Heavy metal accumulation in malignant tumours as basis for a new integrative therapy model

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Abstract and figures

Increased levels of transition metals like iron, nickel, chromium, copper and lead are closely related to free radical generation, lipid peroxidation, formation of DNA-strand breaks, and tumour growth in cellular systems. In order to determine the correlation to malignant growth in humans, we investigated the accumulation of heavy metals in 8 healthy and 20 breast cancer biopsies by means of a standardized Atomic Absorption Spectrophotometry (AAS) methodology. A highly significant accumulation of iron ($p < 0.0001$), nickel ($p < 0.00005$), chromium ($p < 0.00005$), zinc ($p < 0.00001$), cadmium ($p < 0.005$), mercury ($p < 0.005$), and lead ($p < 0.05$) was recorded in the cancer samples when compared to the control group. Copper and silver showed no significant differences to the control group whereas tin, gold, and palladium were not detectable in any biopsies. As previously reported by us, the higher heavy metal concentration encountered in various tumours may be used for therapeutic intervention with ascorbic acid or substituted phenolic mixtures. The autoxidation of vitamin C and phenolic compounds in the presence of heavy metals strongly increase superoxide and H2O2 generation at the tumour site, resulting in a fast depletion of the malignant cell reducing equivalents with oxidosis shift and apoptosis induction. Our results suggest that the use of the above mentioned redox-active compounds devoid of side-effects should be seriously considered in the treatment of different malignancies and infections.

Histological type	
Ductal carcinoma	12
Lobular carcinoma	4
Other	4
Grade	
I	5
II	12
III	1
unknown	2
Hormone receptor status	
ER+	13
ER-	7
ER unknown	0
PR+	17
PR-	1
PR unknown	2
HER2/ Neu staining intensity	
HERCEPTTEST 0	1
HERCEPTTEST 1	6
HERCEPTTEST 2	3
HERCEPTTEST 3	3
ND*	7

* not done