

## Zinc as a marker of cancer risk

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### Background

Zinc is a micronutrient, which is essential for human health, involved in regulation of gene expression, e.g. genes related to cell cycle, apoptosis, response to DNA damage, antioxidant defense, immune response. Literature data on zinc association with cancer risk show inconclusive results.

### Aim of the study

The aim of the study was to evaluate the relationship between zinc blood levels and subsequent cancer risk in a large prospective cohort of persons followed for incident cases of cancer in Szczecin Poland.

### Material and methods

The study was conducted in 3 prospective cohort consisted of persons with no cancer at that baseline:

1. 601 women with BRCA1 mutation, among them 42 cancers were identified during the follow-up
2. 1698 women without BRCA1 mutation, among them 110 cancers were identified during the follow-up
3. 1467 men, among them 42 cancers were identified during the follow-up.

Zinc level blood was measured by inductively coupled plasma mass spectrometry (ICP-MS) using Elan DRC-e ICP-Mass Spectrometer, Perkin Elmer. Odds Ratios were calculated using Fisher's exact test.

### Results

It was observed that female BRCA1 mutation carriers with Zn blood level 6300 – 6700 µg/L have 4-fold lower risk than carriers with Zn level <6300 µg/L or >6700 µg/L (regardless to age) (OR=0,24; 95%CI 0,06 – 1; p=0,03). Results from the cohort of women without BRCA1 mutation and cohort of men revealed that Zn blood level at which cancer risk is decreased is strongly dependent on age. Women <60 y/o with Zn blood level >6800 µg/L have 3-fold lower risk than women with Zn level <6800 µg/L (OR=0,3; 95%CI 0,09 – 0,97; p=0,04). For women >60 y/o a tendency to 3-fold reduced risk is observed with Zn blood level 5600 – 6000 µg/L comparing to Zn level <5600 or >6000 µg/L (OR=0,3; 95%CI 0,1 – 1,1; p=0,06). In the cohort of men individuals <60 y/o and Zn blood level 6300 - 6800 µg/L have 3-fold lower risk of cancer than men with Zn level <6300 µg/L or > 6800 µg/L (OR=0,31; 95% CI 0,11 – 0,89; p=0,02). Men >60 y/o and Zn blood level 7000 – 7300 µg/L have 10-fold lower risk of cancer than men with Zn level <7000 µg/L or >7300 µg/L (OR=0,1; 95% CI 0,01 – 0,72; p=0,003).

### Conclusions

Results from this study suggest that blood zinc level is a strong marker of cancer risk. It might be a subject of future studies to establish whether zinc intake modifications changing Zn blood level will be an effective way of cancer prevention.