for the government health insurance to cease paying for silver/mercury amalgam fillings was circulated to dentists in West Germany. More than one third of the dentists signed the petition. It is not known what action the government will take in response to the petition but it may be anticipated that they will follow the lead of Sweden.

The health department of the government of West Germany had previously issued a public warning against the use of amalgam fillings in pregnant women. Three West German dentists are attending the IAOMT Annual Meeting in Detroit and are forming an IAOMT chapter in their country.

**UNITED STATES:** Dramatic progress is now being made in a number of states, spearheaded by individuals who have formed public anti-amalgam groups. These groups are being chartered as DAMS (Dental Amalgam Mercury Syndrome) and are dedicated to enhancing the public awareness of mercury exposure from amalgam fillings and enacting Right to Know and Informed Consent legislation regarding the use of dental amalgam. The organization is chartered as ADAMS (A Dental Amalgam Mercury Syndrome) in the state of Washington. The IAOMT has offered to provide dental advisory consultants to these groups. Bio-Probe readers are urged to actively support the chapter in your area or to help form one if none yet exists.

In the past year, tremendous progress has been made by these highly motivated and dedicated individuals. Legislative initiatives for Informed Consent and/or Right to Know regarding the use of dental amalgam have already been made in Alaska, North Carolina, Colorado, Michigan, and California. Active chapters also function in Illinois and Washington. New chapters have already formed in New York, New Mexico, and Pennsylvania. Initiatives for new chapters are beginning in Nevada, Florida, and Tennessee. In addition to the legislative initiatives, these groups are attracting considerable media attention to the amalgam controversy. Newspapers, radio and television talk shows, and magazines are increasingly viewing the subject. Nationally syndicated radio and television shows are now showing interest.
A great deal of appreciation and credit is due to the leaders of these public support groups for their devotion and tremendous dedication of time and effort: Alaska - Robert Stevenson; California - Dallas Pattee and Tsilah Burman; Colorado - Shirley Brown; Illinois - Louise Herbeck; Michigan - Carolyn Smith; New Mexico - Murlenc Brakc; New York - Anita Karimian; North Carolina - Elizabeth Ridonour and Pat Preyer; Pennsylvania - Carol Ward; Washington - Cheryl Quackenbush.

FORUM

THE INTERNATIONAL ACADEMY OF ORAL MEDICINE AND TOXICOLOGY 1989 ANNUAL SCIENTIFIC MEETING.

This meeting is developing into a ‘don’t miss’ occasion. Murray J. Vimy, D.M.D. will report on the vital research on amalgam safety being conducted by he and his colleagues at the University of Calgary Medical School. Magnus Nylander, D.D.S. and Mats Hanson, PhD. will give presentations on their research being conducted in Sweden. These three members of the IAOMT are world-class researchers and shouldn’t be missed.

Presentations will also be made by Michael F. Ziff, D.D.S. on the current medico-legal status of the use and non-use of dental amalgam in clinical practice and David Kennedy, D.D.S. on OSHA Guidelines in relation to the dental environment. Trevor Lyons, LDS will speak on oral parasites and their role in periodontal disease. Robert McMahon, D.D.S. will address atypical facial pain caused by residual bony defects and James Masi, PhD. will speak on bioengineering factors in dentistry.

Date: 15-17 September 1989.
Place: Somerset Inn. 2601 W. Big Beaver Rd.
Troy, Michigan. (Detroit/Windsor area) Ph: (313) 643-7800.
IAOMT special room rate = $70.00/night (single or double).
Fee: Members = $225. Non-members = $275.
Contact: IAOMT. P.O. Box 458. Ortonville, MI. 48462. (313) 627-4934. Attention: Sandy.

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The following was provided by Victor Penzer, M.D., D.M.D.

MERCURY POISONING FROM SMOKING MARIJUANA

According to the conclusions of public health researchers from Hawaii, Barbara Z. Siegel, Associate Dean School of Public Health and Professor Sanford M. Siegel, Professor and Chairman Dept. of Botany, (as reported by Howard Fishman in Psychiatric Times, May 1989) the neurological and psychological disturbances commonly attributed to smoking Marijuana, including paranoia, anorexia, irritability, insomnia, and forgetfulness, may be due actually to the inhalation of mercury which is abundant in the Cannabis plants grown in volcanic soil.

The metabolites of Cannabis itself, as organic compounds, are easily eliminated from the body and would not be responsible for long-term effects of smoking, but mercury fumes are absorbed efficiently and deposited in the brain and elsewhere in the body. WHO reports that smoking Cannabis will deliver to the lungs the entire Hg burden with 75-80% of which will be retained in the body. Thus about 320 ug of Hg would be retained from smoking 1 Kg of Cannabis.

The report seems to ignore the contribution of Patrick Störtebecker, M.D., Ph.D., research neurologist who demonstrated the direct pathways through which Hg fumes from the oro-nasal-pharyngeal mucous membranes enter the brain, bypassing the lungs, or the Hg burden from dental amalgam fillings which also must be considered.
REVIEWS/ABSTRACTS


This study was designed to characterize the interaction of methylmercuric chloride or mercuric chloride with thyroid peroxidase (TPO). Two types of experiments were performed. In the first, TPO activities in all cell compartments were inhibited by mercuric chloride but not by methylmercuric chloride. The serum thyrotropin level was substantially lowered by methylmercuric chloride but was unchanged by mercuric chloride. Cell morphology changes were caused by both and were different in character. The second experiment was conducted on isolated thyroid cells. Again, TPO activity was inhibited by mercuric chloride but not by methylmercuric chloride. The results indicated that methylmercuric chloride induced a hypothyroid state without affecting TPO, whereas mercuric chloride inhibited TPO and induced a hypertrophic state owing to compensation for loss of enzyme activity, and that the lack of inhibitory activity of methylmercuric chloride was not due to the inability to penetrate the cells. Therefore, there appeared to be a differential interaction of organic and inorganic forms of mercurials with the thyroid.

BIO-PROBE COMMENT: Further scientific proof that mercury exposure damages thyroid function. Mercury vapor combines the worst features of these two mercury compounds. Like methylmercury, it easily penetrates cell membranes. Once inside the cell, mercury vapor functions like inorganic mercury.


The efficiency of the sodium salt of 2,3-dimercaptopropanesulfonic acid (DMPS) and meso-dimercaptosuccinic acid (DMSA) to mobilize mercury from tissues has been assessed in rats pretreated with different doses of mercuric chloride, phenylmercury acetate or exposed to different concentrations of mercury vapors. These pretreatments increase the mercury concentration in the kidney and to a lower extent in the liver. Only exposure to metallic mercury vapor leads to mercury accumulation in the brain. Both chelators mobilize mercury stored in the kidney and the amount of metal excreted in the urine following a single administration of DMSA is a good indicator of the renal burden of mercury. The rate of removal is greater after DMPS administration than after DMSA but repeated administration of either agent eventually leads to the same total amount of mercury mobilized from the kidney. The loss of mercury from the liver can be slightly accelerated by repeated administration of the chelators. However, the chelators are inefficient in removing mercury from the brain.

BIO-PROBE COMMENT: This study contributes vital information to our store of knowledge. DMPS and DMSA are currently acknowledged to be the best agents for removal of mercury from the body. The fact that they are inefficient in the removal of brain mercury accumulated from exposure to mercury vapor is sound reason for the avoidance and elimination of mercury vapor exposure.


The effects of mercuric chloride on lipid profiles and lipid peroxidation in different body organs of fresh water cat-fish were studied. The animals were exposed daily to 0.2 mg/Liter of mercuric chloride for 10, 20 and 30 days. A significant increment of lipid peroxidation was found in brain, liver and muscle. Total lipids in brain tissue were depleted. Liver exhibited elevated levels of total lipids, cholesterol,
phospholipids, and C/P ratio. Kidney showed marked decrease in the concentration of total lipids, cholesterol, and C/P ratio at higher exposure; the phospholipid values increased. The content of total lipids and phospholipids was high in muscle but the level of cholesterol and C/P ratio were depleted. The lipid contents are affected differently in different body organs from exposure to mercury.

**BIO-PROBE COMMENT:** This study provides some intriguing information on the effect of mercury exposure on body lipids. For example, lipids are extremely important in the central nervous system. Moreover, the accumulations in liver and depletions in other organs are suggestive of currently common health problems. It is unfortunate that the authors did not have the capability to assay blood lipid profiles in this experiment.

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The oxidation of mercury vapor to ionic mercuric mercury is important in limiting the availability of mercury vapor to certain tissues. Thus, after a short residence time in blood (6 seconds after jugular vein injection), 12.9–17% is exhaled in the first pass of blood as compared to 10.4–12.2% exhaled with a longer residence time in blood (1.8 seconds after tail vein injection). Furthermore, there was a general tendency, even at 60 seconds after dosing, for certain tissues - lung, brain, and heart - to have higher values after dosing from the jugular vein. The results confirm previous observations that the form of inorganic mercury greatly influences the short-term deposition of mercury in certain tissues. Thus, as compared to ionic mercury, administration of mercury vapor increases lung levels 5-10 fold; brain levels 4-fold; and heart 3-fold. Blood levels are lower after mercury vapor exposure, particularly after higher doses. These findings are consistent with a model wherein mercury vapor is in part oxidized by red blood cells, with the remainder rapidly diffusing in tissue where it is also oxidized to ionic mercury.

**BIO-PROBE COMMENT:** These world renowned toxicology researchers have confirmed that mercury measurements in the blood are not valid biological indicators of body burden or toxic effects of exposure to mercury vapor, which passes too rapidly from the blood into body tissues (particularly the brain and heart). This also further demonstrates the uniquely severe toxicity of mercury vapor compared to inorganic mercury compounds.

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Increased body burdens of metal cations are known to affect adversely reproductive function in several species. The effects of these metals on gonadal function are well documented. In contrast, little is known about their possible direct effects on pituitary hormone release. The purpose of this study was to determine, in vitro, the effects of nickel, cadmium, and zinc (50 microM) on both baseline and potassium chloride (KCl)-stimulated pituitary luteinizing hormone (LH), prolactin (PRL), and thyroid-stimulating hormone (TSH) release. Anterior pituitary fragments from adult male Long-Evans rats were evaluated using a continuous-flow perfusion system. Baseline and stimulated LH releases were unaffected by nickel and zinc; however, cadmium caused an increase in baseline LH secretion. Baseline PRL release was decreased by zinc, while cadmium resulted in increased release of this hormone. Stimulated PRL release was lower during exposure to zinc but unaltered by nickel and cadmium. Following exposure to zinc, a rebound in stimulated release was noted for all three hormones measured. These results showed that the metal cations tested did have a direct effect on pituitary hormone release at a dose lower than those reported to alter testicular function in vitro. Furthermore, the changes in pituitary hormone secretion varied depending upon the metal and hormone being evaluated.
**BIO-PROBE COMMENT:** Dr. Magnus Nylander, at the Karolinska Institute in Sweden, has conducted autopsy studies demonstrating that dental personnel have severely elevated levels of mercury in the pituitary gland. He has also found that the levels of mercury in the pituitary gland correlate to the number of dental amalgam fillings present in subjects. It has also been scientifically proven that mercury is more toxic and active chemically than nickel, cadmium or zinc. This study demonstrates the potential of mercury to dramatically alter hormones produced by the pituitary, the master gland of the body. It must also be remembered that nickel alloys are used in most dental crowns (caps) and that research has proven patient exposure to nickel from these crowns.

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In this letter to the editor of Lancet, Dr. Störtebecker brings out the very important point that the debate on the toxicity of mercury from dental amalgam has neglected one of the key issues - namely the direct pathway for transport of mercury from the oro-nasal to the cranial cavity. Utilizing data obtained from Dr. Nylander & colleagues Dr. Störtebecker points out the surprisingly high concentrations of mercury found post mortem in the pituitary glands of dentists - concentrations all out of proportion to the mercury found elsewhere in the brain (see table), especially the occipital cortex. This disparity in mercury concentration can only be explained by different routes by which the material arrived at these sites. Through the general arterial circulation both pituitary and occipital cortex receive a small amount of mercury but the pituitary has an extra "dose" by direct transport from the nasal cavity.

**MERCURY CONCENTRATION IN PITUITARY GLAND AND BRAIN**

<table>
<thead>
<tr>
<th>Case*</th>
<th>Pituitary gland</th>
<th>Occipital cortex</th>
<th>ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupationally exposed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>4040</td>
<td>300</td>
<td>14:1</td>
</tr>
<tr>
<td>2</td>
<td>3650</td>
<td>84</td>
<td>43:1</td>
</tr>
<tr>
<td>3</td>
<td>2700</td>
<td>16</td>
<td>169:1</td>
</tr>
<tr>
<td>4</td>
<td>350</td>
<td>40</td>
<td>9:1</td>
</tr>
<tr>
<td>5</td>
<td>350</td>
<td>5</td>
<td>70:1</td>
</tr>
<tr>
<td>6</td>
<td>300</td>
<td>17</td>
<td>18:1</td>
</tr>
<tr>
<td>7</td>
<td>135</td>
<td>19</td>
<td>7:1</td>
</tr>
<tr>
<td>8</td>
<td>1300</td>
<td>18</td>
<td>72:1</td>
</tr>
<tr>
<td><strong>Not occupationally exposed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With amalgam (n = 15)</td>
<td>28(7-77)</td>
<td>11 (3-23)</td>
<td>2.5:1</td>
</tr>
<tr>
<td>Without amalgam (dentulous) (n=2)</td>
<td>10:5</td>
<td>6:6</td>
<td></td>
</tr>
</tbody>
</table>

*Cases 1-7, dentists, case 7, dental nurse.

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Methymercury (MeHg) treatment intramuscularly at doses of 10 and 20 micrograms separately/day/mouse for 30 days affected the weight of body and organs like testes, vas deferens and
semenal vesicles in mice. Diminution of testosterone in serum was also associated with an accumulation of cholesterol in testes and reduction in seminal vesicle fructose. Altered spermatogenesis and Leydig cell morphology in testes and the changes in histology of seminal vesicle and vas deferens indicated androgen deficiency in treated mice. Thus, the data suggested that MeHg administration to mice induced androgen deprived effect to target organs probably by blocking Leydig cell function.

**BIO-PROBE COMMENT:** This study dramatically demonstrates the effect of mercury on male hormones and reproductive structures. The result would not only be reduced male fertility but the resultant ANDROGEN DEFICIENCY would have a profound effect on male characteristics governed by the hormones. Although the substance investigated was methylmercury, it has been scientifically established that mercury vapor acts in much the same way as does methylmercury.

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The carcinogenicity of nickel sulphide (Ni3S2) injected into subcutaneous (s.c.), intramuscular (i.m.), or retroperitoneal (i.p.) tissue, or the intra-articular space (i.a.) of male F344 rats was studied. Rats were given a single injection of 0.5 mg of Ni3S2 and were observed for 48 weeks. Malignant soft tissue tumors were induced in 95% by s.c. injection, 95% by i.m. injection, 84% by i.a. injection, and 45% by i.p. injection of nickel sulphide. The tumors were identified as rhabdomyosarcomas, malignant fibrous histiocytomas, fibrosarcomas, and unclassified sarcomas.

**BIO-PROBE COMMENT:** There is no doubt that nickel and its corrosion products are carcinogenic. Dental patients receiving crowns or appliances made from nickel alloys are exposed to released nickel and should be informed before treatment.

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Silver-loaded ion exchange resin beads implanted into loose connective tissue of the rat pina produced a local reaction. Initially the lesion comprised local necrosis and tissue disruption with predominantly small round cell infiltration. The subsequent organization was delayed and disordered. Fibroblasts developed grossly dilated cisternae of the rough endoplasmic reticulum. The matrix contained poorly oriented collagen fibrils of varying size and ground substance appeared condensed and granular. Distorted collagen fibrils were identified within membrane-bound vacuoles in the cytoplasm of both fibroblasts and macrophages. Abnormalities of the silver lesion were indicative of disordered collagen biosynthesis. Silver interfered with the biosynthesis and assembly of matrix components of the connective tissue. The reaction to silver beads in rats maintained on a diet heavily supplemented with ascorbic acid (vitamin C) approached that of the control (sodium-loaded bead) with respect to the time scale, tissue reaction and tissue organization. However, the repair tissue maintained some of the morphological features of the legacy of silver toxicity, in particular delayed repair and dense intracellular fibrils within fibroblasts and macrophages. The excess of ascorbic acid partially ameliorated the effect of silver, possibly by compensating catabolism of ascorbic acid caused by the presence of the released silver.

**BIO-PROBE COMMENT:** This study has significance in several areas. Silver is the second largest component of dental amalgam fillings (after mercury). Investigation of the effect of tissue absorbed silver from amalgams on periodontal disease would be most interesting. Perhaps even more interesting, would be investigation of a possible relationship between the presence of dental amalgam fillings and the occurrence of systemic connective tissue diseases. Finally, this study provides further scientific justification for vitamin C supplementation.

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SUMMARY: The purpose of this investigation was to determine the chemical composition, confirmed on X-ray diffraction analysis, of some commercially available dental gutta-percha cones. In addition, their plasticity in response to temperature variations was studied by differential scanning calorimetry.

Great chemical heterogeneity was found among gutta-percha cones of different origin as well as within the same brand between small and large sizes. Barium sulfate determined radiopacity, zinc oxide influenced the inherent plasticity, while an excess of gutta-percha seemed to produce brittle gutta-percha cones which were unusable in clinical practice. Differential scanning calorimetry measured accurately the thermal ranges within which gutta-percha cones show a maximal plasticity without any chemical damage. It was also possible to define the thermal optimums for heat carriers, which could lead to more appropriate use of these instruments in endodontic therapy, whatever method may be used.

BIO-PROBE COMMENT: What we found extremely interesting about this paper was the research protocol utilized to arrive at the conclusions reflected in the above summary. For example: Each of ten different brands of gutta-percha cones in standard cone sizes of 15, 20, and 50 were processed to an ash by established procedures. The ashes were then dissolved in nitric acid and hydrochloric acid and no precipitate was observed. This indicated that there were neither silver, lead, nor mercurous compounds (Hg+) present. When hydrogen sulfide was added no precipitate occurred, thus eliminating the presence of copper, mercuric compounds (Hg++), cadmium, bismuth, arsenic, antimony, or tin. Additional testing at pH 9, confirmed the absence of iron, chromium, and aluminum oxide. The end result was the identification of zinc oxide and barium sulfate as indicated by the following table presented by the authors in their article:

Table 1, Quantitative chemical analysis of 10 trademark dental gutta-percha cones (wt/wt)*

<table>
<thead>
<tr>
<th>Samples</th>
<th>Gutta-percha + Waxes and/or Resins</th>
<th>Barium Sulfate</th>
<th>Zinc Oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1: Hygienic</td>
<td>23.00</td>
<td>14.65</td>
<td>62.35</td>
</tr>
<tr>
<td>Sample 2: Mynol</td>
<td>22.34</td>
<td>22.31</td>
<td>56.45</td>
</tr>
<tr>
<td>Sample 3: Roeko</td>
<td>22.15</td>
<td>3.28</td>
<td>74.57</td>
</tr>
<tr>
<td>Sample 4: DeTrey</td>
<td>17.73</td>
<td>8.68</td>
<td>73.59</td>
</tr>
<tr>
<td>Sample 5: Becht</td>
<td>45.72</td>
<td>17.73</td>
<td>36.55</td>
</tr>
<tr>
<td>Sample 6: Septodont</td>
<td>23.58</td>
<td>18.77</td>
<td>57.65</td>
</tr>
<tr>
<td>Sample 7: Medico-Dentaire</td>
<td>22.89</td>
<td>31.23</td>
<td>45.88</td>
</tr>
<tr>
<td>Sample 8: IFKER</td>
<td>22.78</td>
<td>24.27</td>
<td>52.95</td>
</tr>
<tr>
<td>Sample 9: SPAD</td>
<td>23.39</td>
<td>4.99</td>
<td>71.62</td>
</tr>
<tr>
<td>Sample 10: EndoSet</td>
<td>23.17</td>
<td>22.07</td>
<td>54.76</td>
</tr>
</tbody>
</table>

*Mean values in percentages (wt/wt) corresponding to three tests for each registered gutta-percha point.

One last point before we leave gutta-percha. Dr. Alfred Zamm M.D., F.A.C.A., F.A.C.P., in Kingston, NY has been conducting some research regarding his clinical experiences with patients reacting to endodontic procedures. His findings indicate that the allergic type reactions being experienced by his patients results from formaldehyde containing cements utilized in conjunction with gutta-percha rather than the gutta-percha itself.

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