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Measured the concentrations of uranium in human blood samples from Iraq using CN-85 nuclear track detector

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Abstract: the purpose of this study is to measure the concentration of uranium through 20 samples of human blood from healthy people and patients with leukemia, where the concentration of uranium increased by working in an unhealthy environment that led to people being exposed to cancer. The CN-85 was used to measure and determine alpha particles. Blood samples were dried and 0.5 g of each sample was obtained. The reagent was then bonded to a neutron stream using an (Am-Be) and 5×10^3 n.cm ^{2}s^{-1} for seven consecutive days. The reagents were then scrapped with NaOH and 6.25 N for five hours. The intensity of the effect was measured by the optical microscope and compared with standard samples prepared in vitro. The increase in the proportion of uranium in the blood was caused by the military wars in 1991 and 2003 where the use of depleted uranium in the munitions and the war in abundance. The concentrations of uranium for healthy people ranged from (0.077 to 0.216 ppb), at a rate of (0.121 ppb). Patients ranged from (1,330-1.960 ppb) at a rate of (1.671 ppb). The acceptable value from ICRP is (0.810 ppb).

Keywords CN-85 , track indicator, human, blood, uranium focus

Introduction

In fact, ionizing radiation interfaces just with particles by a technique called ionization. In a like way, all common harm impacts start with the consequence of radiation correspondences with the particles forming the cells. A healthy human tissue is altogether recuperative. On the off chance that harm of cells and pulverization of whole cells are not over the past, persisting fiendishness can be kept up a key partition from. Compose relationship between atomic radiation and a telephone focus acknowledges add up to pulverization of the phone. In this way, radiation impacts on, people continue from the smallest to the most atypical aggregates as noted in the above once-finished. High estimations tend to execute cells, while low estimations tend to harm or change them. High estimations can murder such innumerable that tissues and organs are harmed, this subsequently may accomplish a fast entire body reaction a significant part of the time called ARS.[1,2]

Low estimations spread out completed drawn out reaches out of them don't understand an energetic issue to anyone organ. The impacts of low estimations of radiation happen at the level of the cell, and the outcomes may not be searched for a long time. Other than death, there are two or three others conceivable impacts of a high radiation measurement. Consequences for the skin join arithmetic

getting to be plainly flushed like sunburn, dry desquamation (peeling), and sticky desquamation (bothering). Skin impacts will probably happen with a prologue to low importance Gamma, X-ray, or Beta radiation. On the off chance that enough particles are influenced to such an extent, to the point that the chromosomes don't reiterate really, or if there is a noteworthy change in the data passed on by the DNA atom, by then the cell might be devastated by facilitating impediment with its life-regulating framework. Most by a wide margin of the hugeness of the radiation is secured to the skin surface. [3,4]

The estimation required for numerical to happen is unassumingly high, in abundance of 300Gy Irritating requires a measurement in abundance of 1.2 Gy male illustration hair scantiness, in like way called "appellation takes after skin impacts and can happen after uncommon estimations of around 5Gy.[5]

Aim of the study measurement the concentrations of uranium in human blood samples using CN-85 nuclear track detector compare with The standard blood samples of different uranium centers were prepared in the laboratory.

(sex ,age and district) and probability introduction to uranium or not , all illustrations are warmed at 300^{o}C for 6 hr. to dry it and oxidize regular material and re-merging of tests, by then powdered of 0.5g and crushed into a pellet of 1cm diameter,1mm thickness. The standard blood samples of different uranium centers were prepared in the laboratory.[6]

The pellets secured with CN-85 track identifiers on the two sides and put in a plate of paraffin wax at a partition of 5cm from the neutron source Am-Be with warm progress 5×10^{3} n.cm^{-2}.s^{-1}, as showed up in figure (1), get the part segments from these conditions: [7]

$$^{235}U + {}^{1}_{0}n_{th} \longrightarrow \text{fission fragments} + \text{energy} + (2\text{-}4)\ {}^{1}_{0}n$$

$$^{9}Be + {}^{4}_{2}He \longrightarrow {}^{12}C + + {}^{1}_{0}n + 5.76\ \text{MeV}$$

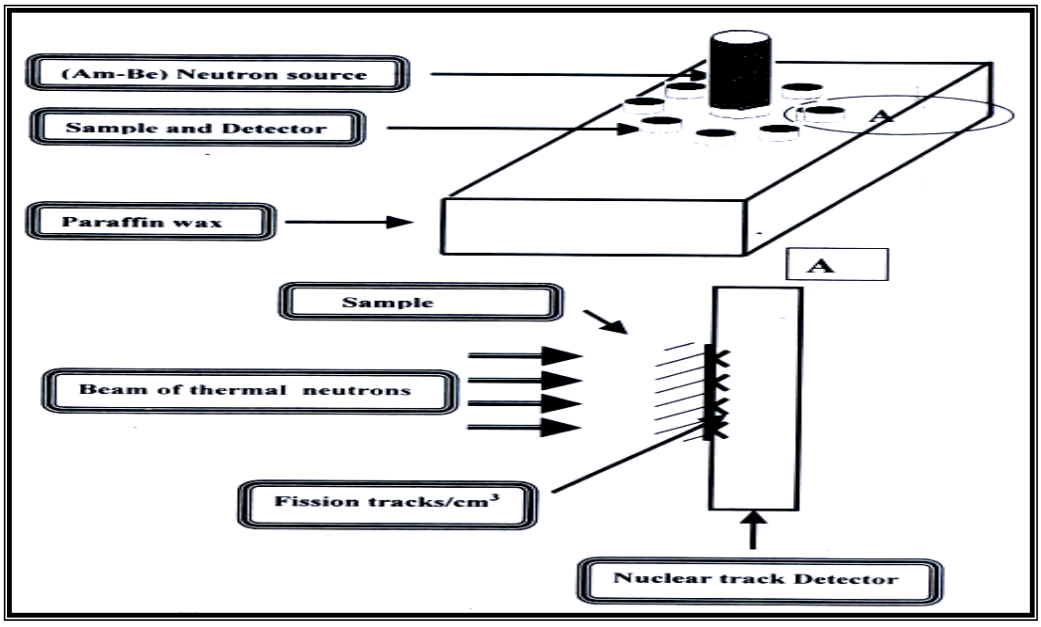

Fig.(1) Irradiation of the identifiers and samples with the neutron source[8]

Collection of samples twenty samples of human blood incorporate healthy and leukemia human were taken from the healing center to quantify the centralizations of uranium as appeared in table (1).

Table (1): All samples of human blood

Sample code	Gender	Age years	Region
B1	male	40	Kut
B2	male	36	Baya'a
B3	female	25	Nasiriyah
B4	male	60	Rahmaniya
B5	female	32	Huriya
B6	female	26	Baghdad aljadida
B7	female	45	Hay ala'amil
B8	female	44	Ramadi
B9	male	60	Yarmook
B10	male	45	Taji
B11	male	38	Washash
B12	male	40	Taji
B13	female	27	Falluja
B14	male	55	Hay ala'amil
B15	female	35	Diyala
B16	male	24	Altalibiya
B17	female	40	Abu Ghraib
B18	female	42	Sha'ab
B19	male	57	Yarmook
B20	female	43	Ramadi

Ten of samples incorporate healthy human and ten of samples incorporate leukemia human are appeared in table (2) and table (3) respectively.

Table (2): Blood samples for healthy human

Sample code	Gender	Age years	Region
B1	male	40	Kut
B2	male	36	Baya'a
B3	female	25	Nasiriyah
B4	male	60	Rahmaniya
B5	female	32	Huriya
B6	female	26	Baghdad aljadida
B7	female	45	Hay ala'amil
B8	female	44	Ramadi
B9	male	60	Yarmook
B10	male	45	Taji

Table (3): Blood samples for leukemia human

Sample code	Gender	Age years	Region
B11	male	38	Washash
B12	male	40	Taji
B13	female	27	Falluja
B14	male	55	Hay ala'amil
B15	female	35	Diyala
B16	male	24	Altalibiya
B17	female	40	Abu Ghraib
B18	female	42	Sha'ab
B19	male	57	Yarmook
B20	female	43	Ramadi

CN-85 identifiers were carved in 6.25N of NaOH arrangement at a temperature of 60°C for 5 hours. The prompted parting tracks thickness was recorded utilizing an optical magnifying instrument, for deciding the groupings of uranium by a similar technique from these conditions. [9]

$$C_x = (C_s \times \rho_x)/\rho_s$$

$$(I_s/I_x) = (R_s/R_x)$$

Where:

C_x: uranium focus for obscure examples

C_s: uranium focus for standard examples

ρ_x: actuated splitting tracks thickness for obscure examples

ρ_s: actuated splitting tracks thickness for standard examples

I_x: proportion between plenitude of uranium ($^{238}U/^{235}U$) for obscure examples

I_s: proportion between plenitude of uranium ($^{238}U/^{235}U$) for standard examples

R_x: the scope of parting pieces of obscure specimens

R_s: the scope of parting pieces of standard specimens. The connections of uranium focuses and tracks thickness of standard examples is appeared in figure (2).

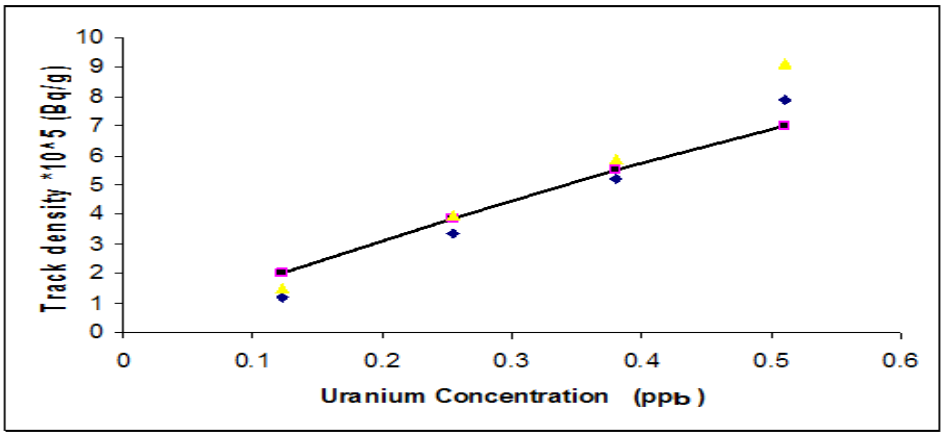

Fig.(2) The connection between uranium focuses and tracks thickness of standard samples

The results this study shows the centralizations of uranium in blood for healthy human demonstrated are appeared in table (4) and figure (3).

Table (4): Concentrations of uranium for healthy human

Sample code	Track density ρ_{x*} 10^3 track.mm^{-2}	Cx ppb
B1	11.0 ± 1.71	0.090
B2	13.5± 2.20	0.129
B3	12.1± 2.03	0.113
B4	12.6 ±2.12	0.119
B5	15.9 ±2.47	0.168
B6	9.5 ± 1.11	0.077
B7	9.8 ±1.32	0.080
B8	13.1±1.79	0.127
B9	11.5±1.82	0.093
B10	20.0±3.02	0.216
		Average = 0.121

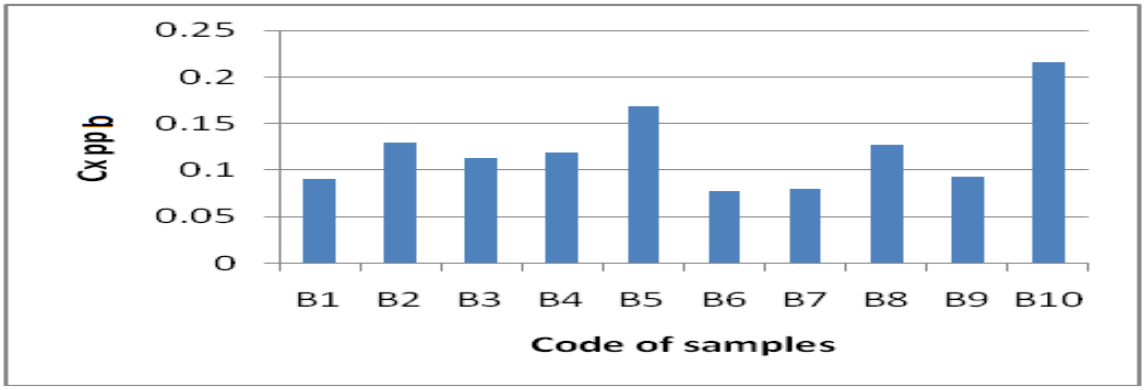

Fig. (3) Concentrations of uranium in blood samples for healthy human

The concentrations of uranium in blood for leukemia human demonstrated are appeared in table (5) and figure (4).

Table (5): Concentrations of uranium for leukemia human

Sample code	Track density $\rho_{*}10^3$ track.mm^{-2}	Cx ppb
B11	105.5 ± 10.05	1.522
B12	145.33 ± 14.0	1.850
B13	201.67± 20.9	1.960
B14	110.0 ±13.72	1.610
B15	159.67 ± 15.5	1.900
B16	85.67±8.38	1.330
B17	95.33 ±12.38	1.449
B18	90.67± 10.7	1.403
B19	130.33 ±13.28	1.805
B20	194.0 ±19.33	1.932
		Average =1.671

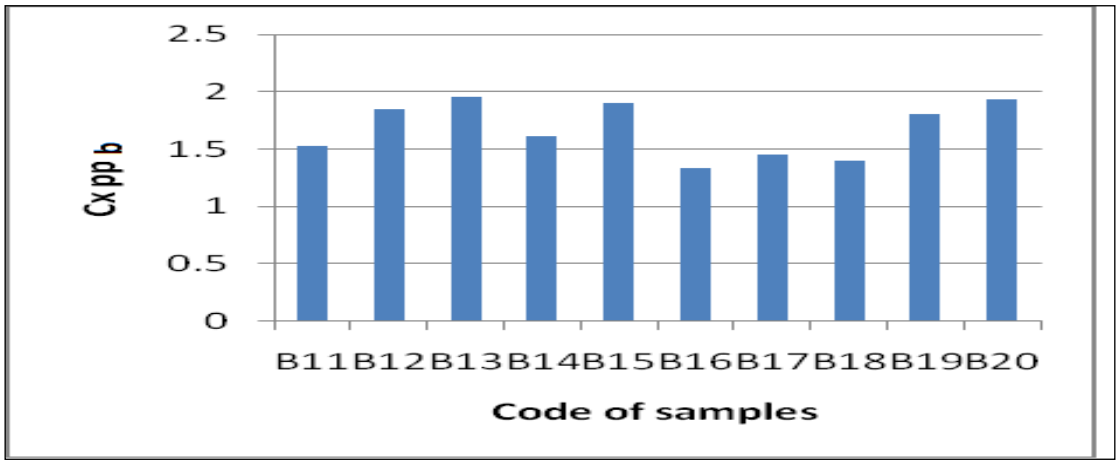

Fig. (4) Concentrations of uranium in human blood tests for leukemia human

The concentrations of uranium in all human blood samples are appeared in table (6) and figure (5)

Table (6): Concentrations of uranium in blood for all samples.

Sample code	Track density $\rho_x 10^3$ track.mm^{-2}	*Cx* *ppb*
B1	11.0 ± 1.71	0.090
B2	13.5± 2.20	0.129
B3	12.1± 2.03	0.113
B4	12.6 ±2.12	0.119
B5	15.9 ±2.47	0.168
B6	9.5 ± 1.11	0.077
B7	9.8 ±1.32	0.080
B8	13.1±1.79	0.127
B9	11.5±1.82	0.093
B10	20.0±3.02	0.216
B11	105.5± 10.05	1.522
B12	145.33 ± 14.0	1.850
B13	201.67± 20.9	1.960
B14	110.0 ±13.72	1.610
B15	159.67 ± 15.5	1.900
B16	85.67±8.38	1.330
B17	95.33 ±12.38	1.449
B18	90.67± 10.7	1.403
B19	130.33 ±13.28	1.805
B20	194.0 ±19.33	1.932

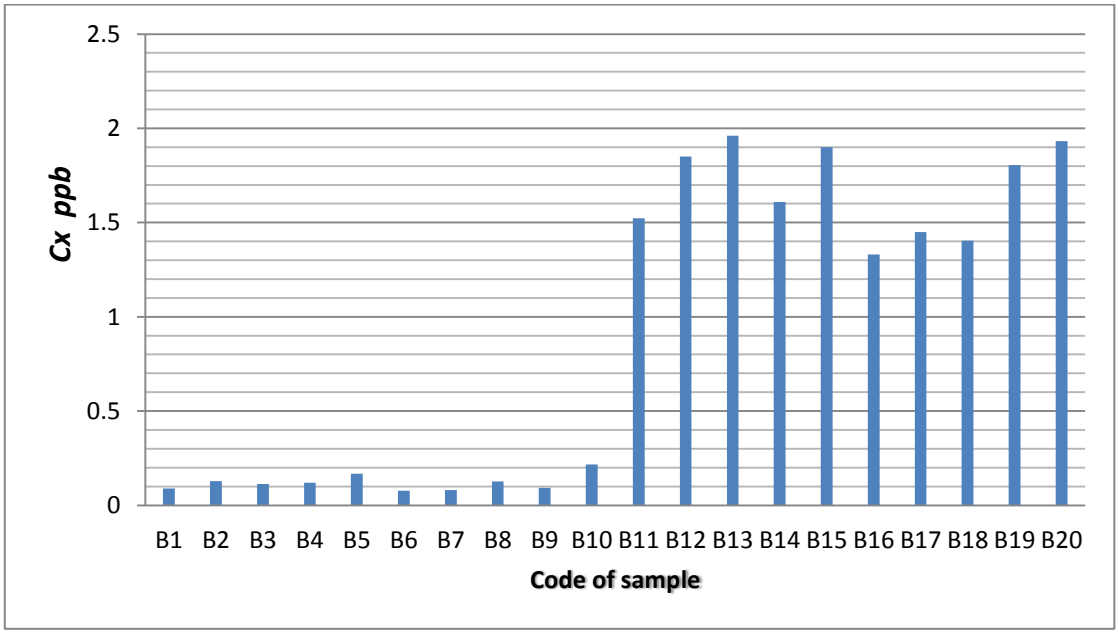

Fig. (5) Concentrations of uranium in all blood samples.

Discussion:

Figure (3) shows up, the group of uranium for healthy human was fluctuating from(0.077-0.216 ppb) with the typical regard (0.121 ppb), the most decreased union of uranium was found in the B6 sample (female, 26 year, Baghdad aljadida) and proportional to (0.077 ppb), yet the centralization of uranium (0.216 ppb) was found in B10 sample (male, 45year, Taji).

Figure (4) shows up, the group of uranium for leukemia, human were moving from (1.330-1.960 ppb) with the ordinary regard (1.671 ppb), the most negligible meeting of uranium (1.330 ppb) was found in B16 sample (male, 24year, altalibiya), the most hoisted centralization of uranium (1.960 ppb) was found in a B13 sample(female, 27year, Falluja).

Figure (5) shows up, the centralizations of uranium for all human were fluctuating from (0.077-0.216 ppb) with the ordinary regard (0.121 ppb), a minimal gathering of uranium was found in a B6 sample (female, 26 year, Baghdad aljadida) and equal to(0.077 ppb), yet the most surprising union of uranium (0.216 ppb) was found in B10 sample (male, 45year, Taji). The results above are closely near with many previous studies as,

- Uranium Concentration Measurements of Human Blood Samples using CR-39,A Thesis Submitted to the College of Science Al-Nahrain University by Lamya' Tawfiq Ali 2004,
- Track Detection Technique using CR-39 for Determining Depleted Uranium in Biological Specimens Shakir M. Murbat Al-jobori Madenat Al-elem University College, Al-KhAdumia, Badhdad, Iraq, Uranium concentration in blood samples of Southern Iraqi leukemia patients using CR-39 track detector 2010.
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Conclusions Iraq was military practices theater through 1991and 2003 war and the weapons misuse in up 'till now being in these districts that clear up the depleted uranium has uncommon inspiration to cases leukemia diseases. The centralizations of uranium for healthy human were fluctuating from (0.077-0.216 ppb) with the ordinary regard (0.121 ppb), while the centralizations of uranium in leukemia, human were moving (1.330-1.960 ppb), the allowed limit is (0.810 ppb) from ICRP.[10]

Recommendations the presented study is a part of the long term ongoing project on the health risk assessment of a humans in the region. The collected data should provide a base for the human risk assessment as well as an estimate of the general pollution status of the environment in Iraq.

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List of abbreviation

SSNTDs = Solid State Nuclear Track Detectors

ICRP =International Commission on Radiological Protection

ppb = part per billion

ARS = Acute Radiation Syndrome

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الخلاصة: الغرض من هذا البحث هو قياس نسبة تركيز اليورانيوم من خلال 20 عينة من الدم البشري من الأشخاص الأصحاء والمرضى الذين يعانون من مرض سرطان الدم حيثتزايدت نسبة تركيز اليورانيوم من خلال العمل في بيئة غير صحية أدت الى تعرض الأشخاص لأمراض سرطانية . تم استخدام كاشف الاثر النووي CN- 85 لقياس وتحديد جسيمات ألفا حيث تم تجفيف عينات الدم واخذ مقدار 0.5 غرام من كل عينة وتم الصاق الكاشف معها ثم تم تعريض النماذج الى سيل نيوتروني باستخدام مصدر مشع (Am-Be) وبمقدار 5×10^{3} $n.cm^{-2}s^{-1}$ ولمدة سبعه ايام متتالية ثم تم قشط الكواشف بواسطة محلول هيدروكسيد الصوديوم NaOH وبمعيارية 6.25 N لمدة خمس ساعات، تم قياس كثافة الأثر بواسطة الميكروسكوب البصري ومقارنتها بعينات قياسية تم إعدادها مختبريا.

إن ازدياد نسبة اليورانيوم في الدم كان بسبب الحروب العسكرية في عامي 1991 و 2003 حيث استخدم عنصر اليورانيوم المستنفد في الذخيرة الحربية وبكثرة . تراوحت تراكيز اليورانيوم للأشخاص الاصحاء من (0.077-0.216جزء في البليون) وبمعدل قدره (0.121 جزء في البليون) أما الأشخاص المرضى فتراوحت تراكيز اليورانيوم (1.330-1.960 جزء في البليون) وبمعدل قدره (1.671 جزء في البليون) مع العلم أن النسبة المسموحة بها من قبلICRP هي (0.810 جزء في البليون) .

الكلمات المفتاحية: كاشف الاثر النووي، الإنسان، الدم، تركيز اليورانيوم.