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# Hyperestrogenemia and increased blood mercury level

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**ABSTRACT**

Hyperestrogenemia is an important reproductive hormone abnormality. This condition is not common in male patients. In this report, the author presents a case study on hyperestrogenemia with increased blood mercury level. The metalloestrogen phenomenon is discussed.

## 1. Introduction

Estrogen is an important hormone in human beings. It is an important hormone inducing feminizing appearances. The abnormality of this hormone can be seen in many conditions. Either abnormal high or low estrogen can be seen. Also, the problem can be seen in both males and females. In this case study, the author discusses on an interesting case of hyperestrogenemia.

Indeed, hyperestrogenemia is a common finding in premenopausal females<sup>[1]</sup> but it can also be seen in many other pathological conditions such as obesity<sup>[2]</sup>. In males, this condition is not common and should be investigated for the etiology. This condition in male can relate to infertility<sup>[3]</sup> and some rare diseases (such as Kennedy disease<sup>[4]</sup>). Here, the authors would like to discuss on an interesting observation on blood estrogen and mercury.

## 2. Case report

This is a consult case of male patient (62 years old, body weight 60 kg, height 165 cm) who have undergone self-paid special laboratory check up for hormone (estrogen, nutrition and toxicology profiles). Focusing on those screening profile, the hyperestrogenemia could be detected (527 pmol/L, reference 38–139 pmol/L) hence this case was consulted to the specialist. Interesting, there is no other hormone abnormality including to FSH in this case. The cause of increased estrogen in this case was further assessed and there was no history of other external source of estrogen (including to phytoestrogen). After careful review of all other laboratory results in this case, another interesting finding is increased mercury level (350 mg/L, reference < 20 mg/L). Finally, this case was referred to the toxicologist for chelation management and it is unluckily that the patient lose following up.

## 3. Discussion

In this case, the primary problem is the abnormality of a feminizing hormone in a male patient. After careful

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review of all investigation, the high blood mercury is also determined. Hence, the second problem in this case was identified and this led to the concern on the metalloestrogen phenomenon, synergistic effect of metal on estrogen expression<sup>[5]</sup>. For mechanism, it is proved that mercury can bind and activate estrogen receptor resulting in hyperestrogenemia<sup>[6,7]</sup>. In animal experimental model, it is observed that mercury can present estrogen like activities in ovariectomized animals<sup>[6]</sup>. In human, changes in reproductive hormone levels including to estrogen in healthy premenopausal subjects could also be observed<sup>[8,9]</sup>. Not only mercury but also other metals such as cadmium and copper can present this property<sup>[10,12]</sup>.

Focusing on the association between hyperestrogenemia and male infertility, high incidence of hyperestrogenemia could be observed infertile men<sup>[13]</sup>. According to a recent report by Ramírez-Torres *et al.*, “the positive correlation observed between estradiol and follicle-stimulating hormone when estradiol levels exceeds 50 pg/mL<sup>[13]</sup>.” Focusing on other effects of hyperestrogenemia in male, increased estrogen is reported for its relationship to some disorders such as coronary thrombosis<sup>[14]</sup>, focal nodular hyperplasia of liver<sup>[15]</sup> and breast cancer<sup>[16]</sup>. In the present case, although the patient was not referred with the problem of infertility the infertility can be seen. This patient has married for twenty-five years but he has no child. Nevertheless, there is no other overt effect of increased estrogen in this patient. Focusing on the pathogenesis of infertility, adding to the already mentioned increased estrogen level, mercury is also reported to induce elevation of lipid peroxidation<sup>[17]</sup>. This elevation can also result in subsequent infertility<sup>[18]</sup>.

Indeed, there is a report confirming that “serum estrone and estradiol levels were positively correlated with blood Hg level for both males and females<sup>[19]</sup>.” The in depth history taking reveals that this patient work in a factory with use of mercury for more than 30 years and this is believed to be the cause of high blood mercury and might be the cause of further finding of high blood estrogen.

### Conflict of interest statement

We declare that we have no conflict of interest.

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