

## Increased urine chromium concentrations in a worker exposed to lead chromate due to the intake of medical herbs

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### Introduction

Chrome VI or Cr(VI) compounds include a large group of chemicals with varying chemical properties, uses, and workplace exposures.

Workers may be exposed to airborne Cr(VI) when these compounds are manufactured from other forms of Cr.

Sodium dichromate is the most common chromium chemical from which other Cr(VI) compounds may be produced. Other manufactured materials containing Cr(VI) include various paint and primer pigments, graphic arts supplies, fungicides, and corrosion inhibitors.

Hexavalent chromium compounds can produce an

irritation of the conjunctiva and mucous membranes, nasal perforation, contact dermatitis (Fig.1), lung cancer, nasal and nasal paranasal cancer(Fig.2). Their ingestion usually leads to abdominal pains, vomiting, diarrhoea, and intestinal bleeding. In many cases, death occurs during the circulatory collapse.

### Materials and Method

We describe the case report of a worker exposed to lead chromate who presented high concentrations of chromium in urine.

A study of chromium environmental concentration

in the workplace was made. Also, an occupational medical examination with a collection of the activities inside and outside the workplace, inclusion of eating habit, and a blood lead chromate, urine chromium at the beginning and end of the workday was performed.



Fig.1.Cr (VI) contact dermatitis



Fig.2.Paranasal sinus cancer

### Results and Discussion

We study a 56-year-old man with no history of medical interest, who had been working for 11 years in a factory that manufactures pigments and additives for chemical industry exposed to pigments with organic and inorganic components spending 12 hours/week producing lead chromate.

An occupational medical examination detected a blood lead level of 6 µg/dL (Spanish biological limit value (BLV): 70 µg/dL) and a urine chromium level at the end of the working day of 52 µg/L (BLV at the end of working week: 25 µg/L); blood and urine creatinine level were normal. The environmental chromium concentrations in the workplace were below 0.5 µg/m<sup>3</sup> (Environmental Limit

Value in Spain for lead chromate:12 µg/m<sup>3</sup>).

An analysis of chromium in urine before and after work (to determine the increase during the working day) found levels of 62 µg/L before and 6 µg/L after finishing work. The tests were repeated a week later, yielding results of 41 µg/L before and 37 µg/L after work.

In view of these results, a full study was made of the patient's habits outside work. He reported the ingest of 300-500mL/day of a medicinal herb infusion (Equisetum Arvense) three weeks previously. The concentration of total chromium in a prepared infusion was 12000 µg/L. The patient stopped consuming Equisetum Arvense and after this, the urine chromium analysis was repeated before and after work, and in both cases the results were below 0.5 µg/L. For the biological control of exposed

workers, urine chromium concentrations are determined at the end of the working week and also before and after the working day in order to determine the increase in chromium during the working day. The maximum acceptable urine value is 25 µg/L (at the end of the work day) and the difference between before and after work should not exceed 10 µg/L (INSST, 2019).

Equisetum Arvense is a medicinal herb used mainly due to its diuretic properties.

The consumption of medicinal herbs can interfere with biological controls carried out in workers exposed to hexavalent chromium compounds. This may produce confusion and may also cause legal problems for companies and workers.

### Conclusions

It is important to provide advice to workers and to

investigate their habits outside work, especially when the environmental and biological values are discordant.

It is also important to know the risks involved in buying

medicinal plants in street markets since there is no quality control of the products on sale there.