

## Towards Quantifying the Effect of Inorganic Ions on Colon Cancer Cells by in Situ Analysis of the Response of Ion Channels Using Real Time Patch-Clamp Spectroscopy

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### 1. Letter to the Editor

The correlation of the content of inorganic elements (potassium, sodium, calcium, magnesium, iron, manganese, zinc, copper, phosphorus, selenium) in the diet and the environment with the risk of colorectal cancer is known [1]. It is known that the mechanisms of action of many inorganic ions on cancer and control cells are associated with the response of ion channels to the corresponding ions, but so far this fact has not been the basis for molecular electrophysiological cancer diagnosis, nor has it been used as a complementary descriptor and predictor in with QSAR-mediated activity prediction of anticancer and carcinogenic compounds. It is necessary to develop tools for the diagnosis and prognosis of colorectal cancer based on the correlation analysis of the content of microelements and cytotoxic elements in the diet and water that can interact with ion channels, and the response of the channels, recorded by local fixation of the potential on the cell membrane (patch-clamp / voltage-clamp). However, modern patch-clamp screening techniques do not allow extracting descriptors in the presence of a large number of interfering and “interfering” ions, that is, they cannot be the basis for the development of correlation methods for ion diagnostics.

To separate the contributions and cellular electrophysiological effects of individual ions, it is proposed to separate the responses of individual types or populations of ion channels according to the frequencies and phases of their operation, implementing spectral signal processing over time windows using special processing algorithms operating in the “soft real time” mode. During processing, the registerograms are correlated with the database for comparison with the responses of known channels that are related to carcinogenesis and cancer cell

migration [2,3] and whose response to certain ions is known. When new data is received during the study, the database is replenished (by “machine learning with supervizer”).

### References

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