

## Study of some Antioxidants in plasma of patients with bladder cancer

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### Abstract

The objective of this study was to determine the catalase activity (CAT), ceruloplasmin activity (CP), glutathione level (GSH) in the plasma of (44) normal donars (22 male, 22 female,) and (66) patients with bladder cancer (22 smoker male, 22 non smoker male, 22 female). Data analysis showed a significant decrease in the mean values of CAT ( $89.577 \pm 17.140$  of a smoker male,  $92.102 \pm 18.898$  of non-smoker male,  $90.225 \pm 12.997$  of a female) as compared to normal individuals ( $155.541$  U/mg Hb of a male,  $150.797$  U/mg Hb of a female) respectively, and GSH ( $0.109 \pm 0.056$  of a smoker male,  $0.110 \pm 0.051$  of non-smoker male,  $0.084 \pm 0.028$  of a female) as compared to normal individuals ( $0.838$   $\mu\text{mol/L}$  of a male,  $0.809$   $\mu\text{mol/L}$  of a female) respectively. A significant increase in the mean value of CP in plasma of patients with bladder cancer ( $56.477 \pm 2.671$  of a smoker male,  $55.602 \pm 3.042$  of non-smoker,  $52.101 \pm 3.212$  of a female) was recorded as compared to normal individuals ( $43.908$  IU of a male,  $41.110$  IU of a female) respectively, There is also a negative relationship between CAT & Cp and GSH & Cp levels ( $r = - 0.089$ , and  $r = - 0.104$ ) respectively, while there is a positive relationship between CAT and GSH ( $r = 0.081$ ) in-patients with bladder cancer.

**Key words:** catalase , ceruloplasmin , glutathione , bladder cancer.

### دراسة بعض مضادات الاكسدة في بلازما مرضى سرطان المثانة

#### الخلاصة

تهدف هذه الدراسة إلى تحديد فعالية الكاتاليز (CAT) وفعالية السيرولوبلازمين (CP) ومستوى الكلوتاثيون (GSH) في بلازما (44) من عينات السيطرة، (22 ذكور و 22 إناث) و (66) مرضى بسرطان المثانة (22 ذكور مدخنين و 22 ذكور غير مدخنين و 22 إناث). أظهرت النتائج بأن هناك نقص واضح في معدل قيم (CAT) ( $89.577 \pm 17.140$  للذكور المدخنين و  $92.102 \pm 18.898$  للذكور غير المدخنين و  $90.225 \pm 12.997$  للإناث) بالمقارنة مع القيم الطبيعية ( $155.541$  U/mg Hb للذكور و  $150.797$  U/mg Hb للإناث) على التوالي، و GSH ( $0.109 \pm 0.056$  للذكور المدخنين،  $0.110 \pm 0.051$  للذكور غير المدخنين،  $0.084 \pm 0.028$  للإناث) بالمقارنة مع القيم الطبيعية ( $0.838$   $\mu\text{mol/L}$  للذكور،  $0.809$   $\mu\text{mol/L}$  للإناث) على التوالي. هناك زيادة واضحة في معدل قيمة السيرولوبلازمين (CP) في بلازما المرضى المصابين بسرطان المثانة ( $56.477 \pm 2.671$  للذكور المدخنين،  $55.602 \pm 3.042$  للذكور غير المدخنين،  $52.101 \pm 3.212$  للإناث) مقارنة بالقيم الطبيعية ( $43.908$  IU للذكور،  $41.110$  IU للإناث) على التوالي، تبين أيضا إن هنالك علاقة سالبة بين CAT و GSH وكذلك بين GSH & Cp ( $r = - 0.089$ ) و بين CAT و GSH ( $r = 0.081$ ) بينما هنالك علاقة موجبة بين CAT و GSH في مرضى سرطان المثانة.

#### Introduction:

An antioxidant is a substance, when it presents at low concentrations compared to those of an oxidizable

substrate, significantly delays or inhibits oxidation of that substrate<sup>[1]</sup>. Antioxidant protects the body from

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2- Twenty-two patients are males (nonsmokers), age (38-70) years.

3- Twenty-two patients are females (nonsmokers), age (36-60) years.

This study was conducted in a specific surgery hospital and Al-karama hospital in Baghdad. Patients suffering from any diseases that may interfere with our study were excluded. 5ml of venous blood samples were collected from these patients in lithium heparin test tubes, the plasma was separated by centrifugation at 1500 x g. for 10 minutes at room temperature, stored

#### Statistical Analysis:

The results for (CAT), (CP), and (GSH) were analyzed statistically. Values were expressed as a mean+SD. The level of significance was determined by

#### Results

The catalase activity was estimated in erythrocyte of patients with bladder cancer and normal individuals as clear in figure (1). Results presented in figure (1) revealed that the mean values of catalase activity in erythrocyte of patients with bladder cancer were significantly decreased as compared to normal individuals ( $p < 0.01$ ), figure (1) also shown a decrease in catalase activity of non-smoker patients as compared to normal individuals, and a higher decrease in catalase activity of smoker patients as compared to normal individuals.

Results analysis shows that the catalase activity of female with bladder cancer are less than of a male.

Figure (2) shown that the ceruloplasmin activity increase in patients groups as compared to normal individuals. Figure (3) illustrates the

in an ice bath and used in the same day for enzymatic activity determination. The remainder of each sample was stored frozen until used to estimate other parameters.

The method of Aebi was used to determine the erythrocyte catalase activity<sup>[17]</sup>. The activity of ceruloplasmin was measured according to the modified method of Rice using P-phenylene diamine – 2HCl (PPD-2HCl) as a substrate<sup>[18]</sup>. Glutathione level was determined according to the Ellman's procedure<sup>[19]</sup>.

student's t-test- when the P value was equal to or less than 0.05 the difference between the two groups was considered statistically significant<sup>[20]</sup>.

negative relationship between ceruloplasmin activity and catalase activity in-patients groups this means that the ceruloplasmin activity is oppositely proportional to the catalase activity. The levels of glutathione in the plasma of patients with bladder cancer and normal individuals have been determined as clear in figure (4).

Figure (4) shown that the levels of glutathione decreased in patient groups as compared to normal individuals.

Figure (5) shown the negative relationship between glutathione level with ceruloplasmin activity in patients groups Figure (6) shown the positive relationship between catalase activity with glutathione concentration in patient groups

## Discussion

The main finding of the present study is that a significant decrease in the main values of (CAT & GSH) and a significant increase in CP activity in plasma of patients with bladder cancer as compared to normal individuals .

The lower of catalase activity in erythrocyte of patients with bladder cancer may be attributed to :

1-The formation of free radicals and increase of super oxidizing <sup>[21]</sup>.

2-The decrease of catalase activity as a result of the tissue damage because of

the inhibiting protection function of (Cat, GSH and SOD) and the loss of

enzymes from cells.

3-Catalase is one of the antioxidant defense that remove free radicals and it

removes the effect of toxic  $H_2O_2$  in the cell <sup>[22]</sup> .

The results in this work for catalase activity are in agreement with Dhalla <sup>[23]</sup> , Dusinovic <sup>[24]</sup>

Increased in ceruloplasmin activity could be attributed to the following reasons:

- Cp is an acute phase reactant that increases in circulation in chronic disease including tumors <sup>[25]</sup> .

### conclusions

It is clear from this study that determining the levels of CAT , CP & GSH in patients with bladder cancer may be a good indicator to evaluate this disease.

This study showed that there was a negative relationship between (glutathione level with ceruloplasmin

- Cp is considered as a storage marker of copper in circulation and over 95% of copper is bound to Cp<sup>[26]</sup>.

The results in this work for CP activity are in agreement with Christine et. al. <sup>[27]</sup> , Barber et al <sup>[28]</sup> , Karaca et al <sup>[29]</sup> they reported a significant increase in plasma of CP activity in ovarian , pancreatic & gastrointestinal tract cancer patients respectively Georgieva et al <sup>[30]</sup> and Yilmaz et al <sup>[31]</sup> found an increase in Cp activity in haematological diseases.

The glutathione cycle operates between GSSG and GSH in the erythrocytes. The Coenzyme, NADPH itself is obtained from the pentose phosphate pathway of glucose metabolism operating in the erythrocytes. However, in bladder cancer, the efficiency of this pathway is lowered with a consequent decrease in the availability of NADPH <sup>[31]</sup>. The serum level of glutathione was approximated 6.4% to that of normal individual. The results in this work show that glutathione level is severely decreased in patients with bladder cancer, and the relationship of glutathione levels with the radicals or related substance may be attributed to the following fact above, and it is an evidence that they are oppositely proportional.

activity ) & (ceruloplasmin activity with catalase activity )in patients groups and its an evidence that they are oppositely proportional & a positive relationship between catalase activity with glutathione concentration in patient groups then its an evidence that they are properly proportional.

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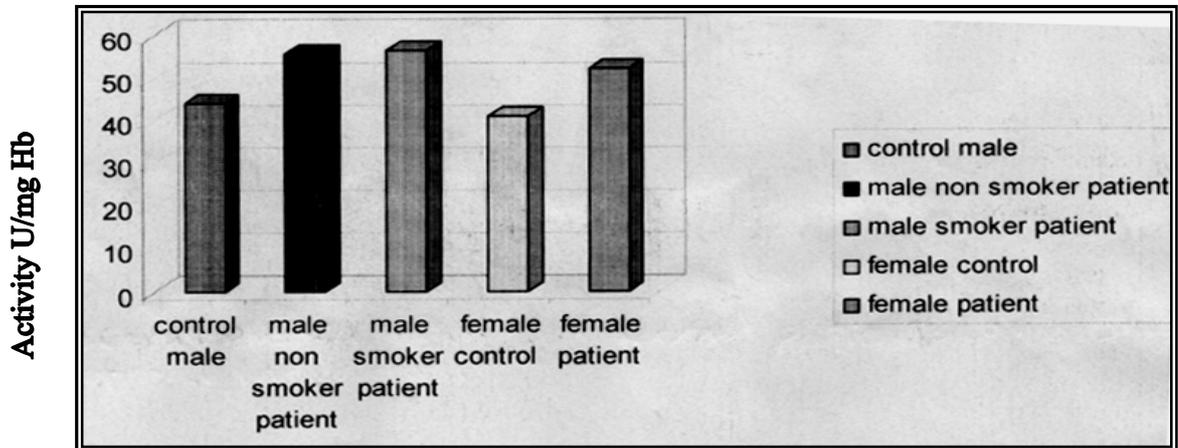


Figure (1) Distribution of the individual and catalase activity in erythrocyte of patients with bladder cancer and normal individuals.

Activity IU

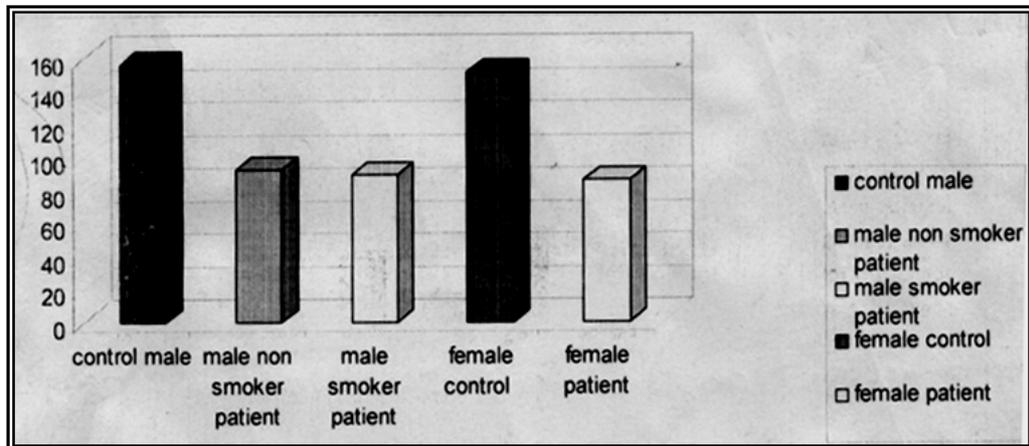


Figure (2): Distribution of the individual and coruloplasmin activity in plasma of bladder cancer patients and normal individuals.

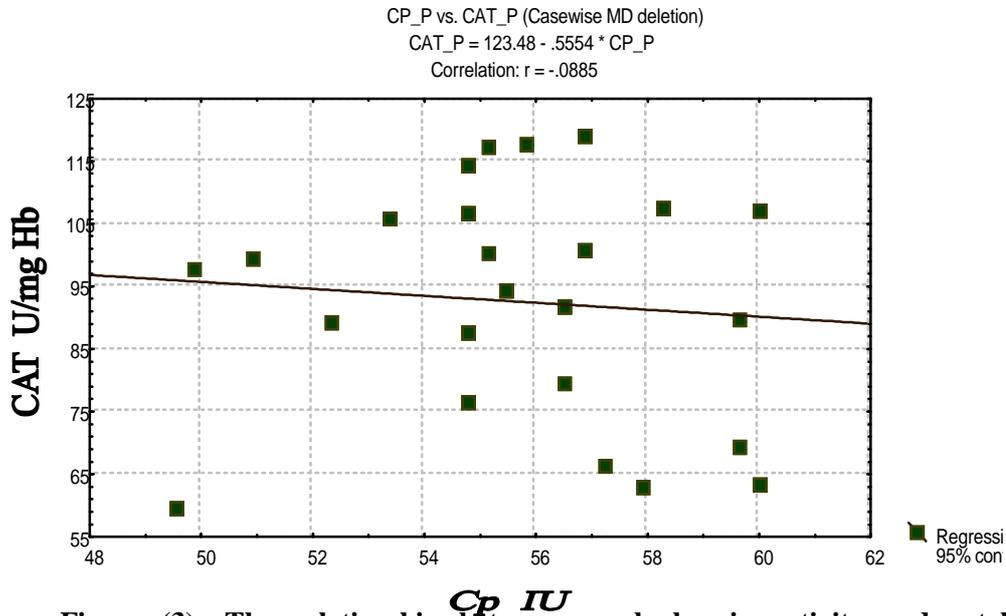


Figure (3): The relationship between ceruloplasmin activity and catalase activity in patient groups.

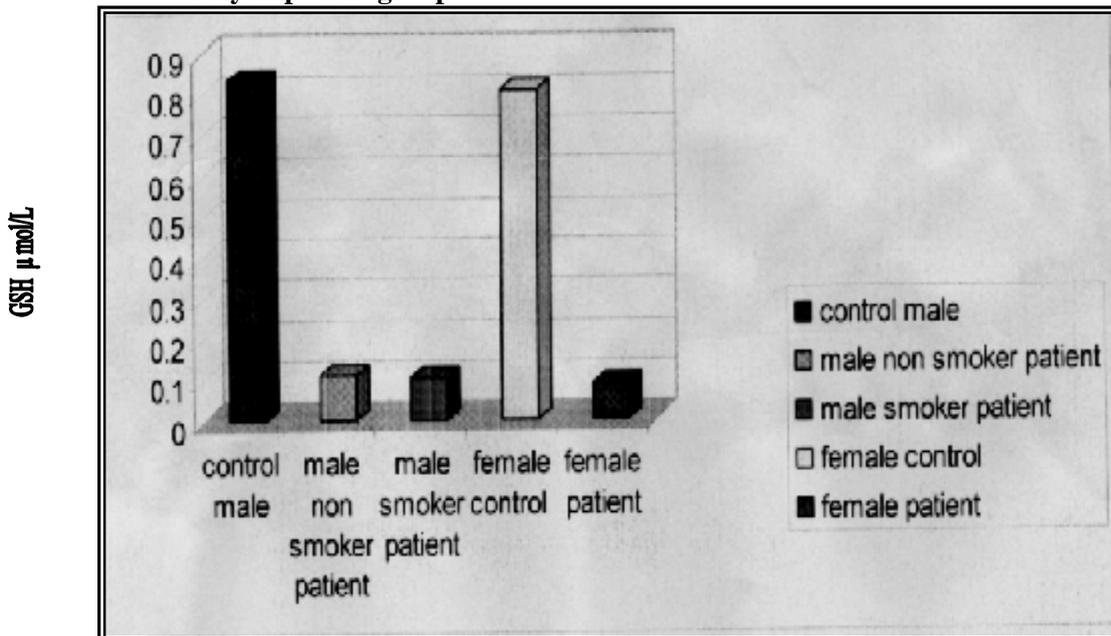


Figure (4) : Distribution of the individuals and glutathione level In plasma of patients with bladder cancer and normal Individuals.

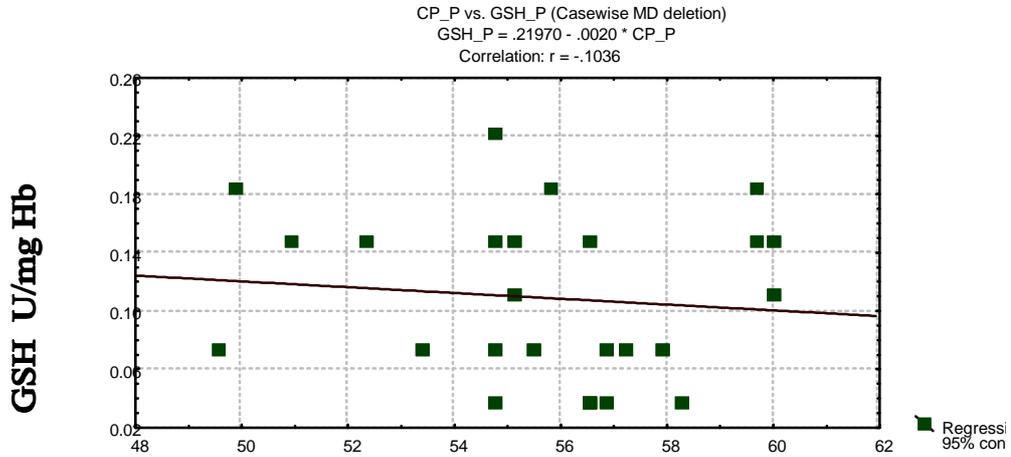


Figure (5): Relationship between glutathione level and ceruloplasmin activity in patient groups.

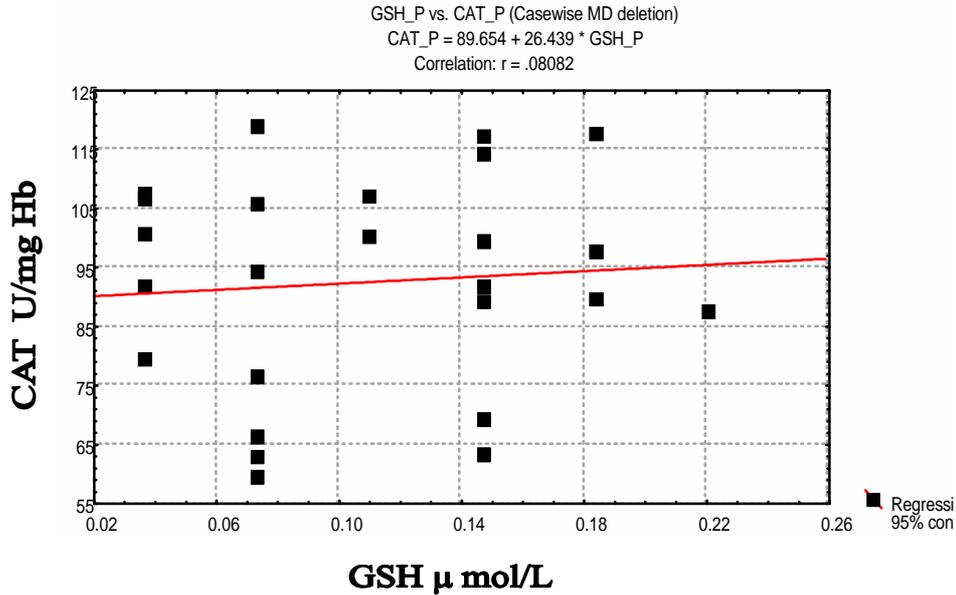


Figure (6): Relationship between catalase activity and glutathione levels in patient groups.