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Determination Some Minerals in Cancer Tissue

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Abstract
Study was amid to detect sometrace elements in human tumor tissue, Manganese, cobalt, cadmium and Zink was measured in cancer and benign tissue using atomic absorption , result show that cancer tissue have higher concentration of cobalt and Zink than benign tissue, it were 156.7±6.5 and 205.79 µg\g respectively.femaleshad higher concentrations than males in cancer 2011.41±439.79, 114..54±0.05, 157.05±6.50 206.58±20.93 µg\gin Mn, Cd , Co and Zn respectively also in benign tissue Female 2373.37±703.56, 114.56±0.06, 154.50±29.4, 204.65±28.23 µg\g in the same minerals above.
Keywords: trace elements, atomic absorption, tumors tissue.

Introduction
As a results of contamination in Iraqi environment which increased after wars and used different weapons, trace elements were increased in different sites; soil, water, food and air, thus present study suggested to detection some trace elements in human tumors tissue.Different studyinIraqi environment improved increasing in minerals concentration in different site such as air, soil, river water and plants inanother hands other studies suggested these minerals roles in carcinogenicity and cytotoxicity on human body.Tahaet al.,(2005) that the concentration of some minerals in the air of districts in Hilla city was abnormally high, the highest concentration in the air was recognized.alsomany local studies explained the high concentrations of these metals in the local environment (air, water and food).
Cadmium (Cd) an known is one of toxic heavy metal that widely used in industry thus Cd is highlypersistent in the environment, it effectson human health by occupational and environmental exposure. Cd exertsmultiple toxic effects and has been classified as a human carcinogen by the International Agency for Research onCancer (IARC). Cd is carcinogenesis that causes some cytotoxic effect by disruption gene expression,inhibition of DNA repair systems , induction oxidative stress, and inhibition of apoptosis (Joseph,2009)
Cobalt (Co) is an essential trace element being an integral part of vitamin B12which is essential for folate andfatty acid metabolism. The carcinogenic potential of cobalt and its compounds was evaluated by IARC in 1991,which concluded that there was inadequate evidence for carcinogenicity in humans (lung cancer) (IARC , 1991) .
Two different mechanisms of cobalt genotoxicity, DNA breakage induced by cobalt metal and especially hard metal particles, and inhibition of DNA repair by cobalt (II) ions contribute to the carcinogenic potential of cobalt compounds. There is evidence that soluble cobalt (II(cations exert a genotoxic and carcinogenic activity in vitro and in vivo in experimental systems but evidence in humans is lacking. Experimental data indicate some evidence of a genotoxic potential for cobalt metal in vitro in human lymphocytes but there is no evidence available of a carcinogenic potential. There is evidence that hard metal particles exert a genotoxic and carcinogenic activity in vitro and in human studies, respectively. There is insufficient information for cobalt oxides and other compounds(Lison etal., 2013).
Zinc (Zn) is a trace mineral which is vital for the functioning of numerous cellularprocesses, is critical for growth, and may play an important role in cancer etiology andoutcome, The intracellular levels of this mineral are regulated through the coordinatedexpression of zinc transporters, which modulate both zinc influx as well as efflux. LIV-1) ZIP6) was first described in 1988 as an estrogen regulated gene with later work suggestinga role for this transporter in cancer growth and metastasis(Grattan and Freake, 2012).
Manganese (Mn) is an essential element present in all living organisms and is naturally present inrocks, soil, water, and food. Exposure to high oral, parenteral, or ambient air concentrations of Mncan result in elevations in Mn tissue levels and neurological effects. However, current understandingof the impact of Mn exposure on the nervous system leads to the hypothesis that there should be noadverse effects at low exposures, because Mn is an essential element; therefore, there should besome threshold for exposure above which adverse effects may occur and adverse effects may increasein frequency with higher exposures beyond that threshold. Data gaps regarding Mn neurotoxicityinclude what the clinical significance is of the neurobehavioural, neuropsychological, or neurologicalendpoints measured in many of the occupational studies that have evaluated cohorts exposed torelatively low levels of Mn (Santamaria,2008).

Mn toxicity has primarily beenobserved in occupational settings where there is thepotential for chronic exposure to high levels orfollowing the accidental ingestion of large quantities.John Couper was the first to report neurological effectsassociated with exposure to Mn in the scientificiterature in 1837, when he described muscle weakness,limb tremor, whispering speech, salivation, and a bentposture in five men working in a Mn ore crushing plant in France24 .

Materials and methods

Extract and determine heavy metals in soft tissue as fallowing according to(**Otchere, 2003).**

1- Pulled out the soft tissue from samples by plastic forceps and put in polyethylene dishes with removing the excessive water by filter paper.

2- Tissue dried on 70 C° for 24 hr. with well grinding by Ceramic mortar.

3- (0.3) g has been taken from dried grinded samples and put it on Teflon Beaker , then added 10 ml from.HNO3 with heating on 85 C° for 1hr . After that , few drops of hydrogen peroxide added for completion of oxidation process within temperature increasing up to 135 C° for 30 min. until we have a clear solution and left it for a while to get a cooling and complete by D.D.W up to 50 ml , and centrifuge this sample to remove suspended lipid compounds in case of presence for 10 min. at 2500 r.p.m and sample transferred to polyethylene bottle to be ready for measurement by Atomic Absorption Spectrophotometer type 6300(Shimadzu, Japan) and results expressed as µg/g. The Following equation was used to determine the concentration of heavy metals as µg/g.

Conc = AxBxd.f/D

conc. = Metal concentration in sample (µg/g dry weight)

A= Metal concentration from standard curve (mg/L)

B= Final volume for filterable samples (ml)

Df= Dilution factor and used as follow ;Df = Volume of dilution sample solution ml/Volume of aliquot taken for dilution in ml D= dry weight (g).

Results

Sample characterization in present study show that Age mean was 41.66 years, samples consist of high percentage of different cancer tissue it was 72.41% and 27.58 % was benign tissue.According to gender samples consist of 55.55% female and 44.44% male table (1).

Table (1) Characterization of tumor samples used in present study.

Character of sample	**Percentage**
Age	41.66±22.68
Benign	27.58%
Cancer	72.41%
Female	55.55%
Mal	44.44%

In cancer tissue trace elements concentrations were higher than its concentrations in benign tissue, these elements were Co and Zn, while others elements were lower in cancer tissue, all variation was non-significant, table (2).

Table (2) Trace elements concentrations inhuman tumor tissue in µg\g.

Trace elements	**Mn**	**Cd**	**Co**	**Zn**
Cancer tissue	1999.87±421.18	114.54±0.05	156.7±6.50	205.79±19.75
Benign tissue	2110.73±557.00	114.57±0.065	153.59±6.33	196.89±22.34

mean±SD

According to gender, in cancer tissue females had higher concentration of Mn, CO and Zn, same results was showed inbenign tissue; Mn, Co and Zn concentration were higher than male table (3).

Table (3) Trace elements concentration Ppm in human according to genderµg\g

Trace elements		**Mn**	**cd**	**co**	**Zn**
Cancer tissue	Male	1998.14±413.59	114.54±0.05	156.44±6.71	204.9±18.98
	Female	2011.41±439.79	114..54±0.05	157.05±6.50	206.58±20.93
Benign tissue	Male	1848.1±212.08	114.57±0.073	152.68±9.093	189.14±14.40
	Female	2373.37±703.56	114.56±0.06	154.50±29.4	204.65±28.23

mean±SD

Discussion

The Genotoxic effects of metals can be mediated either through metabolically activatedelectrophilic derivatives that interact with DNA and other macromolecules, or through direct binding of DNA (De Bont and van Larebeke 2004). Many metals have been shown to directly modify and/or damage DNA by forming DNA adducts that induce chromosomal breaks(Chakrabarti 2001).

Susceptibility to cancer is characterized by extensive DNA damage. This damage isthought to result from decreased repair capacity and/or by the direct carcinogenic interaction ofmetallic ions with DNA and DNA adducts (KLAUNIG,2010)

Study show that even low doses and short term exposure to cadmium cancause specific DNA damage in breast tissue and may be a possible mechanism of action ofcadmium on the cell cycle of human mammary cell lines (Roy et al. 2004). Cadmiumsignificantly stimulated the growth of MCF-7 cells when compared with cells grown in estrogen-depleted medium, comparable with the degree of growth stimulated by estradiol (Roy et al., 2004). This study demonstrates that cadmium induces cell growth, and may have a possible roleSince zinc is essential for growth and cancer is characterized by uncontrolled growth ,zinc accumulation suggests an involvement of zinc in breast tumor genesis. Zinc is important tocell proliferation; however, it accumulates in mammary tumors and supports tumor growth (Sukumar et al. 1983; Lee et al. 2003).

In one study twenty-one-day old female rats wereassigned to a low-zinc, an adequate-zinc, or ad libitum control groups. On day 50, all rats wereinjected with 1-methyl-1-nitrosourea (MNU) to induce mammary tumors. MNU has been widelyused in rodent models to induce diverse mammary tumors that differ in type and location offormation in the mammary gland for studying human breast cancer due to their similarities inhormone dependency. The carcinogenicity of MNU is due to its ability to induce a mutation inthe H-ras oncogene (Lee et al. 2004). Results indicated low-zinc intake suppressed MNU-induced tumor incidence, tumor numbers and tumor multiplicity.

In Iraqi environment many studies improved increasing heavy metals in human body, in study on lactating mothers milk Ziadan et al (no published data)found that increasing in Mn, Co, Zn and Cd in mothers milk in Hilla city also Al-muhanna (2011) found increasing in heavy metals Pb , Fe and Ni. In environment researchers found that Iraqi river air and soil was polluted by different heavy metals (Salman et al .,2007; Hassan et al ., 2009) this led us to concluded that increasing heavy metals in human especially in tumors tissue resulted from environment that may be responsible on carcinogenesis and cusses cancer.

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