

## Heavy metals (chemical poisoning)

### Lead

Last time we were talking about lead and exposure to lead:

(usual in young children) it affects :

1-their brain.

2-level of inteligency ,IQ will be lower than usual, many studies show the relation between exposure to lead and IQ { high exposure lower IQ } .

3- their vision might be affected (he won't be able to see black board in the school ).

4- affect the hearing (he can't hear).

5- nervous system will also be affected ,eg: foot drop (the child will not be able to keep his foot in the right position .

⇒ Children when they start crawling ,sometimes they like to eat things on the floor or on the wall, so children can pick up build and eat it! ,and the mother is happy beacause her children are Silent. but lead can **accumulate in Long bones** of those babies, So what can we do as a doctors ?

other than taking blood sample , or urine sample (there are some enzymes indicating that ), you have to apply certain type of x-rays called (froze x-ray)to show this lead in long bone.

⇒ Old newspaper they used typing for letters on plat cover with ink and make the newspaper ,(this method changing by time but still they found it in small towns ),so by pressing these letters some of the lead might end up on surface ."some people use those newspapers under the food so when food comes in contact with the newspaper the food contaminated with lead ,(little lead will beacome with your food ) , or when you wrap your sandwich with it, lipid in sandwich dissolve some of lead inside your food "

\* advice: you can use nylon instead of newspaper ,or empty paper .

\*even adult can get toxicity with lead at larger level \*(in fact some scientists discovered certain cases of one of the factories)

\*\*person with 104 lead mg/100mL while [Normal below 10 mg/100m],he starts ..... ,and if you leave him for a while he will end up whith kidney failure ,and affect nervous system ans so on .

\*lead exposure is an Occupational hazard\*

## mercury

Three years ago, ministry of health in Jordan circulated a note to all hospitals and health centers to tell them the right way in handling with the thermometers that are broken . ((we use mercury also in 1.barometer 2. Blood pressure meter and 3.thermometer))

### \* Why we use mercury in these meters ?

mercury has good characteristics for this purpose ( If you want to use water instead of mercury you need barometer with 14 m in length! and this is not useful) also mercury doesn't stick to glass ,and the surface of mercury is a good surface to measure not like water which has different surface tension and different shape .

### \* Why did ministry of health do that ?

1- because mercury is dangerous material . (dentists usually have problem with this and this is dangerous to health of **حشوات الاسنان** because they use mercury in amalgam people because part of it start to split and you swallow it ,that's why they are changing now to other filling material ).

2- although mercury is a heavy metal but it can evaporate at room temperature so you inhale it without knowing! It also can enter your body by touching .  
so it can access to your body by : **1. Skin 2.Inhalation 3.eating or smoking.**

### Sources of exposure to mercury :

⊗ One of the possibility of exposure to mercury is **the hatter man** when he bring the leather from animals he usually dry it so it becomes very tough and then he has to make it smooth using mercury ,so he will inhale large amount of it or even touch it !>>>he will become mad (severe madness) so it can affect the brain .

⊗ Other sources of exposure ,when mercury reach the water through industry of (thermometer barometer ...etc) also it is used in explosive material .  
mercury is used as fungicide so it can spread on farm and end up in water .

⊗ Mercury is used to separate gold from other metals in the process of looking for gold in soil, primitive technique used by many people called gold hunters in amazon.

that doesn't mean that you in Jordan are not going to eat the fish coming from that places .

⇒ **1952** ,in Japan- minamata people consume fish almost every day (which is normal for somebody that lives near the ocean),and at that time many ladies got birth to newborns with microcephaly and retardation in children , and when scientist looked for the reason ,they found that there was mercury in high levels in tuna and

sold fish ! it's coming from the factories nearby..many Japanese at that time stopped eating fish for 10 years ,until there are no more mercury and everything became alright .

⇒ Three years ago a lot of canned tuna in factories had high levels of mercury, but it is impossible to do something because these cans are all over the world, instead of making panic all over the world they stopped the production, but they did ask for the tuna cans back which means that this problem is still there.

\* \* mercury as we mentioned can affect the : - brain  
- damage the Gum (especially in mouth breathers, and workers... you see a lining of mercury inside their mouth)

\*\* one major source of environment is the use of mercury in detergent manufactures ,**how?**

⇒ It's an old technique still in use in 3<sup>rd</sup> world countries that ends up with using NaCl and separate Cl to prepare **detergent** (chlorox ,hypex..etc).  
but Cl is not only use for this purpose ,it have other purposes : one of them is to **clean water** ,our water in Jordan is cleaned by government by using Cl ,third use (not always a good use) is **chemical weapon** ( the first chemical weapon used by human beings was Cl ).eg: **1-** in the first world war Germans used it by a very simple technique, just convert it in form of cans that you can open suddenly and release this chlorine so soldiers breath it and die . **2-** In Iraq after **1990** the country was preventing from importing chlorine because they are afraid that it could be used as a chemical weapon but this deprived people from clean water this is why many diseases spread during the war/

⇒ In Jordan some people think to change this mercury (Get rid of it) ,they simply dig a hole in front of a factory and put a lot of mercury inside it and cover it ,by the time it starts to come out and children might see this beautiful shiny balls of mercury and start to collect them, this ends up with toxicity with mercury.

⇒ Later we started to see some mercury in olive oil!! (causing harm)

We have three types of mercury depending on the nature of it[each type has its own characteristics and impact to health :

1-Metallic

2- Organic (the most dangerous type because it reaches the brain)

3- inorganic (if we throw it outdoor the microbes will methylate it and change it into methylmercury which is more dangoures) .

Note : mercury affects all ages .

## Arsenic

A Chemical which became recently more and more important, and it causes problems in many countries .

\*one main source is natural arsenic in soil (some soil in the world is rich with arsenic, so if you dig wells in these places it will have high percentages of arsenic).

\* in far east and sometimes turkey people in rural places have no choice but to drink from this water (Contaminated with arsenic) because there is no other source and cleaning up water might be expensive so more and more (millions)people will be affected by arsenic .

⇒ Our ancestors are more familiar with arsenic, it was called the kings poison (kings use to kill each other or kill themselves by putting it in small amounts in their rings if he wanted to suicide . they put the dose in a ring and the antidote in another ring if he changed his mind! Very sophisticated formulas were used! Science was advanced then...

**Note** This arsenic in large amounts is a killer but in small amounts it kills you slowly.

### **Arsenic can affect people differently depending on genetic makeup of people .....**

**.eg :**

**#1#** when people in far east drink water with arsenic ,black foot disease will be more frequent >> affect blood vessels in their foot >> cause gangrene .

**#2#** people in united states when they are exposed to high levels of arsenic they will have a problem in the conductivity of the heart, you can see this change in ECG .

\*\* Arsenic can cause cancer in (skin ,lung when inhalation, and liver)!! And this is strange because majority of other material attack certain places, but arsenic attacks more than one place in the body( skin ,lung ,liver)

### **What is difficult about arsenic ?**

this phenomena can't be proved in animals (can't use in animals to show the cancer ) but only in human beings .

**Note** Some complex metabolism might create more active (hazard) daughter than the parent .

\*\* arsenic is more commonly used in paint materials .napoleon ponapart ,he died by exposure to the arsenic how ? he painted his cell with green color (made out of arsenic) and with bad ventilation he died !! , and after several year they took sample from his hair and proved that he died because of arsenic .

**Note** It is not only the blood ,urine and fecal material that can tell you the story of people exposure ,hair and nails(sometimes) are useful for this purpose .

**problem** someone gave a young lady arsenic in order to kill her husband, but the lawyer was a clever person, he asked a professor to take a hair, cut it into pieces similar to speed of growth of the hair (hair grow 3 mille/month so the hair was cut into 3 pieces ),sent it to the lab and it shows the concentration of these pieces and they knew the time when she started giving him the arsenic and how much she took .

### **Arsenic is used as Herbicide .**

it has been used as a **chemical weapon** by Americans in Vietnam(because Vietnam is known to be covered by forests ) and they spraying herbicide by their plane they call it the morning orange because it looked orange ,so they used this material (contain arsenic ) to damage the forests .

→ There are four chemical arsenical compounds that are acceptable **as feed additive** (we add it to food for animals to make them gain weight quickly ),because it won't excrete fat in the urine so it will stay in their bodies . what is dangerous about this? Those animals might have high levels of arsenic in their meat .

**experiment** In united states some scientists took rabbits and gave them this arsenic compound (allowed to be used) ,gave them to rabbits daily and saw the level of arsenic in their bodies ,they did this until it reached almost an acceptable level, it took (2-3)weeks to reach the acceptable point , so if we want to eat that meet we have to stop giving them arsenic compound between 2-3 week before eating their meat .

### **It can be found in wine and alcohol . how ?**

how use most of these (alcohol) are made from grapes which grow on the ground ,and when we spray ground with herbicide(using arsenic ) to get rid of harmful herbs it ends up on the grapes which get inside the wine ,so grapes shouldn't contain high levels of arsenic .

Advice : if you want to buy a mug, don't take it colorful(colorful from inside means that these colors come from heavy metals )

⇒ To give you proof, there are a theory said that the roman empire have fall due to lead ! somebody made a beautiful and expensive mugs of lead serve to wealthy people and used for drinking wine ,so the wine dissolved that lead and people start to die earlier ,and they took the remaining bones which showed high levels of lead .

Everything you can imagine is real "- Pablo Picasso"

I am sorry for any mistake 😊

Good luck my colleagues