



New Concept of Neuronal Non-Diffusible Communication

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Editorial

Cell to cell communication is a fundamental basis for organism development and functioning. The role of neuronal cells is especially important in regulation of homeostasis and cellular interactions. Traditional view of this concept is that intercellular signals released from one cell communicate with another cell within the tissue assembly. However, our previous initial findings showed that apoptotic and cancerous cells are capable of exerting a non-diffusible, non-neuronal influence over distance on nearby, but physically disconnected cells [1]. It is also known that cells can interact “through the glass” without direct chemical or electrical contact. In typical experiment with one culture (detector) is incubated for some time inside larger vessel with another culture (inducer), after which one can see clearly changes to the detector culture with respect to control sample [2].

Neuronal cells are the best type of cellular model to study this novel type of communication. Neurons that are not directly in contact with each other, though they may be physically connected at the same time by exchange of physical signals. Such factors could be electromagnetic radiation (in the ultraviolet (UV), visible and near-infrared (NIR) spectral region). It is possible that the observed effects can be attributed to a cell-to-cell communication based on electromagnetic radiation. UV light is damaging for the cells, and its production required a lot of energy- not only to produce energetic photons, but also to control the chemical processes. The other way to send signal would be to use some NIR radiation produced by cell metabolism. Even the experimental evidence for non-chemical and non-contact cell to cell communication can be traced back more than ninety years ago [3] there is still need for an explanation of this new type of communication.

Confirmation of existence of the cells communication mechanisms though NIR light would have large scientific and practical importance. Because of tissue transparency in NIR spectral range, it is relatively easy to apply radiation locally for therapeutic or diagnostic purposes. It would be straightforward to build NIR detectors and sources (like quantum cascade lasers) into small hand-held device along with other biomedical sensors to interrogate biofeedback caused by modulated NIR radiation.

In conclusion, author hopes that this overview about new line of research on non- chemical and non-contact neuronal interaction will encourage neuroscientists and other researchers to explore in details this novel type of intercellular communication to develop new principles of medicine and translational science of 21st century.

References

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