Age/sex related decreases in chromium levels, and increases in toxic metals in over 60,000 patients - implications for health and ageing

Stephen Davies MA, BM, BCh

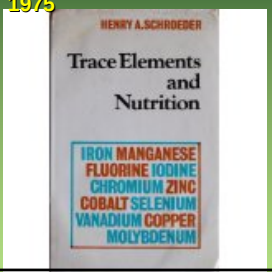
Medical Director, Biolab Medical Unit, London, UK

1

Chromium

2

Henry Schroeder 1906-1975



3

Actions of Chromium

Chromium is required for insulin binding to insulin receptors on the cell membrane

4

Effects of chromium deficiency

deficiency of chromium

↓

insulin resistance

5

Effects of chromium deficiency

Rise in
Blood glucose
HbA1
LDL Cholesterol

Reduction in
Glucose tolerance
HDL cholesterol

6

Age-related Decreases in Chromium Levels in 51,665 Hair, Sweat and Serum Samples from 40,872 Patients – Implications for the Prevention of Cardiovascular Disease and Type II Diabetes Mellitus

(Metabolism, 1997;46:469-473)

Stephen Davies, John McLaren Howard, Adrian Hunnisett, Mark Howard
Biolab Medical Unit, London, UK

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Metabolism
Clinical and Experimental

VOL 46, NO 5 MAY 1997

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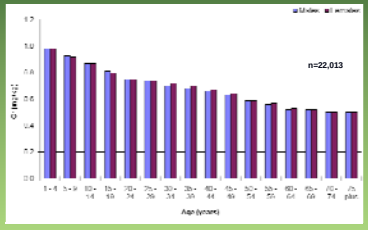
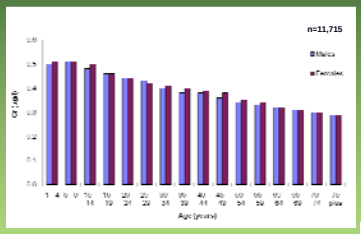
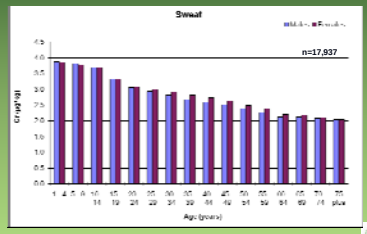
Hair chromium levels decreasing with age



Serum chromium levels decreasing with age



Sweat chromium levels decreasing with age



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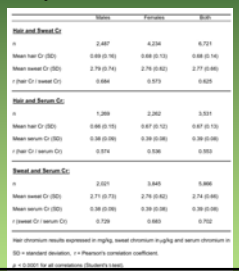
Chromium measurements in hair, sweat and serum
Correlations between different samples
p = < 0.0001 for all correlations



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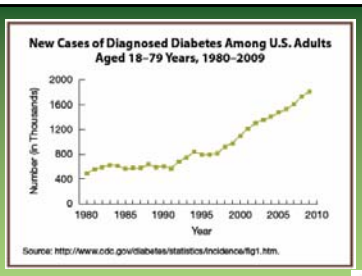

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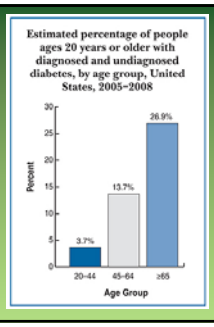

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Toxic Metals

16

Henry Schroeder 1906-1975

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Age-related increases in 187,686 measurements of 5 toxic metals in scalp hair, sweat and/or whole blood in 36,376 patients – implications for modern-day senescence, morbidity and mortality.

(Unpublished Data)

Stephen Davies MA, BM, BCh, Mark Howard, Adrian Hunnisett M.Phil, PhD, John McLaren Howard DSc

Biolab Medical Unit, London, UK

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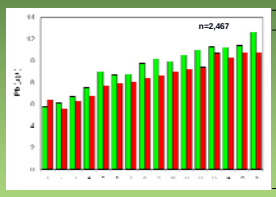
Blood lead increasing with age



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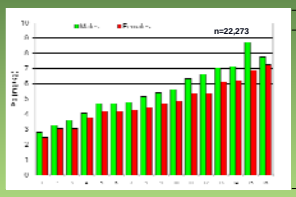
16	75 plus

Hair lead increasing with age



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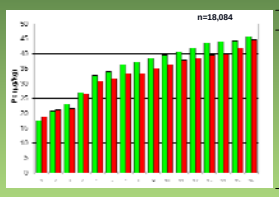
Sweat lead increasing with age



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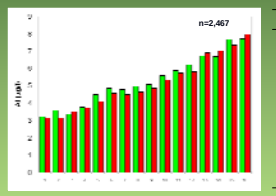
Blood Aluminium increasing with age



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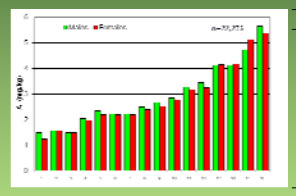
Hair Aluminium increasing with age



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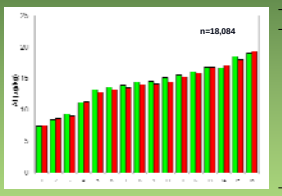
Sweat Aluminium increasing with age



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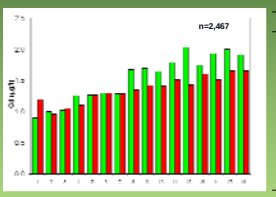
Blood Cadmium increasing with age



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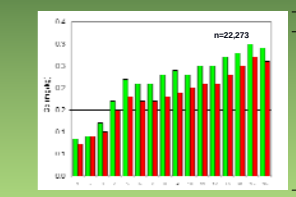
Hair Cadmium increasing with age



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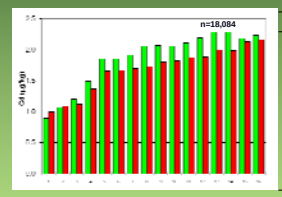

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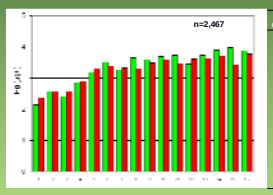
Blood Mercury increasing with age



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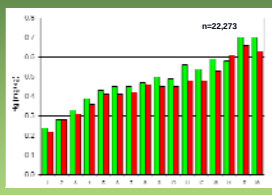

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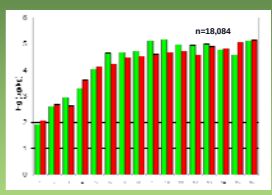

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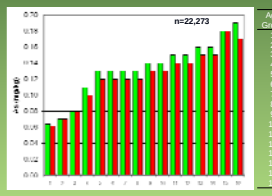

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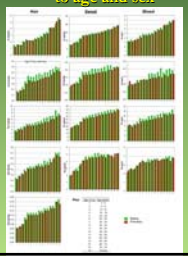
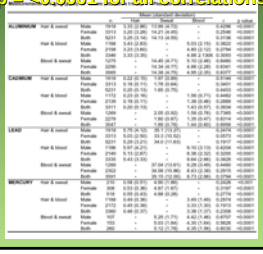


Correlations between different tissue samples (p = <0.0001 for all correlations)



Effects of accumulation of toxic metals

•Lead, cadmium and aluminium and other toxic metals accumulate in the kidney, choroid plexus, bone, and brain, as well as throughout the body

•Can give rise to renal impairment and hypertensive nephropathy

•Toxic metals accumulate in the choroid plexus and can impair the active transport a passive diffusion of essential brain nutrients

Treament approaches in toxic metal accumulation

- Avoidance or reduce exposure where possible
- Protective nutrients
- Zeolite, sulphur amino acids (garlic, eggs etc), other nutritional supplements
- Chelation
- Exercise
- etc

Regular follow up

Ongoing bone mobilisation with age releases sequestered toxic elements in bone into the circulation

Ongoing nutritional chelation and monitoring of toxic metal levels, with futher chelation if necessary

Metabolism

Clinical and Experimental

VOL 46, NO 5 MAY 1997

Age-Related Decreases in Chromium Levels in 51,665 Hair, Sweat, and Serum Samples From 40,872 Patients—Implications for the Prevention of Cardiovascular Disease and Type II Diabetes Mellitus

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Mertz W Nutr. Rev 1997;55,10:373-5

Confirmation: Chromium Levels in Serum, Hair, and Sweat Decline with Age

A study of tissue chromium concentrations measured in 40,872 subjects in the United Kingdom with modern, validated analytical techniques confirms previous reports of the continuous decline in chromium concentrations with age.

This review was prepared by Walter Mertz, M.D., former Director of the U.S. Department of Agriculture Human Nutrition Research Center at Beltsville, MD, USA. Reprint requests should be addressed to *Nutrition Reviews*, 711 Washington Street, Boston, MA 02111, USA.

When the essential role of trivalent chromium in maintaining glucose tolerance and its close interaction with insulin were established in the late 1950s and early 1960s,[1,2] atomic absorption spectrometry had just begun to replace older colorimetric methods for determining trace elements in biologic materials. Moreover, it took approximately 20 years of analytical developments for a continuous decline in reported chromium levels in blood and urine to finally stabilize at one one-thousandth of values earlier considered "normal."[3] Although this development affected the accuracy of analyses in the range below 1 ng/gram in serum and urine much more than in tissues and foods with more than 10 times higher concentrations, it created con-

Mertz 1997

crease the power of data from individuals. We know of the large differences among chromium compounds in their in vitro activity on epididymal fat tissue or cells, which have led to the theory that dietary chromium must be converted in the organism into its biologically active form, called glucose tolerance factor. If that species could be isolated and analyzed in serum and other tissues, the results would have much greater diagnostic significance than the determination of total chromium. It would be similar to the power of vitamin B-12 analysis compared with that of total cobalt. Notwithstanding these future needs, Dr. Davis and his associates deserve thanks for the great effort and care dedicated to their study. It will have a substantial impact on the field of chromium research.

1. Schwarz K, Mertz W. Chromium (III) and the glucose tolerance factor. Arch Biochem Biophys 1959;85:292–5

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JB/AS Please quote ref: 94/8175

25 August 1994

Dr Stephen Davies
Biolar Medical Unit
The Stone House
9 Weymouth St
London W1N 3FF

Dear Dr Davies

You asked for the reasons why we are rejecting your paper on age-related decrease in chromium.

They are that your data is derived from a non-random sample and so cannot be extrapolated to the general population.

Also, the connections you suggest between chromium and chronic diseases are speculations based on other published results, not your own studies.

Your paper does not reach the standards that we require: it makes no substantial contribution to the science and practice of medicine.

I hope this explanation meets your requirements. We will not enter into further correspondence on this matter.

Yours sincerely

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That's all for now folks!