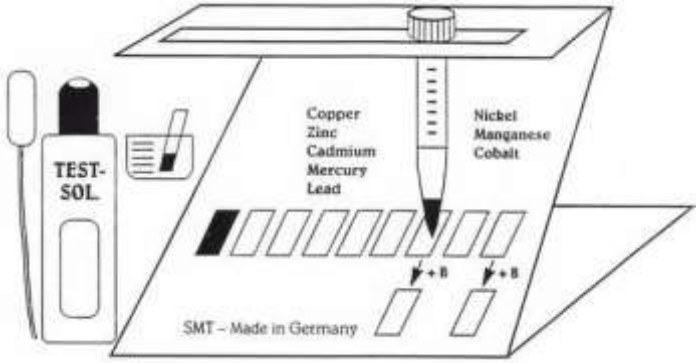
HEAVY METAL TEST

Testing for Metals in Aqueous Solutions



The Reliable Detection Method for the Clinical Practice

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Heavy Metal Test

Dear practitioner, or researcher

The **Heavy Metal Test (HMT)** was developed by us as a practice-based *in vitro* diagnostic heavy metal detection device.

The dithizone reaction method employed in the test is a scientifically proven analytical procedure which has been in use in chemical laboratories since the nineteen-twenties.

Within the context of your initial diagnosis, the **HMT** is intended to point to possible links between diseases and heavy metals.

The test should be administered to every patient since the presence of heavy metals in a patient's urine may indicate whether allopathic, naturopathic, or homeopathic
treatments are therapeutically feasible.

An Objective Scientific Detection Method

The new HMT (Heavy Metal Test) allows the detection of free heavy metal ions in bodily liquids like urine and saliva by means of a simple procedure and in just a few minutes. This exploratory procedure, employed as an *in vitro* diagnostic tool, is based on the dithizone reaction method which has been known to chemical science for more than 60 years. By the qualitative means of coloration, specific metal ions are detected in the urine and in the saliva.

As a reagent, dithizone is able to indicate the presence of heavy metal ions in qualitative and in quantitative terms. In binding with them, colored complexes are formed in the interior of the molecule which are soluble in nonpolar organic solvents. The coloration of these solutions is very intensive, its particular coloration determined by the atomic radius of the respective metal present in the complex. The reaction times of the heavy metal ions vary; therefore, depending on their respective concentrations, different colorations may occur from which one can, in addition to the qualitative conclusions, also semi-quantitative ones regarding the contaminant.

By administering the test as an exploratory measure, contaminations from amalgam fillings or from the environment (cadmium, lead, zinc, copper, manganese, nickel and cobalt - *pointing to infections, organ or system disorders*) can be identified early on, so that the patient can undergo detoxification before any specific therapy is administered.

Other Applications

The HMT can also be used to determine the environmental sources of the contamination in aqueous solutions such as tap water.

Since all heavy metal ions are water soluble, solids like food items, porcelain dishes, dust samples from carpets, wall paints and wall paper etc. can be tested for heavy metals by soaking them in distilled water beforehand.

Procedure

Introduction

The HMT is easy to conduct and the results are not only quickly obtained but also provide a dramatic and convincing demonstration for the patient.

Setting pH Value

For the test a morning urine specimen (about 30 ml) is required which, using the two pH Solutions A and B, is calibrated to the neutral value of 7.0.

Test Description

To begin with the test, place one of the dithizone treated indicator squares into a solution of Testsol, which is made from natural products. The solution takes on a green coloration which signals phase 0 and constitutes the basis for all further tests.

If now a liquid containing heavy metals is added (urine, saliva or other aqueous solution) these heavy metals react with the dithizone and the green coloration changes. The new coloration is compared each time with those on the coloration chart on the test tube rack. Each coloration corresponds to a specific metal (zinc, copper, cadmium, lead, mercury etc.)

The method permits the identification of several metals with only one reagent.

Detailed instructions on how to conduct the test and how to evaluate the results are contained in a booklet and in a pictogram.

Conclusion

Since heavy metals contribute, with up to 80% of the causes, to all diseases, the test for heavy metal contamination has become an essential component of any initial diagnosis for anyone who has the safety of the patient at heart.

With the test, we have created the possibility of determining the level of any such contamination. An ingenious and revolutionary method of making complex biochemical processes visible and of clarifying disease profiles, the test should be available in every practice. The right diagnosis is a precondition for a successful therapy and will result in a satisfied patient.

Heavy Metal Testing (semi-quantitative)

Urine Test:
The specimen to be tested should come from the first morning urine discharge. To check for any contamination of the water supply, the patient should also bring a specimen of the first water coming out of the system in the morning (e.g. from the kitchen tap) in a clean container for testing. No more than 10 ml are needed A urine specimen taken spontaneously during the day can also be tested, but the results will be less revealing.

The urine should be tested for proteins using commercially available reagent strips. Elevated protein levels make it even more difficult to judge the heavy metal values, as protein binds part of the metal ions (menstruation).

Preparing the urine specimen:

a) Fill 10 ml of urine into clean graduated beaker.
b) Measure and note down pH value and, if applicable, protein content of urine.
c) Check and note down appearance of urine (color, turbidity).
d) Set pH Value to approximately 6.5 - 7.0.

Solution A raises pH value (i.e. towards alkaline) Add 6 drops, stir the urine and measure again. Repeat if necessary.

Water:
No preparation is necessary. Always check first morning water sample from faucet. Pour 8-10ml into prepared test-tube.

Sputum:
Depending on the surface condition of amalgam fillings, their release of mercury ions into the oral cavity can be screened. Chew a stick of sugarless gum for 10 minutes. Do not swallow the saliva during this time and collect 8 ml of saliva for screening. Add the saliva into the prepared test tube.(See step 1 and 2) Shake vigorously for 5-10 sec. and allow the solution to stand for 30-60 sec. Compare with color chart. Pour 8-10ml into prepared test-tube.

Dust, Dirt, Paint, Other Substances such as: Rice, Milk, Food, etc.
Take small amounts of material (from vacuum cleaner bag, air conditioner, or scratch a small amount of paint form an object) and place in a plastic container. Add 30ml of distilled water. Shake content vigorously and let settle over night. Screen the water after 24 hours.

Dishes or glasses:
Boil distilled water and pour into your ceramic or lead crystal. Let solution stand for 12 hours, then screen the water.

Screening Instructions:

1. Place one of the small brown test-paper into the test tube.
2. Use the pipette to add 1 ml of the TESTSOL to the test-paper.
3. Close the test tube and shake gently until solution turns green. (Within 20-60 seconds)
4. Add 1 ml of the solution to be tested to the test tube containing the activated (green) TESTSOL solution using the pipette enclosed. The test tube with the mixed solution should be at the 2 ml mark. Shake vigorously for 15 seconds and allow to stand for a minute, and observe the band/ring just below the surface of the mixed solution for color change. (1 cm width)

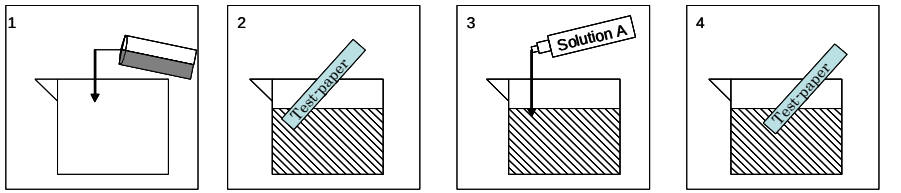
    - If the solution remains green, there are no heavy metals present.

- If it is grey, it is an indication of different metal conglomerate
- If a distinct color shows up (violet, pink, red, etc) there is a presence of heavy metal ions. Compare with the color chart

5. Continue the same procedure by adding 1 ml of the solution during the first and second sample, then add 2 ml for the third, fourth and fifth sample. See pictogram. The dithizone reagent permits the identification of several metals. Compare each time with the color chart.

Safety Information: TESTSOL contains oils that are no health risk. Despite of this, should skin or eye contact arise, rinse thoroughly with water and contact your physician. When swallowed, rinse out mouth with water and call your physician Store at room temperature. Keep out of the reach of children.

General Preparation and Adjustment of pH level to 6,5-7,0



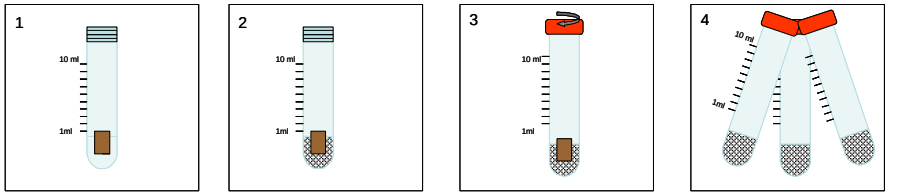
Pour 10 ml into a beaker

Measure the pH of the Solution

If the solution is Acid add solution " A".

Continue adding solution " A" Until pH is between 6,5 and 7.

Preparation of the Test



Add test paper to testtube

Add 1ml Testsol

Cap the test tub

Shake testtube until the test solution is green (15 seconds)

The HMT is a semi-quantitative screen test. Color change occurs when the following metal concentration have been exceeded:

Add	Cu	Zn	Hg	Pb	Cd	Concentration
+1 ml	1.0mg/l	2.0mg/l	1.5mg/l	1.5mg/l	1.5mg/l	Very High
+1 ml	0.5mg/l	1.25mg/l	0.75mg/l	0.75mg/l	0.75mg/l	High
+2 ml	0.25mg/l	0.63mg/l	0.38mg/l	0.38mg/l	0.38mg/l	Medium
+2 ml	0.12mg/l	0.40mg/l	0.25mg/l	0.12mg/l	0.12mg/l	Sligh to Normal or False Negative

Interpretation of the Heavy Metal Test

The Dithizone Heavy Metal Test approach is differently than normal Heavy Metal Testing since the Dithizone reagent only binds to the unbound or free metal ions. In other words, those metals which have not been neutralized by the body and therefore increasing the free radical production a million times, are screened. In a healthy body, with a functioning detoxification system, or in the absence of Heavy Metals, there should be no high, neither medium amounts of unbound or free metal ions found in the urine.

Thus the presence of a high to medium concentration of unbound metal ions may indicate a heavy metal toxicity problem. (The body is not able to cope anymore with free metal ions.)

Note: The consequence of high oxidative stress is that the blood becomes more and more alkaline due the loss of protons. All degenerative diseases including cancer, viruses, bacteria develop and thrive in an alkaline/oxidized environment!

On the other side, if the screen does show a low metal concentration, even though the person shows all signs of heavy metal intoxication, it is very likely that at this stage of metal toxicity, the body's detoxification capacities (through liver, kidneys, intestine, etc.) are totally exhausted. Non-excretor.

How do to determine a Non-excretor?

When the test remains negative (green), your patient may not be free of toxic amounts of electrically active heavy metals. Be particular aware when your patient has amalgam fillings and/or shows signs of heavy metal intoxication. Remember that in an acid environment, metals are held in suspension and can be deposited in tissues that are electro-magnetically altered. Challenge* for 3-7 days and recheck with the HMT. When the results are as before, (test remains green), consider your patient non-toxic (free of toxic amounts of heavy metal ions). When the results change, and a color change occurs, consider your patient a non-excretor.,

* We recommend Bio-Chelat together with some homeopathic drainage remedies and some alkaline buffers. (ex. potassium citrate).

Example: A

+1ml: violet :Copper
+1ml: violet or pink color
+2ml: pink color: Zinc
+2ml: pink color: Zinc

Interpretation: High Heavy Metal/Mercury toxicity. Heavy Metal/Mercury displaces copper and zinc ions at the same time. Malabsorption of copper and zinc; copper and zinc toxicity.

Copper and Zinc occurring together during the test : Of the metals, copper and zinc have comparatively low atomic numbers, occupying places 29 and 30 respectively in the periodic system.. The test will always show them as occurring together only if and when mercury (or another non-essential metal with higher atomic weight) is also present in the organism.

Why is that? Mercury and other heavy metal ions block the access to the metabolic processes within the cell. (like a broken key which will plug up the lock). These reactions are called replacement reaction. Replacement reactions, also called fight for the site, occur when heavy metals grab the biological spaces that should be filled by necessary minerals.

Symptoms caused by mineral deficiency and displacement by a heavy metal. (Hg, Cd, Pb,) include:

- Magnesium: Irregular heartbeat, osteoporosis, receding gums, etc
- Iron: Anaemia
- Copper: Anaemia, Thyroid dysfunction, impaired digestion
- Zinc: Anorexia nervosa, loss of taste, low libido, PMS, etc
- Iodine: Thyroid dysfunction

The essential metals and copper and zinc are needed there, but can not get in, turn into free, electrically active ions which attach themselves to all kinds of protein molecules. There they serve no purpose and do much damage.

At this stage of toxic contamination, the discharge of copper and zinc from the organism is not yet relevant, but as free electrically active metals they can be made visible in our test. The valuable essential metals copper and zinc, have in effect become toxic metals. Diagnostically, the test indicates that the body can not handle the heavy metals and uses liver, kidneys and other tissue as waste deposit sites. It is no surprise that other trace elements like calcium, magnesium and iron are also displaced and becoming deficient.

Sources like copper metal pipes, red wine, chocolate, and certain workplaces further raise toxic levels in the body and it is self evident that a first step would be to eliminate these sources. Inadequate excretion as a result of an unhealthy diet, low bile flow due to toxins as well as liver and kidney dysfunction are further serious causes of creeping intoxication.

Example: B

+1ml: green color
+1ml: dark violet: copper
+2ml: violet: copper
+2ml : pink color: zinc

Interpretation: Copper intoxication from i.e. drinking water, IUD, birth control pill, gallbladder blockage(most of the time), rheumatism, high zinc supplementation, etc.

Copper: Essential in small amounts, copper is an important trace element but is toxic in high concentrations. If the mechanism regulating copper levels in the body is suppressed, e.g. as the result of liver disease and gallbladder blockage, or in infants or small children, copper ions may have serious toxic consequences. Sources: Tap water, cookware, food, workplace.

Copper found in the urine often reflects the copper concentrations in the blood. Elevated serum copper levels and as a consequence, higher levels of copper discharged through the urine are not only symptomatic for the presence of toxins, they may also signal rheumatic conditions, tumors as well liver and kidney diseases.

Example: C

+1ml: green color
+1ml: green color
+2ml: gray color
+2ml: violet color: copper

Interpretation: The source of the copper and zinc levels could be from food intake. If amalgam fillings, or symptoms are present, a chelation agent should be given to check if the person is a non-excretor.

Example: D

+1ml: green color
+1ml: green color
+2ml: peach color: cadmium
+2ml: peach color: cadmium
Interpretation: Cadmium intoxication. Sources: cigarettes, fish, food, air

Cadmium: Cadmium occurring in the food chain and frequently elsewhere does present itself as the predominant(1st and 2nd sample) toxic metal in the test. The test should be repeated after two days. If the result is negative and the cadmium has been evacuated it must have entered the body via a certain food item. If the coloration still signals the presence of cadmium, the sources will have to be identified and eliminated.(workplace, tap water)

Example: E

+1ml: green color
+1ml: pink color: zinc
+2ml: pink color: zinc
+2ml: pink color: zinc

Interpretation: Zinc intoxication. Sources : Supplements, inflammation, cancer. Zinc is also an essential trace element. Exceeding as well staying below normal concentrations in the blood will cause many ailments. The occurrence of zinc in the urine may have two causes: It may be a concomitant symptom of the healing process of an injury where large amounts of zinc are required and where the high turnover of enzymes and proteins result in increased discharge or trivial infection.

Mercury: In the test, mercury is different in that it almost never presents itself as the predominant toxic metal, with all the others, in various concentrations, left in the conglomerate. A mercury concentration high enough to appear in the 1st and 2nd sample would normally correspond to a fatal level in the donor.

There are only two exceptions imaginable:

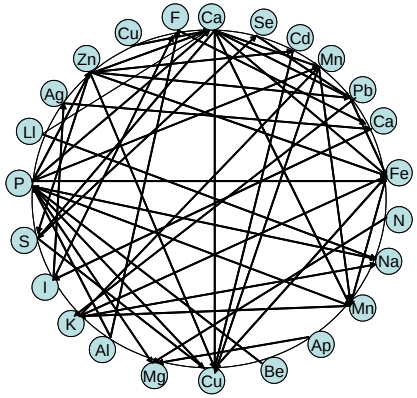
- The short term mobilization occurring during the DMPS procedure.
- Ongoing significant contamination at the workplace

Conclusion: No heavy metal ions should be measured at the 3ml and 5ml line.(Best at the 7ml either) If too many free metal ions are present in the urine, the body is overburdened and tries to get rid of the free metal ions. Remember that urine is filtered blood. One German doctor compared the blood values(metal) with the HMT values and found a 100% concordance. Often the test shows only copper and zinc. That's normal, since copper and zinc are the first metal which will be replaced by the heavier metals. Once the body is detoxified, the copper and zinc values will be back to normal.

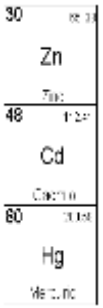
A) Advantages of the test: The dithizone reagent only binds to the unbound or electrically active metal ions. Only the electrically active metals (ions) disturb the harmony of the bio-chemistry and electromagnetic and photon energies in our body, causing disharmony and disease. They also increase the production of free radicals million-fold. Hair analysis and spectrometric analysis are not making the differentiation!

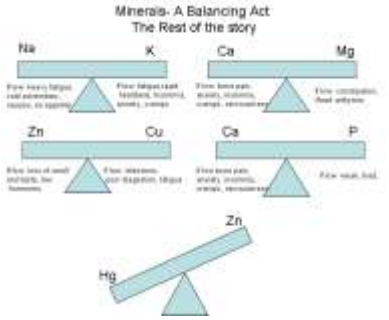
B) Disadvantage of the test: The test will only show the most concentrate metals.
Each metal can occur in acute form(1st and 2nd sample). Nonetheless there may be further heavy metals, not visible for the time being and concealed behind such concentrations. A grey coloration of the test is evidence of such metal conglomerate.

Heavy metals- Why are the bad guys bad guys?



Heavy metals such as mercury, lead, cadmium and aluminum have a number of harmful effects on the body. As they relate to minerals, they can tie up bindings sites on cells so essential minerals, especially those in the same row of the periodic table which have similar binding characteristics, can't get in. This is like putting a broken key into a lock: it not only doesn't open the door but prevents a good key from being used. Some examples of this are mercury (the most common source is dental amalgam fillings) and cadmium (found in cigarettes and elsewhere). These are both in the same column as zinc, a beneficial mineral. These toxic metals can prevent zinc from being utilized, with resulting symptoms of zinc deficiency such as loss of appetite, smell and taste and prostate problems. This is why a person who quits cigarettes often has an increase in appetite even without taking zinc supplements- with less cadmium in from cigarettes, more zinc can get into the cells. Zinc, in fact, functions in more enzymatic reactions than any other mineral.





Demonstration of mercury in the human brain and other organs 17 years after metallic mercury exposure.

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Abstract
A male subject became exposed to metallic merury vapor at work in 1973. He excreted 1,850mg Hg/l urine initially. Controls of urine mercury excretion after D-penicillamin administration led to the assumption of a total body clearance of mercury latest since 1976. Subsequently he developed an organic psychosyndrome without detectable signs of classical mercurialism. He never returned to work again and died of lung cancer in 1990. In different organs(brain, kidney, and lung) which were sampled at autopsy elevated levels of mercury were documented by documented by atomic absorption analysis. Histological examination of the tissue by the Danscher and Schroeder method, which is specific for mercury, showed a highly positive staining in the majority of nerve cells and cells of other organs.

Interpretation:
…..Here we present a patient who clearly was exposed to mercury vapor for a short time. He never suffered from typical clinical signs of mercury intoxication. Treatment with complexing agents failed to increase renal excretion mercury serum levels, which was interpreted as resulutio ad integrum. Post mortem, however, it could be demonstrated that mercury was still stored within the brain in high amounts and painful sensations of which the patient had suffered since intoxication….

Clinical Neuropathy, Vol.15 No. 3-1996(139-144)

NOTE: When using the Dithizone Heavy Metal Test no challenging agents are necessary to address the overall heavy metal burden. The organism is still heavy metal toxic as long as high amounts of free or unbound metal ions are found in the urine. Therefore this test permits to assess the intracellular heavy metal toxicity.

Dr. Joachim Leman

Medical Laboratory Expert –Toxicologist,Germany

HMT – Heavy Metal Screening Test

In the eyes of a chemist, this test is composed of two essential chemical steps.

The first one is a complex forming reaction between metal ions and Dithizone at the phase border separating aqueous solution and Testsol-phase, the second one is an extraction of the performed complex into the organic layer.

Placed before those steps are the pH adjustment by addition of buffer solutions and the extraction of Dithizone into the Testsol layer. Following the aforementioned visual procedure.

The two essential steps as well as the preceding one and the evaluation procedures are very common processes in analytical chemistry and form part of many other determination methods used in clinical chemistry.

Dithizone (1,5-Diphenylthiocarbazone) is a current reagent since it was introduced in trace-analytical chemistry in 1925. It is excellently suited for trace determination of one- to three valent ions of several transition metals.

The formed complexes vary in composition and color depending on pH and dipole strength of the solvent in use. Thus they can be applied for the discrimination of different elements and their quantification by colorimetric.

Testsol is a proprietary product, which joins the advantages of ecological harmlessness, lack of toxicity and inflammability under normal conditions, whereas the chloromethanes used up to now are highly toxic and ecologically objectionable.

The comparative colorimetric evaluation is performed by matching color panels with printed colors based on the Pantone code defined colors of pure complexes. In our hands this match was astonishingly reliable.

We thoroughly investigated the sensitivity and specificity of the HMT- system and we can furnish the proof at any time that the detection of the claimed individual metal species of toxicological relevance is possible at the lower ppm- level. Under favorable circumstances we could detect metal ions even at the ppb – level.

Thus one can obtain important preliminary information for clinical decisions in the medical cabinet or during a bed-side-examination.

The high sensitivity of this test-kit is naturally dependent on the correct test-execution and prone to failure due to e.g. omitted pH-adjustments, shortened waiting periods or wrong consecution of additions.

The dithizone reagent offers an alternative way in assessing heavy metal toxicity and is actually the only test which allows the assessment on the intracellular level.

So you can see that there is no room for any doubts concerning the respectability and reliability of the HMT-Test-Kit. It is based on a scientifically approved method and suitable for clinical purposes so that health insurance companies are supposed to refund the costs for its execution.

I hope you will find my remarks suitable to convince your customers that they have bought a high-quality test-system endorsed by analytical chemists. Any of them may address me directly for further information.

Yours sincerely

Dipl.-Chem.Dr.rer.nat. Joachim Leman

Excerpts from Expert Evaluations of Heavy Metal Test

[...] We thoroughly investigated the test system with regard to its sensitivity and its specificity and found consistent evidence that it is possible to detect individual toxicologically relevant metals in urine or water specimens in the range of a few ppm, at times even fractions of one ppm. This makes it possible to obtain on the spot clinically important preliminary data [...

(J. Lemann, Dr. rer.nat., Toxicologist and Medical Expert, Institute for Toxicology and Medical Laboratory Diagnostics, Hirschberg, Germany)

[...] This report is intended to be an independent assessment of the claims of performance of a novel detection system for some transition metals. These materials are commonly known as toxic or heavy metals. [...] it was found that the system shows remarkable sensitivity for such a simple procedure [...]

(K.H. Bell, Ph.D., Professor and Head, Department of Chemistry, The University of Newcastle, NSW, Australia)

[...] Until the beginning of the nineteen-seventies this reagent was in predominant use for the detection of heavy metal traces in the water supply. It is a certified German Government Standard procedure for water supply analyses. [...]

(G. Schwedt, Dr. rer.nat., Professor and Director, Institute for Inorganic and Analytical Chemistry, Technical University of Clausthal, Germany)

Environmental Toxicity: An Alternative Way of Assessing Heavy Metals.

Numerous scientists world wide are supporting the view today that all life processes are being determined by subtle electromagnetic and photon phenomena [see Prof. Dr. A. Popp,, Dr. Voll (EAP), Dr. Dr. Schimmel (Vega System) and many more). All electrically active metals (ions) and particularly heavy metals, can disturb the harmony of the electromagnetic and photon energies in our body, causing disharmony and disease. They also can increase the production of free radicals million-fold.

It has been stated that 90 % of all chronic and serious illnesses could be prevented if we were able to eliminate the 600 most dangerous environmental toxins (Dr. J. Higgensen, Head of Cancer Research, WHO, Geneva, Switzerland). Every health practitioner is fully aware of the devastating influence heavy metals and/or ionic metals can have on our mental, emotional and physical health and well being.

Until recently, most health care professionals and researchers assumed that heavy metals had to be taken into account only when a patient showed definite symptoms of 'poisoning'. We realize now that our health and well-being is affected by much lower levels of heavy metals than previously assumed. Health authorities constantly correct 'permissible' maximum levels downwards.

It is becoming more difficult to accurately determine the appropriate drug profile in a given case, because the respective simile of symptoms has undergone a shift due to the presence of heavy metal ions. In fact, this phenomenon may be observed for the majority of the classic Hahnemann remedy profiles and it is fair to say that at the present time the effectiveness of any antioxidant therapy is significantly compromised by the presence of heavy metal ions. It is therefore important to first identify the heavy metal in question and then the degree of its involvement. Then, as the cause of the condition, the heavy metal ions must be removed and cleared out.

Two types of metals

The methods used to detect heavy metal contamination are cumbersome and costly and in some instances can't differentiate between organically bound and free metal atoms (e.g. Cu, Zn in spectrometric analyses). Recent research has shown that it is essentially electrically active heavy metal atoms not bound with organic complexes that actively destroys molecular compounds and thereby cause the formation of free radicals. Up to a certain point, a healthy body is able to bind (i.e. chelate) free heavy metal atoms, i.e. neutralize their electromagnetic charge and clear them out. If this mechanism is no longer able to function because too many toxins have accumulated in the organism, the number of free radicals will increase, especially if the body is suffering an antioxidant deficiency at the same time. In such cases, administering antioxidant supplements will not solve the real problem, namely the accumulation of heavy metal ion deposits in the body.

Unfortunately, traditional methods like hair or blood analyses are not able to uncover these connections for the simple reason that the organic sample is destroyed in the course of the analysis. Such procedures are therefore unable to differentiate between metal atoms bound with organic complexes and unbound and therefore electro-magnetically active ions, a difference that is crucial in the assessment of the overall situation.

A new way to assess heavy metals

In 1925 Helmut Fischer of the Siemens Concern in Berlin succeeded in detecting heavy metal ions by means of a dithizone process. As a reagent, dithizone is able to indicate the presence of heavy metal ions in qualitative and in quantitative terms. In binding with them, colored complexes are formed in the interior of the molecule which are soluble in non polar organic solvents. The coloration of these solutions is very intensive, its particular coloration determined by the atomic radius of the respective metal present in the complex. The reaction times of the heavy metal ions vary; therefore, depending on their respective concentrations, different colorations may occur from which one can, in addition to the qualitative conclusions (the dithizon reagent binds to Cu, Zn, Cd, Hg, Pb, Mn, Co, Ni,) also semi-quantitative ones regarding the contaminant. (At the lower ppm level, even at the ppb level).

The dithizon heavy metal reagent allows the detection of free heavy metal ions in bodily liquids like urine and saliva . By administering the test reagent as an exploratory measure, contaminations from amalgam fillings or from the environment (cadmium, lead, zinc, copper, manganese, nickel and cobalt - pointing to infections, organ or system disorders) can be identified on the spot, the potential health problem, as well as the need for detoxification before any specific therapy is administered. The test reagent is therefore an important aid in the decision making process during the initial evaluation and detoxification therapies, recommended as urgent and necessary counter-measures, can be monitored with the test reagent administered.

The dithizone reagent can also be used to determine the environmental sources of the contamination in aqueous solutions such as tap water and since all heavy metal ions are water soluble, solids like food items, porcelain dishes, dust samples from carpets, wall paints and wall paper etc. can be tested for heavy metals by soaking them in distilled water beforehand. In other words, in addition to being a diagnostic tool for urine and saliva, the reagent is also useful to find contamination causes in the patient's environment.

Replacement Reaction or How to Asses Mercury Toxicity

The sheep study done at the University of Calgary in Canada(sheep had amalgam fillings placed in their mouths) clearly shows that very little mercury is found in the urine and in the blood, but highest amount are shown in the kidneys. Since this is the case how to assess mercury toxicity via the urine?

To understand this a short review of basic bio-chemistry and how heavy metals react in the body is necessary.

In the human system, the bivalent metals are engaged in a continuous fight against one another, e.g. copper against zinc, magnesium against calcium, which results in the replacement of the "lighter" element by the "heavier" one in terms of their atomic masses. Replacement reactions, also called fight for the site, occur when heavy metals grab the biological spaces that should be filled by necessary minerals.

Just as carbon monoxide replaces essential oxygen, other elements and compounds cause their toxic effect by replacing chemicals essential to the body functions. Within a group, for example group 2 in the periodic table of elements(2 refers to the number of extra electron) there is zinc (Zn), cadmium (Cd), and mercury (Hg), in order of increasing atomic weight. (65, 112, and 200 respectively). Zinc in its ionic form, Zn^{2+}, is necessary for proper body function, although an excess is toxic. Cadmium, found in paints, cigarettes, tires, and brakes, is toxic. Mercury, found in amalgam fillings, paints, and some industrial processes, has no known use in the body and is even more poisonous.

Since cadmium and mercury, in their more soluble ionized or salt forms, will attempt to participate in the same biochemical reactions as zinc, their presence will prevent the zinc reacting and performing its functions in the body. This is like a 65 pound person (zinc) competing unsuccessfully with 112 pound (cadmium) and 200 pound (mercury) people in a game of musical chairs. As a result, mercury leaching into the body from silver-mercury amalgam fillings will cause symptoms of zinc deficiency such as fatigue, PMS, thyroid problem, loss of smell and taste, macular degeneration, prostate enlargement, rheumatoid arthritis, sterility, immune suppression, etc., even if there is plenty of zinc available.

Other symptoms caused by mineral deficiency and displacement by a heavy metal. (Hg, Cd, Pb,) include:

- Magnesium : Irregular heartbeat, osteoporosis, receding gums, etc
- Iron: Anaemia
- Copper: Anaemia, Thyroid dysfunction, impaired digestion, scoliosis
- Zinc: Anorexia nervosa, loss of taste, low libido, PMS, etc
- Iodine: Thyroid dysfunction

Causing a toxic accumulation of essential minerals.

By taking the biological spaces of the essential minerals, heavy metals, in particular mercury, create simultaneously a toxic accumulation of essential minerals. The body receives everyday essential minerals through the food, unable to be absorbed leading to an accumulation and overburden of these minerals. High toxic accumulation of copper for example can be the cause of Parkinson’s

disease, anaemia, allergies, hair loss, appetite disturbance, hyperactivity, low thyroid activity, headaches, skin conditions, constipation, learning disabilities, and/or depression. When checking the urine for mercury, by using the dithizone reagent, toxic amounts of copper and zinc (direct antagonist to mercury) will always show up first. These are the markers to monitor if mercury our other heavy metals are present in the body. After starting detoxification therapy, the copper and zinc level will even increase more (discharge of the depots), before they decrease. This indicates that there are now less heavy metals in the tissues and more copper and zinc ions are now being assimilated. So instead measuring the mercury(heavy metal) concentration which is very difficult to assess since mercury(heavy metals) are neither in the blood nor in the urine, the indirect disturbance caused by the heavy metal atoms are measured.

Conclusion

Since heavy metals contribute, with up to 80% of the causes to all diseases, the assessment for heavy metal contamination has become an essential component of any initial diagnosis.

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