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Mineral metabolisms and signs of cancer revealed in hair by fluorescence X-ray Analysis

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Abstract:

Homeostasis in concentration of essential elements and its abnormality due to the development of cancer have been observed for single hair samples by fluorescent x-ray analysis using synchrotron radiation. Ca and K play important roles as messengers in the universal cellular signal transduction. Their concentrations in hair were found to have two levels of high and low concentrations due to open and close of their ion channels of hair matrix cells, which exhibit the status of their metabolisms. The analysis of patient hair from its root to tip revealed that breast cancer accompanies the characteristic long-term change from the high to low level of the hair Ca concentration that had started 8 to 12 months before finding the cancer; breast cancer originates from disturbance of the cellular signal transduction by the high Ca level in cells. In contrast to the case of Ca, K concentration in cells must be much higher than that in serum. However, K deficiency to cause hypertension was found for 50% of the hair donors; this rate is nearly equal to the population of hypertension in Japan. Most of elements such as Fe, Cu, Zn, etc. are controlled with their excretion as bile in the liver. When this function is disordered by diseases such as hepatocellular carcinoma, the elemental profiles in hair were strongly disturbed by unusual increases of element concentrations and appearance of other elements such as Ge, depending upon dietary element intakes.

Key words: [calcium paradox](#), [breast cancer](#), [hypertension](#), [hepatocellular carcinoma](#)

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