
Submission to the Senate Committee investigating Progress in the implementation of the recommendations of the 1999 Joint Expert Technical Advisory Committee on Antibiotic Resistance

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Introduction

- As a GP, I am well aware of the problem of antibiotic resistance. For example, in the last year I have seen more patients suffering from *Clostridium difficile* colitis, a diarrhoeal illness that results from overgrowth of antibiotic resistant bacteria, than I had seen in my previous 13 years of clinical practice.
- As reported by both medical and non-medical media, the problem of microbial resistance is usually attributed to overuse of antibiotics by doctors and in the food animal industry.
- I wish to draw the Committee's attention to a frequently overlooked area that contributes to antibiotic resistance, and that is mercury exposure.

Mercury resistance and antibiotic resistance

- The link between mercury resistance and antibiotic resistance was demonstrated in 1993 by Summers et al.¹ This study demonstrated that in human subjects without recent exposure to antibiotics, those with a high prevalence of mercury resistance in their intestinal flora were significantly more likely to also have resistance to 2 or more antibiotics.
- Since this study, other studies have confirmed that bacterial exposure to metals such as mercury can contribute to antimicrobial resistance because many transferable plasmids carry genes for multiple types of resistance.² Of particular note, it is possible for bacteria exposed to metals such as mercury to carry genes for antibiotic resistance, even in the absence of exposure to antibiotics.³

- While mercury is ubiquitous in the environment, by far the largest mercury exposure in the general population occurs through dental amalgams.⁴ Other exposures occur through ingestion from foods such as fish, and through air pollution from coal fired power plants.
- People who have mercury amalgams typically have these for decades of their life, and thus have a significant lifetime exposure to mercury. This exposure creates a long term reservoir of antibiotic resistant bacteria in the gut and oral cavities of exposed people in the general population.

Significance of the above

- In 1993 Summers et al observed that the link between mercury- and multiple antibiotic resistance in microbes is of more than just academic interest; the rising incidence of multiple antibiotic resistant microbes in even healthy subjects is a major problem in medicine. Twenty years later, this observation still holds true.
- I expect that it will be difficult to make progress in the area of antimicrobial resistance while large sections of the Australian population remain exposed to mercury, particularly from dental amalgams.
- Thus I suggest that the Committee further consider the implications of mercury exposure for antibiotic resistance.

¹Summers et al, Mercury Released from Dental "Silver" Amalgams Provokes an Increase in Mercury- and Antibiotic Resistant Bacteria in Oral and Intestinal Floras of Primates, *Antimicrob. Agents Chemother.* April 1993 vol. 37 no. 4 825-834 , <http://aac.asm.org/content/37/4/825.short>

²Betts A Study in Balance: A study in Balance: How Microbiomes are Changing the Shape of Environmental Health, *Envir Health Perspect* Vol 119 no 8 Aug 2011, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3237378/>.

Ready et al The effect of amalgam exposure on mercury- and antibiotic-resistant bacteria, *Int J Antimicrob Agents*, [Volume 30, Issue 1 p 34-39](#), July 2007

³Skurnik et al, Is exposure to mercury a driving force for the carriage of antibiotic resistance genes? *J Med Microb* 59(7): 804-807 2010 <http://jmm.sgmjournals.org/content/59/7/804.short>

⁴WHO. (2003) [Elemental Mercury and Inorganic Mercury Compounds: Human Health Aspects](#)