

CORRELATION STUDY OF TRACE METALS IN MALIGNANT AND NORMAL BREAST TISSUES BY AAS TECHNIQUE

S. Rahman

Chemistry Division, Directorate of Science, PINSTECH, Nilore, Islamabad

The study reports the application of atomic absorption spectrophotometry (AAS) for quantification of Fe, Cu and Zn in forty one formalin-fixed biopsy breast carcinoma tissue and adjoining fifteen normal tissue samples. These tissues samples were of category two breast carcinoma patients and of normal subjects. The qualitative comparison between the elements levels measured in the two types of specimens suggests significant elevation of these metals in the histopathological samples of carcinoma tissue. The samples were collected from women aged 19-51 years. Most of the patients belong to urban areas of Pakistan and middle to high socioeconomic status with the exception of few. Findings of study depicts that these elements have an important role in the initiation and development of carcinoma as consistent pattern of elevation for Fe, Cu and Zn was observed. The results showed the excessive accumulation of Fe (166.9 mg/L) in tissue samples of breast carcinoma patients ($p < 0.01$) than that in normal tissues samples (23.5 mg/L). In order to validate our method of analysis certified reference material Muscle Tissue Lyophilised (IAEA) MA-M-2/TM was analyzed for Fe, Cu and Zn. Determined concentrations were in good agreement with certified levels.

The concentration distribution of trace elements Cu, Zn and Fe measured in the malignant tissues were found to be higher when compared to benign tissues, as depicted in Table 1, indicating the involvement of these metals in the breast malignancy [1, 2]. Results also indicate that excess iron may play a role in breast carcinogenesis.

Table 1: Concentration (ppm) of Fe, Cu and Zn in healthy, adjacent to malignant and malignant tissues

Element	Healthy normal tissue (n = 6)			Adjacent to malignant tissue (n = 15)			Malignant tissue (n = 20)		
	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
Fe	49.1 ±11.4	48.1	23.5- 77.8	52.2 ±19.4	60.8	24.6-90.6	129 ±22.7	137	106-166.9
Cu	1.64 ±0.8	2.3	0.4-3.6	2.1 ±1.03	2.3	0.5-3.9	2.9 ±1.3	3.1	1.8-5.6
Zn	9.9 ±2.9	8.6	3.2-29.4	14.9 ±10.9	12.5	3.6-38.9	27.6 ±12.4	29.2	13.6-33.9

References

1. A. Kubala-Kukus, D. Banas, J. Braziewicz, S. Gozdz, U. Majewska and M. Pajek, "Analysis of elemental concentration censored distributions in breast malignant and breast benign neoplasm tissues", *Spectrochimica Acta B* **62** (2007) 695.
2. J. G. Lonescu, J. Novotny, V. D. Stejskal, A. Latsch, E. Blaurock-Busch and M. Eisenmann-Klein, "Increased levels of transition metals in breast cancer tissue", *Neuroendocrinology Letter* **27** (2006) 36.