

## SERUM VANADIUM LEVELS IN OLIGOSPERMIC MALES\*

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### SUMMARY

The human body contains relatively small amounts of elements which are considered essential for human nutrition. Vanadium is a micro-nutrient, which is present in all healthy tissues and in rats, its deficiency has played a role in infertility. The serum levels of vanadium was studied in 50 oligospermic males and in the control group. No statistical difference was observed.

### Introduction

There are 21 mineral elements now considered to be essential for human nutrition. However, with the exception of iron and iodine, the role of trace minerals in human nutrition is not well established.

The human body contains relatively small amounts of several elements compared to 14-16% of adult body weight as protein and 12-20% as fat, only 4-5% of man's weight is accounted for by minerals. The number of elements found in the human body about 60 years ago were 17-18, has now reached 81, out of the 92 naturally occurring ones.

Vanadium is one of the micro-nutrients essential for human nutrition. 'Recom-

mended Dietary Allowances' have been defined for iron, iodine, zinc, copper and manganese. In addition, for 'estimated safe dietary intakes' have been given for micronutrients like selenium and molybdenum but still the dietary intake of vanadium is not established.

Of the various minerals in the body, the levels of different micro-nutrients is given in Table I.

Vanadium is a micro-nutrient. To be considered essential it must fulfil the following criteria:

1. The element must be present in all healthy tissues.
2. Its concentration in the tissues must be relatively constant.
3. Withdrawal of the element from the diet must produce similar structural and physiological abnormalities in the species.
4. These abnormalities must be reversed by the addition of the element in the diet.

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TABLE I  
Minerals of the Adult Body

Classification	Mineral	Amount in Adult Body (grams)
1. Macronutrients essential at levels of 100 mg or more per day for adult humans	Calcium	1200
	Phosphorus	860
	Sulphur	300
	Potassium	180
	Chlorine	74
	Sodium	64
	Magnesium	25
2. Micronutrients essential at levels no higher than a few miligrams per day for adult humans	Iron	4.5
	Fluorine	2.6
	Zinc	2
	Copper	0.1
	Iodine	0.025
	Chromium	0.006
	Cobalt	0.0015
3. Micronutrients essential, but amounts needed for humans cannot be estimated at present	Silicon	0.024
	Vanadium	0.018
	Tin	0.017
	Selenium	0.013
	Manganese	0.012
	Nickel	0.010
	Molybdenum	0.009
4. Minerals present in humans, functions not known	Strontium	T
	Bromine	R
	Gold	A
	Silver	C
	Aluminium	E
	Bismuth	
	Arsenic	
	Boron	

Human intake of Vanadium has been established to be about 32 mg daily in a well balanced diet for a person weighing 75 Kg. Most of the body vanadium is present in fat, bone, teeth and serum. Significantly, higher levels are reported in the lungs.

A vanadium deficit has not yet been finally established in humans. A deficit in animals produces reduced bone growth, as abnormality in lipid metabo-

lism viz. increased serum cholesterol and triglycerides concentration, impaired reproduction and epiphyseal distortion.

Experimental study done in rats have shown that there are deficient levels of vanadium in infertile rats. Vanadium is reported to affect iron and lipid metabolism. Chicks fed with vanadium deficient diets showed high levels of plasma cholesterol and triglycerides. An inhibition of cholesterol synthesis by vanadium has

been observed *in vivo* in human and animal tissues.

Hence, in view of its involvement in reproduction, we at the B. Y. L. Nair Ch. Hospital and Topiwala National Medical College decided to study the serum levels of vanadium in infertile couples. This is a pilot study as the experimental group studied is small. Fifty males who had no issues were considered. Their routine semen analysis was done and they were oligospermic. Their upper limit of sperm count was 20 millions/ml. 5 ml of the blood was collected and serum levels of vanadium were estimated by the atomic absorption spectrophotometry (Alloway *et al*, 1968) at the Institute of Science, Bombay. Husbands of recently delivered women were taken as a control group. Sera of 50 such husbands were also analysed by the above mentioned technique.

#### Results

The serum level of vanadium in the infertile males was 0.113  $\mu\text{g}/\text{G}$  with a standard deviation of 0.00331 and in the control group it was 0.088  $\mu\text{g}/\text{G}$  with a standard deviation of 0.00136. Statistically there is no significant difference between the levels of plasma vanadium of these patients of infertility and the control group.

#### Discussion

Hence from this study, one wonders whether the trace element, vanadium has any significant role to play in reproduc-

tion especially at the cellular level. High intracellular concentrations of potassium and sodium in the extracellular fluid is accounted by the transmembrane pumping of sodium and potassium through a specific enzyme in the cell-membrane. The membrane is identified as sodium-potassium Adenosine Triphosphatase (Canthy *et al*, 1978). This could affect the reproductive cells too.

#### Conclusion

Since there is no available world literature to confirm the data that low level of serum vanadium are seen in infertile males. We hope to extend this study further to see the levels of vanadium in other biological fluids, tissues and seminal plasma which might be more indicative.

The ultimate objective would be to determine whether vanadium content could be assessed as a marker of prognostic value to assess the results of treatment of infertility.

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