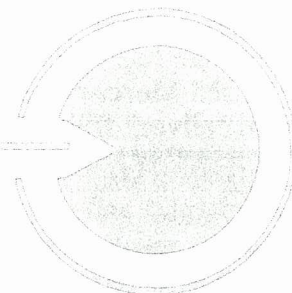


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NEWSLETTER



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SPECIAL FLASH EDITION

MERCURY RELEASED FROM DENTAL "SILVER" FILLINGS CAUSES PATHOLOGY IN THE KIDNEY AND IN ORAL AND GUT MICROFLORA

We consider the events so significant that we have decided to publish an abbreviated version of the Newsletter in order to provide you with this extremely important information in the most timely manner.

A new study by Vimy and Lorscheider validating the use of intra-oral mercury vapor readings as a predictor of mercury accumulation in human tissues has just been published. (copy attached) A major investigative report on the amalgam issue was published in the Chicago Tribune on August 15, 1990 (copy attached), and on the same date the following two abstracts demonstrating pathology were published in the current issue of "The Physiologists":

Vimy M.J., Boyd N.D., Hooper D.E. and Lorscheider F.L.

Glomerular filtration impairment by mercury released from dental "silver" fillings in sheep.

Departments of Medicine Pathology and Physiology, University of Calgary, Alberta, Canada.

In humans mercury (Hg) vapor is released from silver amalgam fillings which contain 50% Hg by wt. When such fillings are placed in sheep teeth, the kidneys will concentrate amalgam Hg at levels ranging from 5-10 μg Hg/g renal tissue 4-20 weeks after placement (FASEB J. 3:2641-2646, 1989; Am J. Physiol. 258:R939-945, 1990) In another report (publ. elsewhere) we demonstrate that the monkey kidney will likewise concentrate large amounts of amalgam Hg. For the present study occlusal fillings (12, total Hg 5100 mg) were placed in each of six adult female sheep under general anesthesia, using standard dental procedures. Glass ionomer occlusal fillings (12) were inserted in two control sheep. At several days prior

TABLE OF CONTENTS

<i>Glomerular filtration impairment by mercury released from dental "silver" fillings Vimy et al.....</i>	<i>1</i>
<i>Increased mercury resistance in monkey gingival and intestinal bacterial flora after placement of dental "silver" fillings. Summers A.O., Wireman J., and Vimy M.J., Lorscheider F.L..</i>	<i>2</i>
<i>Dental amalgam mercury daily dose estimated from intra-oral vapor measurements: A predictor of Hg accumulation. Vimy M.J. and Lorscheider F.L.....</i>	<i>2</i>
<i>Does mercury from amalgam restorations constitute a health hazard. Winer J.A., Nylander M. and Berglund F.....</i>	<i>3</i>
<i>Oral 2,3-Dimercaptosuccinic acid (DMSA) for the management of moderately severe childhood lead poisoning. Graziano et al.....</i>	<i>3</i>
<i>2,3-Dimercapto-1-Propanesulfonic Acid (DMPS) as a rescue agent for the nephropathy induced by mercuric chloride. Zalups et al.....</i>	<i>3</i>
<i>Bioavailability of dietary glutathione (GSH) Jones D.P. and Hagen T.M.....</i>	<i>4</i>
<i>Toxicology and quantitative risk assessment for mercury. Young R.A. & Weil D.....</i>	<i>4</i>

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to dental surgery, and at 30 and 60 days after placement of fillings, renal function was evaluated by glomerular filtration rate (GFR, inulin clearance) and by blood and urine electrolytes, urea and proteins. Average GFR of 69.5 ± 7.2 ml/min before amalgam placement was reduced to 32.3 ± 8.1 ml/min by 30 days and remained low at 27.9 ± 8.7 ml/min after 60 days. GFR did not change in controls. After amalgam replacement urine Na^+ increased steadily from 24.8 ± 7.7 to 82.2 ± 20.3 mmoles/L at 60 days. Urine K^+ also increased. Levels of urea and total protein increased from 0-60 days after amalgam. Thus, amalgam Hg levels in kidney are sufficient to significantly reduce GFR, either by reducing renal blood flow or by alteration of the glomerular membrane. Electrolyte, urea and protein patterns in urine are also consistent with impaired renal tubular reabsorption.

Summers A.O., Wireman J. Microbiology Dept., University of Georgia, Athens, GA; Vimy M.J. and Lorscheider F.L. Depts of Medicine and Physiology, University of Calgary, Alberta, Canada.

Increased Mercury resistance in monkey gingival and intestinal bacterial flora after placement of dental "silver" fillings.

Mercury (Hg) vapor is continuously released from silver amalgam fillings in humans. However, the bioavailability and toxicological relevance of the Hg exposure is uncertain. Since an increase in Hg resistant bacteria in response to Hg contamination of soil or water is an indication of bioavailability of Hg in the environment, we examined whether the incidence of such bacteria in the gingival and fecal flora is altered following placement of amalgam tooth fillings. Occlusal fillings (16, total Hg 1500 mg) were inserted into two adult male cynomolgus monkeys under general anesthesia, using standard dental procedures. Duplicate samples (12) of fecal and gingival microbial flora were taken from each monkey during 10 days prior and 30 days after amalgam placement. Samples were cultured for Gram positive facultative oral bacteria and both Gram negative and Gram positive facultative fecal bacteria. Primary isolates were screened to determine the proportion resistant to Hg and to arsenate (As) and tetracycline (Tc), agents to which bacterial resistance is found in nature. While As and Tc resistance were detected continuously in all cultures, Hg resistance was undetectable until the 10th day after amalgam placement. Thereafter, levels of Hg resistance in gingival and fecal flora ranged from 1 to 100%, averaging 30% in both monkeys until termination. From the 3rd-30th day total fecal Hg excretion averaged 300 $\mu\text{g}/\text{animal}/\text{day}$. Thus, ingested Hg is sufficiently bio-available to select for a substantial increase in the proportion of Hg resistant bacteria in both the oral cavity and the intestine. Since Hg resistant bacteria convert Hg(II) or methyl-Hg(I) to volatile, lipid soluble Hg (0) (Summers, Ann Rev Microbiol 40:607-34, 1986), the increased incidence of such bacteria in flora may influence the pharmacodynamics and toxicity of ingested Hg from dental amalgam.

BIO-PROBE COMMENT: It is interesting to note that Swedish researchers have found high levels of mercury in the gut lining of patients with Crohn's disease. A more complete study of Crohn's patients is presently in progress. It would appear that the possibility exists that mercury from dental fillings may be an etiological factor in Crohn's disease.

Vimy M.J. and Lorscheider F.L.

Dental amalgam mercury daily dose estimated from intra-oral vapor measurements: A predictor of mercury accumulation in human tissues

The Journal of Trace Elements in Experimental Medicine 3:111-123, 1990.

ABSTRACT: Recent misconceptions regarding Hg exposure from dental amalgams have been based on several questionable assumptions. The present paper reexamines earlier estimations of Hg daily dose from dental amalgam in order to elaborate and refine the mechanical and volumetric parameters of open-mouth Hg vapor sampling. This facilitates a comparison with the physiological parameters of human respiration. Corrections for the sampling factors of flow rate and sampling dilution, and the respiratory factor of Hg accumulation in the closed mouth between oral inhalations, reduce our original daily dose estimates by approximately 50%. Application of a general pharmacokinetic model with our revised Hg daily dose estimates results in predictions for brain, kidney, blood, and urine which approximate tissue Hg measurements reported in subjects with dental amalgams. When tissue Hg predictions are made based upon alternate Hg daily dose estimates proposed by other investigators, the resultant error was as much as 11-fold lower than were actual tissue measurements in humans. It is concluded that intra-oral air Hg vapor measurements can be useful for estimating Hg daily dose and tissue Hg levels. (Address reprint requests to Dr. F.L. Lorscheider, Dept. Medical Physiology, Faculty of Medicine, University of Calgary, 3330 Hospital Drive N.W., Calgary, Alberta, Canada T2N 4N1.)
