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Good morning,

Members of the Committee for Social, Health and Family affairs of the Council of Europe, I am grateful for the invitation and happy to inform you about the health effects of toxic metal on the human body and the risks involved.

The U.S. Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR) prepared on behalf of the U.S. government a list of substances, which are extremely harmful for humans. The substances are prioritized considering how often they are found in the environment and how easily humans can come into contact with them as well as depending on how poisonous they are.

According to this list, the metalloid arsenic is the most toxic substance on earth followed by the heavy metals lead and mercury. Further metals, which are on the list, are cadmium, nickel, chromium, methyl mercury, copper, palladium, and silver. The well-known formaldehyde, which is less harmful than the heavy metals, comes up not until the end of the list.

The question, which now arises, is: "What makes heavy metals so dangerous?" the answer consists of multiple aspects:

1. Several metals affect our daily life.
2. Those metals can accumulate in the human body.
3. There is probably no safe threshold with regard to multiple exposures to different potential toxic metals, which affect humans.
4. Metals have varying toxic and immunologic effects.
5. Metals interact with each other in various ways.
6. The common diagnostic procedures are unsuitable to diagnose a chronic contamination of heavy metals.

7. The effect of toxic metals on human health has been mostly ignored and underestimated.

The following examples show the frequency with which metals appear in our daily life:

- Arsenic, barium, cadmium, chromium, lead, copper, mercury, nickel, thallium, antimony, and beryllium can be found in tap water.
- Metals are used as additives in food. These include copper (E141), titanium dioxide (E171), iron (E172), aluminium (E173, E520, E521, E522, E523), silver (E174), and gold (E175).
- Methyl mercury, arsenic, and cadmium can be found in fish.
- Cadmium accumulates due to chemical fertiliser in the food chain.
- Amalgam is still used as tooth substance, which consists of copper, mercury, and stannic. Also silver, gold, cobalt, chromium, indium, palladium, platinum, stannic, and titanium are put to use in the dentistry.
- Aluminium, lead, mercury, and titanium appear in cosmetics.
- Lead and cadmium can enter the body via cigarette smoke.

Although this list is not complete, these examples still demonstrate how often heavy metals occur in our daily life and how easily humans can come into contact with these potential poisonous substances.

There are various statements of toxicologists from different countries, who calculated how high the value is of the daily average exposure of heavy metals from food, water, and air. Prof. Reichl from Munich says that daily 11µg arsenic, 200µg lead, 50µg cadmium, 500µg nickel, and 8-16µg mercury are absorbed. The numbers of the Portuguese Lobet and Folce differ from these a bit. This is the result of different nutritional and environmental conditions. Certainly the people in Portugal eat more often fish, which is why the average arsenic exposure is with a value of 223µg higher than in Germany, where Prof. Reichl lives. The same applies to mercury, what the Portuguese specify with 21µg per day.

Even though the calculations differ a little bit, the common statement of toxicologists' studies from several European countries is that we have to deal everyday not only with one potential toxic metal, but rather with several more metals, which appear in different concentrations in food, semi-luxury food, water, and air.

The danger is well-known for quite some time that these metals can accumulate in the human body. The numbers of 1984 show that a human being by an average weight of 70kg stored 100mg aluminium, 14mg arsenic, 80mg lead, 30mg cadmium, 4mg mercury, 10mg titanium, and 30mg stannic. What has been not taken into account by the evaluation was the fact that even more metals occur in our daily life, which also can accumulate in our body. These include for example nickel and barium. Hence, the real average overall contamination of one person is not so easy to prognosticate.

Even the medical service of health insurance funds in Bavaria concludes in a social-medical report of 2009 that all, in particular older people in Europe, have to assume to be affected by a contamination via food and inhalation of pollutants.

The toxic effects of heavy metals are often missed, because the observation period is too short. In case high concentration of poisonous substances affects a particular person a corresponding consequence can be diagnosed in a short time. The evidence that the substance is toxic is easily done. However, Habersche's rule implies that by taking a respective long exposure time into account toxic effects arise even at low concentrations. This exposure time of accumulated toxins such as lead, mercury, and all cancer-causing substances can amount to several years through to decades. Therefore the question is whether in the long term a safe threshold value exists considering a chronic low supply of various metals. We have reason to doubt this that is shown by studies of numerous scientists. The American E. F. Madden emphasised in his overview about the significance of combined metal-interactions in the development of metal-induced cancer diseases, that the interaction of various metals can be bigger than the sum of single effects of those metals. In addition to this, Hungarian scientists point out in a study made 2006, that a low harmless amount of lead combined with low harmless amount of mercury or cadmium can be still toxic. The authors conclude that threshold values obviously are ineffective according to an exposure towards various substances.

Metals have toxic and immunological effects, which are described in many studies. These include the formation of free radicals, increased formation of nitric oxide, formation of inflammatory mediators and organ damage involved.

As example, I would like to specify exactly the relation between lead and cardiovascular diseases. In March 2007 a study of the American environmental authority was published, which confirmed a positive correlation between a low dosed chronic lead contamination and the appearance of high blood pressure and cardiovascular diseases. The authors explain that a lot of studies prove this relation in the last few decades. Further they go more into detail that negative actions on blood pressure and cardiovascular emerge already at a significantly lower lead concentration according to the latest reports as it has been assumed up to now. They call on public health system to develop and introduce arrangements to reduce further the lead contamination of adults.

Hence, the American environmental authority confirms with it that a chronic low dosed lead exposure is a risk factor for high blood pressure and vascular diseases the same as stress and lipid metabolic disorder. Unfortunately, this aspect was almost completely ignored. The lead contamination of patients with blood pressure problems were simply not measured and consequently not treated, although it is a known risk factor. In my opinion that is medicinal unjust and unscientific.

After all not only lead but also a number of various metals have a harmful effect on cardio as well as on blood vessels. For instance, since over 30 years there have been a number of studies which approve the correlation between a chronic mercury exposure and cardiovascular diseases. So, shown by studies from Spain in the year 2007, from Norway in 2004, from Greenland and Denmark in 2005, from United States in 1990 and from Poland in 2007 – to name only a few, which establish a connection between mercury, which appears on the one hand as amalgam restoration and on the other hand in fish, and the increased appearance of vessel and cardiovascular damages.

It is also known that lead and mercury each for its own or even in a correlative kind of way damage the cardio and blood vessels. Further scientific results show that a number of other metals also possess such ability. These include the metalloid arsenic as well cadmium,

barium, aluminium, the contrast medium gadolinium and nanoparticles – as zinc oxide and yttrium oxide.

This confirms that simple cause-effect-correlations such as “a certain amount of mercury induces high blood pressure” or “a certain amount of lead causes a certain amount of atherosclerosis” are worth considering, since various metals in divers concentrations damage organs such as cardio as well as blood vessels.

Metals have several cytotoxic effects. These include damages of cell membrane, hormone receptors, nucleus and DNA as well as the damage of the energy-providing mitochondria. Beyond that metals have immunological effects, which lead to chronic inflammatory processes, immunosuppressive or allergic effects. Those toxic and pro-inflammatory features of metals turn them into a risk factor for many human diseases.

These include

- The already mentioned cardiovascular diseases as high blood pressure, arteriosclerosis, heart attack, peripheral arterial disease, coronary heart disease, carotid artery (carotid stenosis), and apoplectic stroke,
- Disorders of the immune system as allergies, autoimmune diseases, chronic infections, and cancer diseases,
- Diseases of the central nervous system as Alzheimer’s disease, Parkinson’s disease, multiple sclerosis, dementia, autism, attention deficit (ADD) and attention hyperactivity disorder (ADHD)
- Mental disorders as depressions, bipolar disorders, and schizophrenia,
- Endocrine disorders as diabetes or hyperthyroidism, as well as
- so far hard classifying disorders for instance chronic fatigue (CFS), fibromyalgia (FM) or multiple chemical sensitivity (MCS),
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Members of the Committee for Social, Health and Family affairs, in the time available to me, it is only possible to give an overall view and insight into the abundance of research results and knowledge, which reveals the effects of metals on human health.

I would like to emphasize, that these are not only theoretical insights or study results, as well as demonstrate it thanks to a list of symptoms, which were successfully cured via a therapy due to the underlying metal contamination.

These include high blood pressure, which stays firm after the treatment even without medication, arteriosclerosis, cerebrovascular insufficiency, stroke, fibromyalgia, chronic fatigue, chronic pain, chronic infections (Lyme disease, Epstein-Barr virus EBV, candida), biliary cirrhosis, multiple sclerosis, depressions, allergies, neurodermatitis, autoimmune diseases and cancer. Here, patients are involved, who were partially not able to work due to their diseases and they were again fit for work after ascertained diagnosis and treatment of their heavy metal contamination.

Although, this is a short and incomplete list, it still stresses, which potential resides in a detailed diagnosis and therapy of chronic heavy metal exposure.

I would like to point out that the EU White Paper on the future EU Chemicals Policy of 2001 suggests that the political decision-making process had to be based on the principles of precaution and prevention under the consideration of reliable scientific evidence that a

chemical substance causes adverse effects on the human health and environment to prevent harm even there is still considerable uncertainty about the exact nature and gravity of the possible damages. This should also hold true for heavy metals and not only for chemical substances.

All in all, I would like to emphasise again that potential toxic metals are harmful for essential cellular functions. They belong to the most harmful substances worldwide based on their high incidence, toxicity, and extent of contact with humans. Heavy metals can induce or intensify every disease of civilisation. Therefore it remains the requirement that the diagnosis and treatment of chronic heavy metal contamination should belong to basic therapies for the treatment and prevention of chronic diseases.

This is such an enormous potential for creating public health, which has been given too little attention so far.

I thank you for your attention and will be glad to answer any questions you may have.