Stability of serum copper, selenium and zinc

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Introduction:

Trace element can be determined in epidemiological studies that lasted for many years and the stability of sample is therefore a key point.
The aim of this study was to compare the concentrations of copper, zinc and selenium in samples stored at -20°C for 3 years.

Method:

Samples (one native pool of human serum and two further serum pools prepared by spiking the first with known Cu, Zn and Se concentrations) were prepared by a member of the thematic network "Organisers of external quality assessment / proficiency testing schemes related to occupational and environmental medicine" (Cas W Weykamp, Queen Beatrix Hospital, Winterswijk, The Netherlands) in 2006. These sample were sent to Grenoble University Hospital in dry ice.
These sample were sent twice to the participants of the French Trace Element External Quality Assessment Scheme (in May 2006 and May 2009). In the meantime, the samples were stored at -20°C.
Twenty three laboratories sent results for the two runs for copper, 24 for zinc and 14 for selenium. Results were compared using Student t test for paired samples.

Results:

Comparison of the two sets of results did not evidence any significant difference for the three elements and the three levels (p>0.10, table 1, figures 1-3).

Table 1: Copper, selenium and zinc concentrations obtained in three samples in 2006 and 2009

	Sample	157		158		159	
		2009	2006	2009	2006	2009	2006
Cu	mean±SD	13.9±1.2	13.6±1.2	21.2±1.9	21.2±2.2	29.1±2.8	29.0 ±2.1
n=23	robust mean ±robust SD	13.9±0.9	13.6±1.3	21.4±1.5	21.2±2.2	29.2±1.9	29.1±2.4
	mediane	13.9	14.1	21.5	21.0	29.2	29.0
	p-value	0.31		0.97		0.97	
Se	mean±SD	0.73±0.05	0.76±0.15	1.58±0.13	1.56±0.35	3.21±0.3 0	3.19±0.64
n=14	robust mean ±robust SD	0.74±0.02	0.77±0.10	1.56±0.12	1.56±0.19	3.13±0.18	3.27±0 .44
	mediane	0.74	0.76	1.53	1.53	3.11	3.27
	p-value	0.41		0.88		0.93	
Zn	mean±SD	9.9±1.6	10.0±1.5	23.8±3.5	22.8±2.5	31.5±4.9	30.2± 3.7
n=24	robust mean ±robust SD	9.7±0.6	9.9±0.8	23.2±1.7	23.1±1.9	30.7±2.7	30.6±2.8
	mediane	9.8	10.1	22.9	23.4	30.1	31.0
	p-value	0.88		0.14		0.20	

Figure 1: Copper, expressed as median (percentiles) in 2006 and 2009

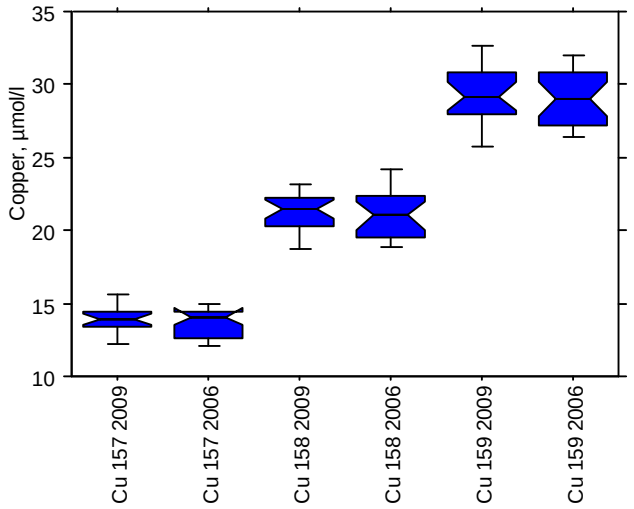


Figure 2: Zinc, expressed as median (percentiles) in 2006 and 2009

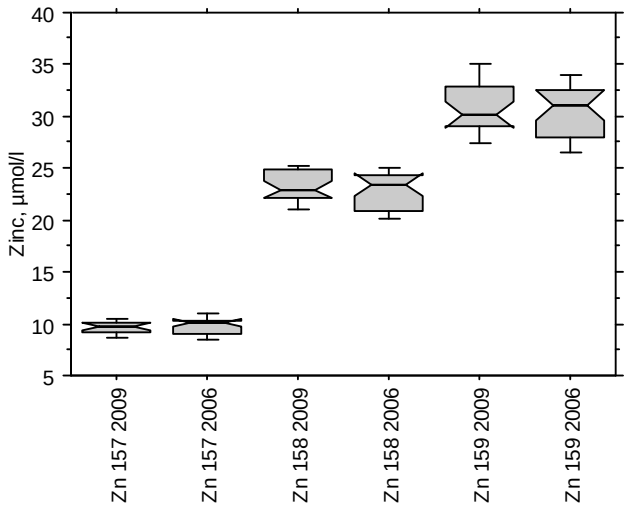
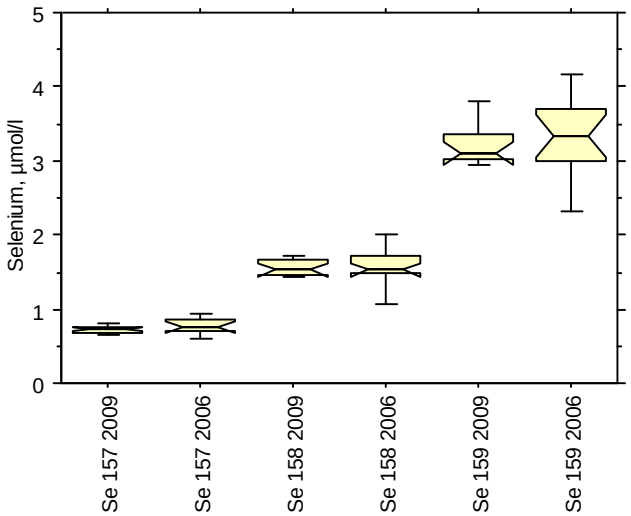


Figure 3: Selenium, expressed as median (percentiles) in 2006 and 2009



Conclusion:

These results confirm the good stability of essential trace element in frozen samples for long period of time.