



## Uranium concentration variation dependency on gender correlated with age of bladder cancer patient

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### ABSTRACT

Human health was and still the most important problem and objective of all most researches. Finding out what causing in decadency of healthiness of Iraqi population is our tendency in the present work, Uranium causing cancer that is affected by correlation between age and gender of bladder cancer patients is studied in the present work. Mean of Uranium concentration (Uc) decreased with increasing age for all age group without dependency on gender. While, there is a wide dispersion in Mean Uc excretion between males and females, due to the effect of correlated gender with age, where female Mean Uc is maximum at age 50-69 year (2.355  $\mu\text{g/L}$ ) and it's higher than male Mean Uc (2.022  $\mu\text{g/L}$ ) in this age stage because of menopause, also average period of illness and percentage of patients are affected by correlated gender with age. So that factor of gender correlation with age is affect in calculation of background levels and radiation exposure and causing bladder cancer incidence.

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2001).

Enrichment process of Uranium is producing Depleted Uranium (DU) that is employed in the production of armor-piercing projectiles. DU was used as ammunition by USA and UK troops in an open environment for first time in history against Iraqi civilians and military target during 1991 and 2003 (D.Fahey and DU education project, 2003). Intake Uranium is followed by subsequent significant medical problems. Both chemical and radiological properties of Uranium rising risk of mortality as a result of cancer and other disease (Diehl *et al.*, 1999).

### INTRODUCTION

The routinely checking of workers (and in some times publics) for intakes of substance presented with naturally occurring levels in collected bioassay samples, such as uranium, is sensitive and need more accuracy. This is attributed to the significant variation in the Uranium concentration (Uc) values from someone to other that are affected by several parameters such as gender, age, accommodation area, food habits, and other factors (Roth *et al.*,

Cancer cells are abnormal cells grow and divide to form new cells without controlling, when they grow old or get damaged don't die as they should, also new cells form when the body doesn't need them. The buildup of extra cells often forms a mass of tissue called a growth or tumor. This behavior gives rise to form all cancer diseases which are about one hundred, and it can attribute to the patrimonial changing of the structure of a gene or to the external effects of the environment such as ultraviolet,

CT tomography, tobacco products, and viruses. Also cancer could be as acute and delayed deterministic or stochastic results of radiation exposure (Cameron *et al.*, 1992).

## MATERIALS AND METHODS

### Theoretical Part

Most cancers cannot be attributed to one reason, but several factors or actions can combine to initiate a healthy cell through the transition to a cancerous cell. In some types of cancer, the transformation process can take several years, as several evidences suggest (K.Schneider, 2001). That is agreeing with radiological toxic of Uranium, which is representing by  $\alpha$ -decay. Alpha particles have big mass and electrical charge comparing with other emitted radioactive particles, therefore, it is slowing down in all media faster than other particles, so, its penetration is small. Alpha particles with 5 MeV can penetrate roughly 50  $\mu\text{m}$  in soft tissue; hence, the intake of Uranium is causing severe damage due to internal exposure (Kolhatkar, 2000). Absorbed energy which deposited over long time, about years, in restricted region of the body tissue, is the outcome damage that consequent ionizing radiation exposure (Burnham, 1992). Both biokinetic and retention time and amount of Uranium inside human body affected in internal exposure results (Zarkadas and A, 2001).

Bladder cancer description based on how far it has invaded into the wall of the bladder as invasive versus non-invasive cancer. Both non-invasive tumors and any invasive tumors that have not grown into the main muscle layer of the bladder could be described as superficial and non-muscle invasive (Balar *et al.*, 2014). The authors in reference (Scosyrev *et al.*, 2009) showed that "The bladder cancer is the fourth most common cancer in men and the ninth most common in women in the USA, results in significant morbidity and mortality". However, there is no explanation, model, and (or) theoretical description to the effects of genders on bladder cancer.

Previous reports reviewed by (Shariat *et al.*, 2010) refer to the effects of age and gender on the bladder cancer occurrence probability and the treatment procedure of it. However, it was concluded that the bladder cancer occurrence probability slowly increases in women due to several bad habits such as fast food, smoking, and others (American Cancer Society, 2016). However, men still register the greater portion of this cancer.

Exposure to environmental factors such as smok-

ing and chemicals can be the reason of a great difference in the probability incidence of bladder cancer between men and women (Marks *et al.*, 2016), or this disparity can be attributed to the difference of hormones between males and females and therefore its impact on the development of bladder cancer (Dobruch *et al.*, 2016).

In the present work the Uranium exposure is representing the cause of bladder cancer, and the renal excretion of uranium correlates to a high degree with intake of Uranium concentrations (Orloff *et al.*, 2004), so that the renal excretion of Uranium concentration in bladder cancer patients and their period of illness is studied against their age, gender, parentage, also the effect of gender correlation with age on Uc, percentage and period of illness is studied.

Another study done by German federal environment agency reported data of 24-hour urinary excretion uranium levels related to some researches, for different groups of normal individuals examined from 2001 to 2003, with both genders, different age range (3-92 years) and different regional origin. The results of male Mean Uc is always higher than female Mean Uc, but it was remarkable that, in these studies the gender is not correlated with age stage, in other ward Mean Uc is calculated for each gender with allover range of participators ages. Low number of cases was involved in other study (Werner *et al.*, 1999), and the researchers mentioned that there was no variation in Uc of renal excretion depending on gender.

### Experimental Part

Uranium excretion in urine is proportional to the uranium level in the body, because it detects any incorporation through inhalation added to ingestion (Roth *et al.*, 2001), and hence urine sample was chosen to indicate the pollution in human body. Urine samples of patients collected from sixty bladder cancer patients' visiting different hospitals and centers for tumor treatment, with aged ranged between (10 -89 year) and both genders. Twenty four hour urine samples were collected in plastic cans with 0.5 - 1 liter, and directly added to it 1 ml of Hydrochloric acid to prevent precipitation.

Uranium concentrations in patients' urine samples have been calculated using kinetic phosphorimetry analyzer (KPA-11) spectrometry. After preparation of the samples, KPA-11 can quickly measure Uc with highly precise and accurate measurements. It has a minimum detectable limit about 10 ng/L and it is operated by a pc code that treated and analyzed the obtained data. However, Uc measurements were done in "Iraqi Radiation Protection Center" (IRPC).

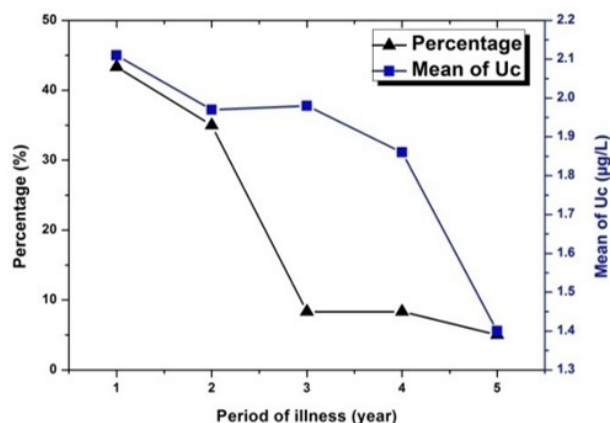
The occurrence probability of bladder cancer can affect by variation of gender, age, Uc, and period of illness. Therefore, this work aims to study the effects of these parameters together on the occurrence probability for all the participators.

**RESULTS AND DISCUSSION**

Uranium concentration in urine of publics was limited by WHO to 0.04 to 0.57  $\mu\text{g/L}$  (WHO, 2001), this indicates that the variation of Uc between populations is in 0.01  $\mu\text{g/L}$ .

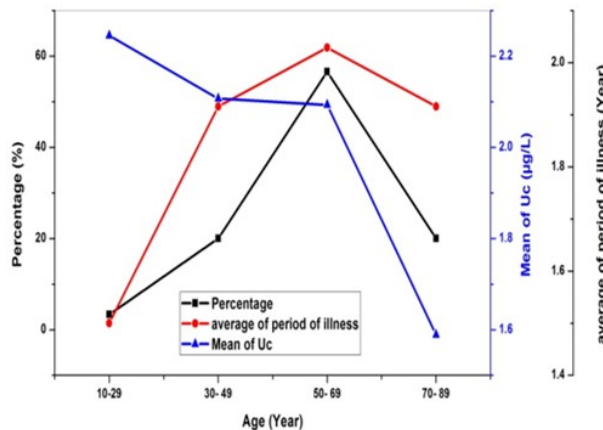
All participators of study distributed according to their period of illness as shown in Figure 1, and it shows that Mean of Uc excretion of all group are higher than the maximum permissible recommended values of WHO (0.57  $\mu\text{g/L}$ ) (World Health Organization, 2001). Also as much as the period of illness decrease the Mean of Uc and percentage of the patient increases. That explained how the excretion of uranium is decreased by time, and percentage of patients those could fight against cancer also decreased by time.

To study the effect of age alone on Mean Uc excretion, average of period of illness and percentage of patients, patients were distributed according to their age as four groups, and independent on their gender, as shown in Figure 2. Results show Mean of Uc is maximum at age (10-29 year) group and decreasing with increasing age. Average period of illness has a minimum value 1.5 year at age group (10-29 year) and maximum value about 2 year at age group (50-69 year), while percentage of patients is minimum at age (10-29 year) and decreasing with increasing age.



**Figure 1: Mean of Uc excretion and percentage of patient as a function of their period of illness**

To study the effect of correlated gender of patients with their age on Mean Uc excretion, the average



**Figure 2: Mean Uc excretion, average of period of illness and percentage of patients as a function their distribution corrodng their age groups**

period of illness and percentage of patient, patients distributed according to their age into four groups as shown in Figure 3.

Results indicate that there is wide dispersion in Mean Uc excretion between male and female as shown in Figure 3. In comparison with Figure 2, the decreasing of Mean of Uc with increasing age is related to male gender only. While for female gender, Mean of Uc is maximum at age (50-69 year) group, where female Mean Uc is 2.355  $\mu\text{g/L}$  and it's higher than male Mean Uc that was 2.022  $\mu\text{g/L}$  in this age stage. That may be explained by biological differences between men and women that lead to differential health outcomes (Miniño et al., 2002). Also, woman's health problems should be considered particularly due to the particular conditions of women verses to men such as pregnancy, menopause and menstrual cycle. The hormonal imbalance in women can affect in their own health at any age (Marianne et al., 1992).

For woman normal hormonal cycle also changes naturally during menopause, women may also experience imbalances in estrogen and progesterone levels. (Dobruch et al., 2016) referred to that the change in sex hormones is affected in bladder directly, causing bladder malfunction, and hence cancer is resulting. However, we are not depending on the previous opinion in reference (Dobruch et al., 2016) in explanation our results, because of some hormone levels for both genders fluctuate throughout lifetime and may it just be the result of natural aging, other changes occur when your endocrine glands get the recipe wrong. But we referring to that: one of the most important healthy causes in woman body is menstrual cycle (Avidan, 2017) and there

are common signs of perimenopause which usually occurs between ages 45 and 55 (Marianne *et al.*, 1992). Consequently, increasing the female Mean of Uc to maximum value at age (50-69 year) group, and higher than male Mean Uc at this age, could be attributed to the following explanation: menstrual cycle is beneficially powerful contributing process in extrication large amount of pending materials in blood every month from woman body and considered a natural purification of her body from uranium, so that stopping this process causes increasing the reached amount of Uc to bladder, and Uc motivate catching bladder cancer. And hence we suggested that: adding effect of gender correlation with age in calculation of background levels and radiation exposure.

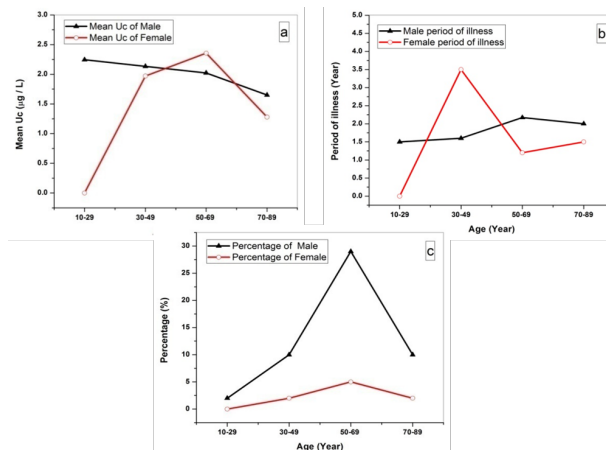
Figure 3 shows the behavior of period of illness that corresponding for both genders is the same behavior of Mean Uc, were women's period of illness is lower than men's period of illness at all age groups except age (30-49 year) group, also women's period of illness at age (30-49 year) group is the maximum among all age groups for both genders. These results attributed to same effect of gender correlated with age, and explained by considering the period of illness of cancer patients is the lifetime of fighting against cancer and its depending on healthiness state, where increasing this period is correlated positively with healthiness. Also, women at age (30-49 year) group are with high activity of menstrual cycle; hence women are fighting for the longest time at this age and for longer time than men.

Figure 3 shows that the percentage of male patient is larger than that of female at all age groups, this refer to bladder cancer is still man's disease more than woman's, that agree with (Scosyrev *et al.*, 2009), but also this result could be explained and attributed to that: women are diagnosed with more advanced disease at presentation, and they less favorable outcomes after treatment and have worse survival rates, in other words they died, and couldn't still fighting and registered as bladder cancer patients.

Also, Figure 3 shows increasing the percentage of patients for each gender with increasing age, reaching to maximum value at age (50-69 year) group, and that explained as follows: bladder cancer has print of elderly age, in addition to that both genders couldn't survive at largest age group (70-89), where the percentage is decrease again due ruthlessness of this disease and short life expectancy.

## CONCLUSION

The mean Uc excretion of all bladder cancer patients have value upper than the restricted allowed values



**Figure 3: a-Mean Uc excretion, b- average of period of illness and c- percentage of patient as a function their distribution corrodng their correlated gender with age**

of WHO. There is wide dispersion in Mean Uc excretion between males and females, due to the effect of correlated gender with age. Factor of gender correlation with age affects in calculation of background levels and radiation exposure and causing bladder cancer incidence. Menopause increases woman's risk of bladder cancer incidence and Mean of Uc excretion, however, bladder cancer is still man disease more than woman and has print of elderly age.

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