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Health hazards of heavy metals and other metals

Report[1]

Social, Health and Family Affairs Committee

Rapporteur: Mr Jean HUSS, Luxembourg, Socialist Group

Much of the information provided in this memorandum (unless otherwise indicated) is taken from a presentation by Dr Peter Jennrich, general practitioner and medical advisor to the International Board of Clinical Metal Toxicology (IBCMT), at the meeting of the Social, Health and Family Affairs Committee in Paris on 15 November 2010.

Summary

Thanks to a great amount of scientific research, the permanent exposure of human beings to small doses of heavy metals, such as cadmium, mercury and lead, is increasingly being recognised as one of the co-determinants of certain neurological, cardio-vascular and autoimmune illnesses. Given the right of every individual to a healthy environment, preventive health strategies aimed at reducing human exposure to heavy metals should be a political priority of all countries. This is made all the more urgent by the high cost to health systems provoked by chronic medical conditions caused, amongst other things, by such harmful substances.

The member states of the Council of Europe are invited to put into practice the results of the most recent studies and to limit, as far as possible, the use of heavy metals in agriculture, industry and the medical sector so as to limit their further bioaccumulation in nature, the food chain and, finally, in the human body. Furthermore, the right to a healthy environment should be reinforced through existing instruments of the Council of Europe, such as the revised European Social Charter, but also through other international treaties, some of which are under preparation.

A. Draft resolution[2]

1. The Parliamentary Assembly is concerned that, in their health policies, the member states of the Council of Europe pay insufficient attention to the health hazards of metals, for which there is sound scientific evidence in many cases. Thus, there is increasing evidence that the permanent exposure of human beings to small doses of substances such as aluminium, cadmium, mercury or lead could be one of the co-determinants of certain neurological, cardio-vascular or autoimmune illnesses.

2. Given the right of every individual to a healthy environment, preventive health strategies to reduce human exposure to such harmful substances should be a political priority. This is made all the more urgent by the high ultimate cost of heavy metals, which are strongly suspected of contributing to chronic medical conditions that in turn place a heavy burden on national health insurance funds.

3. In addition to the immediate political and legislative action that is needed in accordance with the precautionary principle, scientific research on all the complex features of heavy metals should continue. This will help to establish a causal link between the presence of heavy metals in the human environment and some human illnesses, identify more appropriate responses to these illnesses and adopt industrial processes and treatment methods in line with the best current scientific knowledge.

4. To strengthen national policies, the right of every human being to a healthy environment should be more securely anchored and reinforced in international standards, including those of the Council of Europe. The Assembly has already made repeated appeals in this respect, for example by adopting Recommendation 1885 (2009) on drafting an additional protocol to the European Convention on Human Rights concerning the right to a healthy environment, but to date the Committee of Ministers has done nothing tangible to follow up on this.

5. All action relating to heavy metals can be placed in an international context in which the threats that these substances pose to human health and the environment are increasingly recognised. For instance, the European Union is currently reviewing its Community strategy on mercury up to the end of 2011, and negotiations are currently under way under the United Nations Environment Programme to draw up a binding international instrument on mercury by 2013. The Council of Europe member states should take an active part in these negotiations and act as pioneers in the movement towards innovative health and environment policies.

6. The Assembly notes that the scientific and medical knowledge of heavy metals has reached such a level that there is no longer any reason to defer practical action to reduce their presence or eliminate them from the human environment and hence to alleviate their impact on people's health. It therefore calls on all the member states to support an innovative political approach to the issue and take the following comprehensive measures:

6.1. identify heavy metals and their health hazards as health and environment policy priorities, while adopting the precautionary principle endorsed in Recommendation 1787 (2007) on the precautionary principle and responsible risk management. In so doing, states should focus on eliminating as many heavy metals as possible from the human environment, preventing the bioaccumulation of such substances in the natural environment, the food chain and, finally, the human body, preventing and treating chronic conditions caused by them and providing special protection for the most vulnerable;

6.2. in the European Union and in other international settings, promote measures to establish stricter rules on the production, use and import of products containing heavy metals, including specific limits concerning exposure to heavy meals, in particular as regards the most vulnerable people, to be established in collaboration with the World Health Organization;

6.3. organise and facilitate exchanges of knowledge and good practice between specialised national authorities so that they can acquire more information on the subject and take inspiration from successful policy measures adopted elsewhere;

7. The Assembly urges all member states to take the following preventive measures in respect of the most toxic heavy metals, such as mercury:

7.1. prohibit or limit, wherever possible and appropriate, the use of heavy metals by industry, agriculture and by the medical sector, and where the latter is concerned, particularly by restricting or prohibiting the use of amalgams as dental fillings;

7.2. promote the broad dissemination of information on the health effects of heavy metals to allow all professionals and consumers to make informed choices with regard to matters such as medical treatment methods, consumer products, food and means of transport, without having to wait for more radical political measures;

7.3. promote scientific and technological research on means of replacing heavy metals in all industrial and agricultural processes and medical treatment in the long term, whilst setting up strongly regulated systems to prevent conflicts of interest for the experts involved, such as those referred to in Assembly Recommendation 1908 (2010) on lobbying in a democratic society (European code of good conduct on lobbying), by notably supporting medical research in this field;

7.4. where heavy metals cannot be replaced immediately, reduce their entry into and bioaccumulation in the natural and human environment as much as possible, amongst other measures by requiring all users and emitters of heavy metals, including dentists, to install efficient anti-pollution and filtering equipment.

8. At international and European standard-setting level, promotion of the right to health and a healthy environment as fundamental human rights must continue. In this respect, the Assembly calls on the member states to continue to promote the idea in the Council of Europe of an additional protocol to the European Convention on Human Rights concerning the right to a healthy environment as proposed by its Recommendation 1885 (2009). Furthermore, it considers that 2011 – the year of the 50th anniversary and 15th anniversary respectively of the European Social Charter and the revised European Social Charter – would be an ideal time to introduce the right to a healthy environment into the revised European Social Charter, for example under Article 11 on the right to protection of health.

B. Explanatory memorandum by Mr Huss, rapporteur

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1. Introduction

1. Environmental pollution and continuous exposure of human beings to toxic heavy metals such as mercury, cadmium and lead is a seriously growing problem throughout the world. Exposure to metals has risen dramatically in the last fifty years as a result of an exponential increase in the use of heavy metals in industrial processes and products. Although we are generally exposed to metals in a latent manner and in small daily doses, as they are present in various environmental components, foods and materials, we can temporarily be more heavily exposed as the result of an accident: the chemical accident that took place in an aluminium production plant near the Hungarian village of Kolontar on 4 October 2010, as a result of which nine people died instantly, is an unfortunate example which represents only "the hidden part of the iceberg".[3]

2. An increasing number of illnesses, in particular chronic disorders, are suspected or have for some time been known to be caused by exposure to heavy metals and other chemical substances that are omnipresent in our environment. It is therefore high time that heavy metals were recognised as a serious public health problem and member states should do everything within their power to prevent and provide better treatment for the resulting diseases.

3. International scientific literature has brought to light a considerable amount of evidence showing that heavy metals are extremely harmful to human beings. Some of their effects, for example the impact of lead on blood pressure and therefore on cardiovascular diseases, have been known for over 120 years. Generally speaking, people have even been aware of lead poisoning since antiquity. Thanks to extensive research carried out in this area, the impact of heavy metals, at least as co-determinants, can be determined for numerous disorders.

4. The purpose of this report is not to conduct a detailed scientific analysis of the health hazards of heavy metals, to cover all substances and every single disorder nor to draw scientific or medical conclusions, but to outline the problem in a way that is understandable for political decision-makers and the general public. The report seeks to make decision-makers and the general public aware of the pressing nature of the problem by taking a selective look at certain metals and disorders, and to urge member states and their governments to take action or facilitate the action that needs to be taken by other stakeholders at national level.

2. Heavy metals: a public health problem

5. The presence of heavy metals in our immediate environment and their impact on human health might initially be perceived to be an individual health problem resulting from the

increased susceptibility of certain people. However, the steady rise for many years in disorders that are known to be linked to environmental pollution, combined with ever more specific scientific and medical knowledge, should lead the member states of the Council of Europe to acknowledge the serious public health problem of heavy metals and to find appropriate solutions.[4]

6. Several countries have moved beyond merely acknowledging the problem as far as certain metals are concerned. For example, the use of amalgams in dentistry has been restricted or prohibited in Denmark, Germany, Norway, Russia and Sweden, and, in the wider world, in Japan. Other countries should follow suit, and the same scientific and political attention should be paid to heavy metals other than dental mercury. The issue of amalgams in dentistry will also serve as an example in a more in-depth examination of the extent of the health risks and the possible political responses.[5]

7. It is becoming increasingly urgent to take action as a result of the present economic situation, where health insurance funds, like other public bodies, are having to face up to budgetary constraints. In the future, a larger number of health problems should be tackled at their origin in order to contain health care costs. This applies especially to chronic illnesses, which are often linked to environmental effects and are particularly costly for public health systems.

2.1. Metals in the human environment

8. Metals occur naturally in our environment, especially in the Earth's crust, where they contribute to the balance of the planet. However, as a result of human activity they are distributed, concentrated and chemically modified, which may increase their toxicity. Due to mining, industrial and agricultural activities, hunting, and the fact that large amounts of consumer products end up as waste, the air, water, soil, microorganisms, plants, animals and, finally, human beings are being polluted and poisoned by heavy metals.[6]

9. There is accordingly no escaping the permanent exposure to heavy metals and other toxic substances, which are omnipresent in our daily lives. It is high time this problem was tackled more systematically and with greater commitment to ensure that, over time, human contact with toxic heavy metals is avoided to the maximum possible extent and the risks they pose to human health are eliminated.

10. The presence of metals in the environment has been well known for many years. A study published by the French National Assembly and Senate in 2001 showed that many metals used in industrial processes, such as arsenic, cadmium, chromium, copper, manganese, mercury, nickel, selenium or organic zinc, end up in the human environment as a result of air and water emissions and solid waste.[7] One important source is also human transport (by land, air, inland waterway or sea). These sources will not be discussed in greater depth as the problems associated with metals could give rise to specific studies for each source of emission and metal or are already the subject of such studies.

11. Apart from their natural presence in the Earth's crust and their industrial uses, many metals can be found more directly in the human environment without everyone necessarily being aware of this. The table below outlines a number of sources of metals with which human beings come into direct contact. This overview shows it would be wrong to think some people are not affected by the problem just because they have no amalgam fillings or are not

employed at a metal-working company, since there are other sources that could put them in contact with toxic metals.

12. Presence of metals in the direct human environment (non-exhaustive list):[8]

Aluminium	Drinks cans, medicines (vaccines, stomach liners, orthopaedic and dental ceramics, medical glues), cosmetics, sun cream, toothpaste, deodorants, saucepans, aluminium kitchen foil; Food chain: drinking water, vegetables, food additives (biscuits, dairy products and other sweetened products)[9]
Arsenic	Food chain: drinking water (natural mineral deposits), vegetables, especially lettuces, seafood[10]
Cadmium	Ceramic products in contact with foodstuffs, cigarettes and cigarette smoke, batteries; Food chain: drinking water, vegetables, seafood, animal livers and kidneys
Mercury	Production of chlorine, gold extraction, batteries, measuring instruments, dental amalgams, cigarette smoke; Food chain: fish (swordfish, tuna, rays and sharks)
Nickel	Jewellery, coins; Food chain: drinking water, molluscs, chocolate, soya, nuts, oat flour
Lead	Batteries and accumulators, old paints
Organic zinc	Vitamin supplements, sun screens, deodorants, athlete's foot products, anti-dandruff shampoos[11]

13. The problems associated with some heavy metals are taken into consideration in political agendas, at least in some regions of the world. The mining of mercury is being replaced more and more by its recycling. Accordingly, secondary production (from waste recycling) is currently double the primary global production of around 3 000 tonnes a year (extracted from the mineral cinnabar). This is doubtless for economic but also for environmental reasons (even though the main source of pollution is coal-fired thermal power stations).[12] The European Union put forward an ambitious strategy on mercury in 2005[13], which is currently being revised, and many countries seem prepared to sign a future binding international treaty.

14. Nonetheless, certain recently adopted industrial processes seem somewhat counterproductive as far as the elimination of mercury is concerned: a sector that consumes great quantities of mercury is that of so-called "environment-friendly" low-energy light bulbs, which can contain 3 to 5mg of the metal. In addition, the decision to prohibit the production of mercury in the European Union (as of 15 March 2011) has led to the resumption of its small-scale, clandestine production in China, Russia, Mongolia and other countries. In addition to ensuring the substantial reduction in its own emissions, Europe should shoulder its responsibilities in the light of global pollution, which is not decreasing.[14]

15. Another metal in respect of which radical measures have been taken for some years is lead: its use was still very widespread in industry, printing and paint production in the first half of the 20th century but many industrial uses were subsequently discontinued, including its use in automotive fuels (leaded fuels are now prohibited almost everywhere in the world). However, it is still present in batteries and accumulators, in industrial lead products and in the chemical industry, not to mention buildings in large urban areas, where old paints are still very much present (see section 2.3 below).

2.2. Why are the effects of heavy metals underestimated or not sufficiently taken into account?

16. Heavy metals, like other toxic substances, seldom appear in doses high enough to trigger immediate illness. They are consumed in small doses but continuously, and build up in various organs of the human body where they become "time bombs". In addition, according to some experts, the healthy human body can cope with weak doses of heavy metals and eliminate them without developing any specific reactions. People do not all respond in the same way to exposure to heavy metals owing to their different genetic predispositions and state of health. It is therefore often difficult to establish a causal link.

17. Some substances do not have any effect on their own, but only in combination with another substance. It is the combination of heavy metals and other chemical substances which produces dangerous "cocktails" and very little is yet known about their combined effects. Similarly, it is difficult to analyse the interaction, in the human body, of heavy metals and oral or intestinal bacteria. Consequently, the magnitude of the direct or indirect effects of heavy metals is difficult to evaluate and there are no targeted scientific and medical responses today.

18. Sometimes, preconceived ideas based on a lack of scientific knowledge may persist. One example of this concerns toxic substances more generally: formaldehyde, which is often feared as a substance that is harmful to the environment and to health, ranks 244th on the priority list of hazardous substances, whereas arsenic, lead and mercury are ranked one to three and cadmium seven. Despite these rankings, which are scientifically established on the basis of combined indicators,[15] heavy metals and other substances are difficult to measure and to identify in individuals. Their traces may appear in blood or urine, but they generally accumulate in other organs of the human body where they may generate serious, often chronic, diseases.

19. Finally, any scientific information on heavy metals that may exist is not accepted by the medical profession as a whole and is at any rate not systematically put into practice in medicine. As a result, medical personnel in many member states currently have a very limited knowledge of heavy metals and their proven or suspected effects on health, and this situation makes it hard to take effective counter-measures against the health hazards posed by heavy metals. After all, and without wishing to analyse this aspect more closely here, powerful economic interests doubtless contribute to ensuring that heavy metals continue to be used in many situations, sometimes owing to a lack of alternatives and sometimes in order to avoid substantial investment costs (bound up with changes in existing industrial processes).

2.3. Health risks of metals: existing knowledge on the subject and initial political responses

– *General overview of the health effects of metals*

20. Continuous exposure to small doses of heavy metals can trigger numerous reactions in human beings. The main reactions include cardiovascular diseases such as arteriosclerosis or thrombosis, as a recent South Korean study on mercury has again shown.[16] A large amount of research and experimentation has proved that heavy metals can contribute to immunological disorders such as multiple sclerosis or other shortcomings in the immune system (chronic inflammation, immunosuppressive effects, allergies). They have also been found to have disrupting effects on the reproductive and endocrine system (including all organs/glands which have the function of secreting hormones) and cytotoxic effects (causing cell damage). Neurotoxic effects occur directly when heavy metals pass through the brain barrier and this leads to a disturbance of the central nervous system, such as Parkinson's and Alzheimer's diseases and disturbance of foetal brain development.

21. One illness which, in French, is even named after a heavy metal because of the obvious link between the two, is "saturnisme", designating acute or chronic lead poisoning (the planet Saturn being the symbol for lead in Alchemy). Unlike most heavy metals, lead does not play any recognised role in the human organism and it is known to be harmful to the cells, irrespective of its concentration. Very young children are more vulnerable to lead poisoning than adults because of their specific behaviour (because they put everything in their mouths for example), their greater susceptibility and the fact that their organism is developing – lead poisoning can stunt physical and cognitive growth; the same applies to the foetus and the embryo who can be contaminated by their mother through the placenta. In France, for example, in recent years a number of children were still being poisoned by lead found in old paint (in particular paint used in buildings constructed prior to 1949): 213 new cases of lead poisoning were detected in 2007, 116 of which involved young children under 6 years of age. Some 70% of the persons concerned were living in the Ile-de-France region, and 70% of the cases were in fact linked to old paint.[17] Despite the ban on lead in paint and petrol in many countries, serious cases of lead poisoning (or other lead-related illnesses) can still be found in most major cities and industrial regions.

22. As already mentioned above, the health risks of heavy metals also depend on personal susceptibility. For example, genetic predispositions, age and general state of health play a role with regard to the effects that heavy metals may have on a patient, and these effects become co-determinants for the development of certain disorders. This may lead to various interpretations of the toxicity of heavy metals, which can have devastating effects on some people and no measurable effect on others. The following table provides examples of organic, neurological and physical disorders that may be caused, *inter alia*, by the co-influence of potentially toxic metals.

23. Suspected or proven effects of metals on human health (non-exhaustive list):

Metal	**Organic diseases**[18]	**Neurological and psychiatric effects**[19]
Aluminium	Joint pains, bone calcium loss, anaemia[20]	Dementia, Alzheimer's, Parkinson's, encephalopathy with loss of memory, concentration and mobility
Arsenic	Type 2 diabetes[21]	Damage to the nervous system, leading to weakness, deafness, paraesthesia, organic psychoses with drowsiness, agitation, stupor, delirium, schizophrenia
Cadmium	Damage to kidneys and lungs,	No reference found at this stage

	fragile bones, anaemia, increased risk of cancer if inhaled[22]	
Mercury	Brain damage, autoimmune diseases (rheumatic arthritis, lupus, multiple sclerosis),[23] cardiovascular diseases (such as hypertension), liver cancer[24]	Diminished intelligence, speech disorders, restlessness, aggressiveness, visual and hearing disorders, polyneuropathy, myasthenia gravis, Alzheimer's
Nickel	Allergies, dermatitis, eczema[25]	Headaches, dizziness, lack of sleep
Lead	Haematological and cardiovascular effects (hypertension),[26] kidney damage[27]	Depression that may lead to suicide, lack of attention, damage to visual intelligence and motor functions, memory disorders, learning difficulties, fatigue, agitation, aggressiveness, psychoses, hallucinations, peripheral polyneuropathy, encephalopathy, saturnism (lead poisoning)
Organic zinc	Stomach cramps, nausea, vomiting, anaemia, damage to the pancreas	Cerebral oedema with nausea, vomiting, dizziness, visual disorders, cramps, forgetfulness, fatigue, lack of interest, headaches, sleeping difficulties

24. It should be pointed out that all the information given above on the sources and possible health effects of metals is not presented in any systematic manner as it is extremely hard to establish the causality between exposure to a metal and the emergence of certain disorders. For example, no distinction is drawn between the health effects of heavy metals originating from industrial sources and those involving more direct human contact. The sources, routes of exposure and health effects are presented without any formal classification with the aim of illustrating the complexity, seriousness and extent of the problem. Nor are any details provided of the health effects of the lack of certain substances, such as zinc, which must above all be taken in sufficient quantities by pregnant women and young men.

25. The possible effects of heavy metals, which are already alarming in adults, are even more serious where children are concerned: when exposed to the same level of toxins, the organism of a foetus, a baby or a child would react more than an adult’s body. During the first months and years of life, children’s organs develop rapidly, making them more prone to functional damage. The nervous system continues to develop throughout childhood and therefore children are especially vulnerable to toxic chemicals in their personal environment as well as in their food and water.[28] Heavy metals can also reach the foetus through a prolonged exposure of pregnant women to cigarette smoke which contains cadmium. In the context of the European Union’s PHIME integrated research project (6th Framework Programme), it was, furthermore, established that the level of exposure to lead above which children’s intelligence could be affected was lower than previously thought. The European researchers associated with the PHIME project concluded from this that the efforts to eliminate sources of lead pollution should be relentlessly pursued. Similar claims are made with a view to other heavy metals: at an international seminar held at the European Environment Agency in Copenhagen on 10 February 2011, PHIME experts presented the main results of their five years of work under the title “Effects of exposure to metals: no margin of safety in Europe”.[29]

26. Scientific and medical experts are currently concerned with a number of problems to which solutions are far from found: how to identify or measure heavy metals in the human body at an early stage and well before the negative effects are felt; how to identify their presence in vital organs where they cause the most harm; what quantities of heavy metals in the body indicate that medical treatment is necessary; what kind of treatment should be given (tackling the problem at its origin if possible, detoxification by innovative methods even if they have not been recognised by all medical professionals, etc.)? It is crucial for scientific research in this area to be continued and politically supported by all member states in the context of their health policies, while at the same time fully acknowledging the influence of heavy metals as a public health issue.

– *We are all affected: the contentious debate on dental amalgams*

27. One of the major focuses of the controversy surrounding heavy metals is the issue of dental amalgams, which contain mercury at levels of up to 50%. In most countries in Europe and in the world, amalgams continue to be used as dental fillings. However, some European countries such as Austria, Germany and Russia have restricted the use of amalgams and Denmark, Norway and Sweden even banned them in 2008/2009.[30] The debate is currently very animated in France, which is probably the largest consumer of amalgams in Europe,[31] and it is for this reason that the arguments put forward in this country will be used as examples. For instance, the French representatives of the arguments for and against the continued use of dental amalgams attended a heated debate on this subject in Paris on 23 March 2011, hosted by the Sub-Committee on Health.

28. Marie Grosman, a lecturer in life sciences, adviser to the association against the use of mercury in dentistry, "Non au mercure dentaire", and member of the environmental health campaign group Environmental Health Network (RES), spoke on behalf of the Chemical and Toxicology Association (ATC), demanding that for environmental and health reasons the use of mercury in dental treatment be abandoned as soon as possible. In her view and that of the researchers with whom she works, amalgams are the prime source of exposure to mercury for developed countries, also affecting embryos, foetuses (through the placenta)[32] and children (through breastfeeding). Exposure to mercury can seriously affect the health of patients and dental professionals, and early exposure to low doses of mercury (during pregnancy and through breastfeeding) increases the risk of a decrease in the intelligence quotient (IQ) among children.

29. According to the World Health Organization in 2005, certain studies show that mercury may have no threshold below which some adverse effects do not occur.[33] According to various scientific studies, it has genotoxic, neurotoxic, immunotoxic, reprotoxic, embryotoxic and endocrine disrupting effects and it has been proved that mercury collects by bioaccumulation in various organs of the human body (such as the blood, cerebral cortex, pituitary gland and thyroid). More recently, it has become increasingly clear that mercury may be one of the many causes of Alzheimer's disease. Accordingly, the researchers' strong advice is to apply the precautionary principle and abandon the use of mercury immediately rather than waiting for irrefutable proof.[34]

30. In France, the critical experts demand toxicity testing on all dental materials and assume that mercury will be immediately excluded because of its proven toxic effects. They call for patients to be fully informed and asked to give their consent before being given fillings made of amalgam. They also highlighted the high ultimate cost of the use of amalgams, whose impact on the health of patients and professionals places a heavy burden on

health systems. According to European studies, between 60 and 90 tonnes of mercury from dental surgeries are released into and contaminate Europe's atmosphere, surface waters and soil every year.[35] Lastly, French experts criticise the French authorities' inconsistent stance on the issue. Whereas they are officially opposed to the end of the use of mercury by dentists in the European Union, the National Health and Environment Plan for 2009-2013 singles out mercury as one of the substances giving most cause for concern and recommends that emissions of and public exposure to mercury should be reduced by 30% by 2013.

31. In the face of this ardent criticism of mercury, the French Dental Association (ADF) has taken a more qualified stance on the issue for years. In its view, the dental amalgam used for the last 150 years or so is still the dental filling substance which poses the least threat to patients, and no serious illness resulting from its use has been detected or scientifically proven to date.[36] Professor Michel Goldberg, who is a researcher at the French national medical research institute (INSERM) and represents the ADF, endorses the position adopted by the French Health Product Safety Agency (AFSSAPS), confirmed by the European Union committee, the Scientific Committee on Emerging and Newly Identified Health Risks (SCENHIR) – see below), both of which he sits on. According to the AFSSAPS's findings, "amalgam is still the material most suited for the repair of permanent back teeth where there is a high incidence of tooth decay and multiple, widespread lesions, particularly in children, adolescents and young adults".[37]

32. The AFSSAPS also points out that materials other than amalgam are still complicated, costly to use and less durable. Undesirable health effects have also been detected in certain new synthetic dental filling materials.[38] Furthermore, American studies have shown that dental amalgams have no effect on the brain development of children over the age of 7 with fillings of this sort.[39] Nevertheless, Professor Goldberg says that "France's 40 000 dentists are using amalgams less and less and there are two main reasons for this: firstly, the current agitation about mercury has prompted them to adopt the precautionary principle and secondly, aesthetic considerations".[40] Even among experts who are less critical of mercury, the fitting and removal of dental amalgams is considered to be highly ill-advised for pregnant women, even though it is claimed that the doses of mercury passed on by a mother's milk are at such a low level that no adverse effects have ever been detected.

33. Over and above national strategies and debates, the future of mercury is currently being debated at European and world level. The European Commission is in the process of revising its Community strategy on mercury. In the conclusions presented at the 3075th meeting of the Environment Council in Brussels on 14 March 2011, the Council of the European Union referred to the importance of reducing mercury emissions and stated that the ultimate goal should be to phase out all mercury products. On the other hand, with regard to the use of mercury in dental treatment, the Council sets the Commission the relatively unambitious goal of considering, where appropriate, the possible need for measures to reduce the environmental impact of mercury in dental amalgam on the basis of a previous investigation, the results of which are expected by the end of 2011. By adopting this goal, the Council appears to remain true to the conclusions drawn by the SCENHIR Committee, which concluded as recently as 2008, in a study ordered by the European Commission, that "dental amalgam is an effective restorative material and may be considered the material of choice for some restorations … It is generally concluded that no increased risks of adverse systemic effects exist".[41]

34. The rapporteur welcomes the active debate at European Union level, but considers that in view of the clear scientific evidence, the countries of the European Union and Greater

Europe as represented by the Council of Europe should take a more critical view of the issue of dental amalgams and take this unique opportunity to tackle the scourge of the health effects of mercury. Europe should act as a pioneer in the efforts to eliminate mercury and a leader in the current negotiations under the United Nations Environment Programme (UNEP) to prepare a binding instrument on mercury for 2013. A stance of this type was called for recently by the Swedish delegation of the European Union, which considers that the success of the efforts to counter the harmful effects of mercury depends on a harmonised, consistent approach at European level. The rapporteur would like to express his wholehearted support for this argument.[42] Finally, a recent development likely to change the global debate on amalgams, is the announcement by the United States government that it will support a "phase down" of the use of dental amalgams with the goal of a complete "phase out" of their use in the long run.[43]

35. To provide the whole background to the current debate, it is important to mention that the alloys used in the dental field also seem to play a role in the emergence of another problem, which is electrosensitivity. This phenomenon apparently finds its cause in the simultaneous presence of mercury and diverse other metals in the oral cavity (nickel, cobalt, chrome, etc.) – a combination which creates measurable electrical (galvanic) currents, which are at the origin of disruptive electromagnetic fields. Persons with dental amalgams could thus be more concerned by electromagnetic disruptions of the environment, as the metals in their oral cavity could act as resonating bodies.[44] Without wishing to examine this question more in-depth here, reference is made to the report **"**The potential dangers of electromagnetic fields and their effect on the environment",[45] prepared by the rapporteur himself in the context of the Assembly's Committee on the Environment, Agriculture and Local and Regional Affairs and should also be debated by the Standing Committee in May 2011.

3. Conclusions – recommendations

36. Political awareness and reactions with regard to relatively new problems in the public health field often come too late, are too slow and are not comprehensive enough. In response to the issue of heavy metals, whose toxic properties are being increasingly highlighted, health policymakers should apply the precautionary principle at all levels and ban all the possible uses of these substances before conducting more specialised research. In this context, measures to protect the life and health of European citizens affected by heavy metals should finally explicitly recognise the right of every individual to a healthy environment.

37. Scientific and medical knowledge of heavy metals has undoubtedly reached such a level that there is no longer any reason for deferring practical action to reduce or eliminate their health risks and consequences. Some already well-researched issues call for quick action, such as on amalgams in dentistry, which have now been prohibited by several European countries. This is also one of the areas that illustrate very well the extent to which this affects us all, since a large proportion of the global population have fillings made from these products. In the case of France alone, the French Health Product Safety Agency, for example, estimated in a report published in 2005 that about 14 million amalgam fillings were inserted each year and that most French people over 30 years of age have them.[46]

38. In view of the conflicting arguments put forward by different scientists and despite the fact that immediate action would be advisable in certain areas such as the use of mercury in dental treatment, the rapporteur concludes that research on the subject should continue. Indeed, it will have to be intensified in certain specific areas, such as the interactions of various substances or their reactions in and with the human body, and be stepped up so that

more can be ascertained about the effects on the environment and human health. Appropriate responses need to be identified and effective means applied to deal with the problem. Closely linked to the problem of heavy metals, research should also be reinforced concerning metal nanoparticles (often containing zinc, silver or titanium), regarding which certain effects on human health have started to be identified.[47]

39. Preventive health strategies to reduce human exposure to heavy metals and take more account of the impact of heavy metals in all forms of treatment should be high on the political agendas of Council of Europe member states. To encourage such groundbreaking health strategies, the Assembly should recommend that member states take the following measures:

– define heavy metals and their health hazards as national public health priorities, while emphasising the prevention of chronic illnesses caused by such substances and reinforcing the precautionary principle wherever possible by abandoning some uses of heavy metals as soon as possible;

– prohibit or limit the use of the most toxic heavy metals in agriculture or industry (following the example of the ban on leaded petrol), especially with regard to the production of foodstuffs and consumer goods, which discharge heavy metals into the direct environment of every human being;

– support medical research on this subject, including systematic and comprehensive scientific monitoring, in order to consolidate knowledge of the effects already identified, for example research into chronic illnesses, and supplement this with knowledge on subjects into which there has to date been little research (the combined effects of substances, factors contributing to people's vulnerability), and on the treatment approaches to be adopted (new detoxification methods, etc.);

– work with international organisations such as the World Health Organization to harmonise international policies and standards in the sphere and foster such changes in those member states which are members of the European Union;

– promote the broad dissemination of information on the health effects of heavy metals to allow all professionals and consumers to make informed choices with regard to matters such as medical treatment methods, consumer products, food and means of transport without having to wait for more radical political measures.

40. Lastly, the Council of Europe member states should see to it that Europe becomes a pioneer in promoting groundbreaking health policies and harmonising political responses to the problem of the health hazards of heavy metals and a leader in the international negotiations on the preparation of a binding international instrument under the United Nations Environment Programme.

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[4] Much of the information provided in this memorandum (unless otherwise indicated) is taken from a presentation by Dr Peter Jennrich, general practitioner and medical advisor to the International Board of Clinical Metal Toxicology (IBCMT), at the meeting of the Social, Health and Family Affairs Committee in Paris on 15 November 2010.

[5] Also taken into account is the information gathered at the expert hearing held at the meeting of the Assembly's Sub-Committee on Health in Paris on 23 March 2011.

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