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Simulation of chemotactic networks in nematode *C. elegans* : Is there any change on networks by exposure to ionizing radiation?

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The nematode *Caenorhabditis elegans*, which is known as a model organism of nervous system, produces motion in appropriate response to each chemical stimulus, for example, the moving toward attractive chemicals and the avoiding of noxious ones. The animal also has associative learning ability, i.e., after conditioning of NaCl (a soluble attractant) without food chemotaxis of the animal changes as to avoid NaCl when it perceives NaCl. Recent work has shown a new research paradigm of "learning" and "stress" by using *C. elegans*, such as effects of aging and oxidative stress on learning[1].

Under above circumstances, we found that gamma-rays exposure of *C. elegans* during food-NaCl associative learning induces the disturbance of chemotaxis toward NaCl, while chemotaxis toward benzaldehyde (a volatile attractant) has no changes. Soluble and volatile chemicals are perceived by distinct sensory neurons that connect each with multiple interneurons and motoneurons. However, since several interneurons connect with these sensory neurons, neuronal networks with respect to chemotaxis toward NaCl and benzaldehyde are partially overlapped. Therefore, although it is indicated that the change by irradiation was induced mainly in some parts of the neuronal network of NaCl chemotaxis, the details remain clarified.

In this report, to find the certain parts of the neuronal networks that are induced to change by gamma-irradiation, we here modeled the chemotaxctic networks (including networks for signal transduction of various chemicals as well as NaCl) based on actual connections[2]. Through the computer simulation of the responses before and after irradiation, we confirm that the actual response can be represented by this model. With preliminary results, we will discuss the change on networks by gamma-irradiation.

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2. White JG, Southgate E, Thomson JN, Brenner S. The structure of the nervous system of the nematode *C. elegans*. *Philos. Trans. R Soc. Lond. B Biol. Sci* **314**, 1-340 (1986).

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