

## Effect of Electro Magnetic Field (EMF) on Dental Amalgam and General health

SUNDARESAN BALAGOPAL<sup>1</sup>, VIRUDHACHALAM GANAPATHY SUKUMARAN<sup>2</sup> and VANDANA JAMES<sup>1</sup>

<sup>1</sup>Department of Conservative Dentistry & Endodontics, Tagore Dental College, Chennai - 600127

<sup>2</sup>Department of Conservative Dentistry, Sree Balaji Dental College and Hospital, Bharath University, Pallikaranai, Chennai - 600100, India

\*Corresponding author E-mail: sbalagopal@hotmail.com

DOI: <http://dx.doi.org/10.13005/bpj/759>

(Received: July 25, 2015; accepted: September 10, 2015)

### ABSTRACT

Electromagnetic radiation (EMR) is energy in waves emitted from a source. This energy is both electric and magnetic. Electromagnetic radiation from a source penetrates the surrounding area, creating an electromagnetic field (EMF). It affects the behavior of objects in the vicinity of the field. This includes the amalgam fillings in particular and other metal restorations and components of prosthesis and appliances and the dental implants. Even humans beings are store house of different bio-electrical fields. The muscles and hence the body move and different organs like heart function due to the bio electric stimulus. These bio-electrical mechanism which smoothly maintain our lives can be altered through external interfering EMR. This often results in varying types of stress one suffers. This article is about a true health incidence that happened to an acquaintance of mine and I think all practicing dentists should be aware of such conditions in the current Hi-Tech world. I assure that this article is worthy of your time and it is sure to kindle your brains.

**Key words:** Electromagnetic radiation (EMR), dental amalgam, electromagnetic field (EMF), dental metal restorations.

### INTRODUCTION

Electromagnetic radiation (EMR) is energy in waves emitted from a source. This energy is both electric and magnetic. The waves alternate rapidly, from positive to negative in electrical terms, and from North to South pole in magnetic terms. Electricity and magnetism are very closely related in nature. When an alternating magnetic wave penetrates a body an alternating electric current will flow inside that body. Electromagnetic radiation from a source penetrates the surrounding area, creating an electromagnetic field (EMF). Hence an electromagnetic field is a physical field produced by electrically charged objects. It affects the behavior of objects in the vicinity of the field. The EMF is strongest at the source, and weakens with

increasing distance until it becomes too small to measure. Almost all metals in the EMF are affected by the EMR. This includes the amalgam fillings in particular and other metal restorations and components of prosthesis and appliances and the dental implants.

Even humans beings are store house of different bio-electrical fields. The muscles and hence the body move and different organs like heart function due to the bio electric stimulus. In fact I saw an article and demonstration on how the musculo-skeletal bio-electric impulses can be harnessed to duplicate the human hand movement in robotics through electrical leads from a human hand to a robotic arm<sup>1</sup>. These bio-electrical mechanism which smoothly maintain our lives can

be altered through external interfering EMR. This often results in varying types of stress one suffers. Any type of stress result in two types of responses. One, neurological which is comparatively immediate and less harmful and the other is chemical and more harmful as it loads the system with adrenaline and glucocorticoids and its resultant effects in the body<sup>2</sup>.

Today's most offices run computer assisted in their administrative area. There are a lot more offices and industries that work on larger Hi-Tech computers and machineries. These have their own large servers and uninterrupted power supplies (UPS). These computers, servers, UPS and Computer aided machineries are rich sources of EMR's they create an EMF expanding to large areas of office space. Added to this due to constrain in the office spaces in many establishments, a large number of employees may have their seats within the EMF. Further life has introduced a lot of devices, gadgets and machineries, which has made our life more comfortable or rather less active along with a lot more of EMF around us. This includes the laptop computers, PDA's, mobile phones etc. Most people are unaware of the ill effects of EMR to dental restorations and health.

### A Case Report

This is a true health incidence that happened to an acquaintance of mine and I think all practicing dentists should be aware of such conditions in the current Hi-Tech world. Most of the sentences stated here are, what this person has expressed. The affected person is a male aged 50 years, with weight 110 kilograms, physically active with no relevant medical problems like hypertension, diabetes etc. except that he has undergone a few surgeries after a road traffic accident over twenty five years prior to the problem stated here. He was an engineer in the merchant navy for about twenty years. He then switched over to a shore job in information technology related with shipping.

His new job was in an office and his workstation was placed adjacent to a server room and a battery back up [inverter] room. The distance between his workstation and the server and the battery backup was within 2 feet. He had been in

this job where he worked with a laptop for about 3 years. But the new environment (workstation) was provided to him since 3 months.

The symptoms he suffered and that started soon after shifting to the new worksite, as told by him were, "I was having feverish feeling, body ache by the end of the working day, tiredness by the end of the day, on and off tingling of the filling in tooth cavities, tense ? anxiety ? to the extend of disturbed sleep. These were generally mistaken as and related to stress related reactions (on enquiry he told - by himself and his family members including a physician in the family). Until started feeling a spell of very short disorientation almost as a short black out. This and other symptoms felt did not match with any other age related difficulties as (these symptoms) had been only since moving to the new job site. The BP was checked with a small battery operated unit during and after work and had been found normal (he had a close relative who was a physician as mentioned earlier)". He underwent a number of investigations, which included blood tests (routine counts, chemistry and enzymes) imaging and scans which all showed no significant alteration from the normal.

He was sure that he suffered but hesitated to seek further medical help through counseling because he did not know how and what to tell the doctor and he was not keen on taking any medicines unless the cause is established. Further in his own words he narrated the following:

"After self assessment of all changes in life style and difficulty experienced, everything zeroed down to the change in work station. So I Googled <working near server room> and I went through the following sites:

1. [http://scholar.google.co.in/scholar?q=emf+radiation+studies&hl=en&as\\_sdt=0&as\\_vis=1&oi=scholart](http://scholar.google.co.in/scholar?q=emf+radiation+studies&hl=en&as_sdt=0&as_vis=1&oi=scholart)
2. <http://www.edugeek.net/forums/general-chat/12537-working-server-room.html>
3. [http://scholar.google.co.in/scholar?q=effect+of+emf+on+teeth+fillings&btnG=Search&hl=en&as\\_sdt=0%2C5&as\\_vis=1](http://scholar.google.co.in/scholar?q=effect+of+emf+on+teeth+fillings&btnG=Search&hl=en&as_sdt=0%2C5&as_vis=1)

I was surprised and happy to note that the web page displayed a range of symptoms, many

which I could relate to such as the ones mentioned below. Symptoms of Electrohypersensitivity or Radio Wave Sickness in the article mentioned the following.

#### **Neurological symptoms**

Headaches, dizziness, difficulty concentrating, memory loss, irritability, depression, anxiety, insomnia, fatigue, weakness, tremors, muscle spasms, numbness, tingling, altered reflexes, muscle and joint pain, leg/foot pain, flu-like symptoms, fever.

#### **Cardiac symptoms**

Palpitations, pain or pressure in the chest.

#### **Ophthalmologic symptoms**

Pain or burning in the eyes, pressure in/behind the eyes, deteriorating vision, floaters..

#### **Others**

Dryness of lips, tongue, mouth, eyes; deteriorating fillings; ringing in the ears etc.

As the list was extensive, there was a possibility of me 'seeing only what I wanted to see' and ending up with assumptions. The tooth tingling was a rare one, as explained the filling was acting as independent antenna and probably absorbing energy."

This person told the office regarding the cause and effect on his health and had his workstation moved away from the EMF and was totally relieved of all the sufferings. This is not just to understand one more cause for a tingling sensation in a filling but for many other reasons mentioned below.

### **DISCUSSION**

The reported case is not an isolated incidence. There are reports of similar incidences in the medical journals and world wide web.(3) This author also had a similar episode of a patient who visited her after seeing about twenty different physicians for her problem of "nightly adrenaline rushes," which produced a racing heartbeat that kept her from being able to sleep after having a titanium dental implant put in and worsened after

having a second titanium dental implant put in. Most physicians she consulted did a number of 'standard of care' tests but could not find the cause of this patient's distress and finally she was prescribed antidepressants and sleeping pills. This patient also had extensive dental work which included amalgam fillings, metal crowns, porcelain-fused-to-metal crowns and root canal treatments. The author also states that after she removed the mercury-amalgam fillings and the permanent metal retainer from this patient, she experienced a lessening of her symptoms.

In a discussion on this subject of EMR Lina Garcia<sup>3</sup>, has mentioned that the amalgam fillings and any metal restorations can act as an antenna for microwave transmission of any radiation in close range. These can result in a new kind of electromagnetic stress for the human body. Further there are reports from other workers as well regarding the possible effects on amalgam on EMRs<sup>4</sup>. These results apart from galvanic deterioration and its effect on health the deterioration suffered by amalgam due to the microwave attracting stress<sup>5</sup>. It has been stated that the EMR can affect people of all age and women seem to be more affected than men. It has also been reported that the effect is more on menopausal women<sup>3</sup>. The author also rightly inform that slowly there are many who find out for themselves the effect of EMR on themselves from their work place after their health get affected and for many it may not likely be a pleasant experience of discovery.

It has been reported by many that dissimilar metal restorations in the mouth with amalgam restorations produce electrical currents, which increase mercury vapor release<sup>6-8</sup>. It has also been observed that corroded amalgam has tendency to volatilize more mercury<sup>9,10</sup>. It has also been reported about the volatility of mercury from amalgam restorations on exposure to EMRs<sup>5</sup>. This study has also found that individuals having amalgam fillings who have long period of exposure to EMF or MRIs have higher levels of mercury exposure and excretion<sup>5</sup>. And there are a number of articles published on the harmful, allergic and vague symptoms caused by mercury released from dental amalgam fillings<sup>11-20</sup>. These undiagnosed symptoms are a result of high stress for many

individuals. It is also an accepted fact that when an individual is stressed it results in a host of excessive enzyme and hormonal activities. Many of these result in suppressing the immune system and create symptoms of diseases not traceable to any commonly known pathological causes. Though there are no strong proven causal effects of mercury from amalgam being the cause for many vague symptoms of diseases, there are many anecdotal incidences of remission of neurological, cardiac, dermatological, endocrinological and dental symptoms after replacement of amalgam restorations. At the same time it is worthwhile to advise anybody to reduce their exposure to EMR by keeping away from EMF through reducing the amount of time spent in or near the computer server room and battery back up areas.

Further, studies have to be conducted to determine stress suffered and its health effect on individuals of different age groups, both sexes and determine the tolerance level, safety level and relate these with the quantity of metal in the mouth of an individual.

### CONCLUSION

There is an increase in the reporting of symptoms related to depression and anxiety. Many of these could be stress related. From the reported data of causal effects of EMF on metal restorations, it is concluded that dentists should seriously take into consideration the working environment of the patient when suggesting metal restorations and wherever possible metal free restorations should be an option.

### REFERENCES

1. <http://www4.ncsu.edu/~bbalago/HUMAN%20COMPUTER%20INTERFACE%20USING%20EMG%20SIGNALS%20-%20HAND%20GESTURE%20BASED%20MANIPULATOR%20CONTROL.pdf> (downloaded on 26.02.2015)
2. McLeod, S. A., What is the Stress Response. Retrieved from <http://www.simplypsychology.org/stress-biology.html> (2010).
3. <https://iabdm.org/education/articles/has-the-dental-work-in-your-mouth-turned-you-into-a-walking-antenna/> downloaded on 22.02 (2015)
4. A.J.Certosimo et al, National Naval Dental Center, "Oral Electricity", *Gen Dent*, **44**(4): 324-6 (1996).
5. Ortendahl T W, Mercury vapor release from dental amalgam in vitro caused by magnetic fields generated by CRT's, *Swed Dent J* **31** (1991).
6. Walker RS, et al. Galvanic interaction between gold and amalgam: effect of zinc, time and surface treatments. *J Am Dent Assoc.* **134**(11): 1463-7 (2003).
7. R.D.Meyer et al, Intraoral galvanic corrosion. *Prosthet Dent*, **69**(2): 141-3 (1993).
8. S. Olsson et al, Release of elements due to electrochemical corrosion of dental amalgam. *J of Dental Research*, **73**: 33-43 (1994).
9. D. B. Boyer, Mercury vaporization from corroded dental amalgam. *Dental Materials*, **4**: 89-93 (1988).
10. A. Berglund, A study of the release of mercury vapor from different types of amalgam alloys, *J Dent Res*, **72**: 939-946 (1993).
11. B. Windham, Annotated Bibliography: Exposure and Health Effects Related to Mercury/ Amalgam and Clinical Results of Amalgam Replacement; [www.home.earthlink.net/~berniew1/amalg6.html](http://www.home.earthlink.net/~berniew1/amalg6.html) (2002).
12. Kucerova H, et al. Influence of galvanic phenomena on the occurrence of allergic symptoms in the mouth. *Gen Dent.* **50**(1): 62-5 (2002).
13. Toumelin-Chemla F et al. Unusual in vivo extensive corrosion of a low-silver amalgam restoration involving galvanic coupling: a case report. *Quintessence Int.* **34**(4): 287-94 (2003).
14. Cheshire William P. Jr. The shocking truth about trigeminal neuralgia. *New England Journal of Medicine*, **342**: 2003 (2000).
15. A. Buchner et al, Amalgam tattoo of the oral mucosa: a clinic-pathologic study of 268

- cases, *Surg Oral Med Oral Pathol*, **49**(2): 139-47 (1980).
16. M. Forsell *et al.*, Mercury content in amalgam tattoos of human oral mucosa and its relation to local tissue reactions. *Euro J Oral Sci* **106**(1): 582-7 (1998).
17. Weaver T, *et al.* Amalgam tattoo as a cause of local and systemic disease. *Oral Surg. Oral Med. Oral Pathol.* **63**: 137- 40 (1987).
18. M. D. Rose *et al.*, The tarnished history of a posteria restoration. *Br Dent J* **185**(9): 436 (1998).
19. Lorscheider *et al.* Mercury Exposure from silver fillings, *The Lancet* **337** (1991).
20. Inovay J, *et al.*, The role of electrical potential differences in the etiology of chronic diseases of the oral mucosa. *Journal of Dental Research*, **40**: 884 (1961).