Estimation technology of species composition of phytoplankton

Estimation method of species composition of phytoplankton based on *in-situ* measurement of excitation spectrum

Technologies for rapid measurement of phytoplankton community structure are required to monitor temporal dynamics and/or spatial distribution of phytoplankton. So far, several methods using multiple excitation wavelengths are distributed for the purpose of water quality assessment.

Taxonomic phytoplankton group has its own specific characteristics of excitation spectrum. While detecting fluorescence from chlorophyll a, we change the excitation wavelength. Then we can get an excitation spectrum in accordance with the community structure of phytoplankton. Analysis of the sampled water with HPLC can tell us the community structure based on pigment base. The estimated amount of chlorophyll a is an index of total phytoplankton, chlorophyll a is that of green algae, and fucoxanthin is that of diatom.

Based on empirical comparison between an excitation spectrum and HPLC data, we can get the conversion formula. Then we can know the community structure from the excitation spectrum.

Multiple wavelength fluorophotometer developed by us

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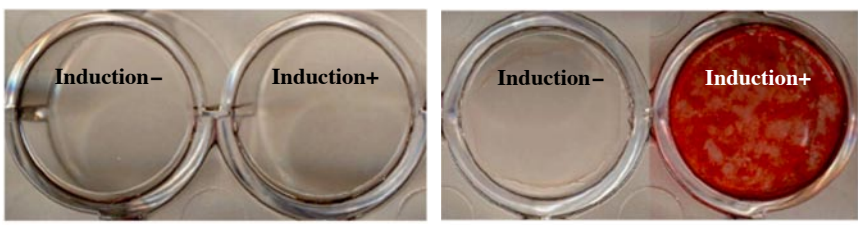
Successful re-activation of human mesenchymal stem cells by transducing single gene

Leads to the spread of regenerative medicine using stem cells

Culture-expanded mesenchymal stem cells from the marrow of a patient are being used for regeneration medical therapy to his/her damaged tissues such as bone or cartilage. However, the clinical application of this technology is limited because the proliferation and differentiation abilities of these cells decline drastically within the culture after several weeks. We transduced a gene, *Nanog* or *Sox2*, which is expressed by embryonic stem cells, with the aid of a retrovirus into mesenchymal stem cells with reduced proliferation and differentiation abilities.

The proliferation and osteogenic differentiation abilities of the cells into which the *Nanog* gene was transduced were either restored to the normal levels or increased in comparison to their initial (right after the primary culture) levels. The proliferation and the differentiation abilities were not restored in the cells into which only the *Sox2* gene was transduced; however, they were restored when these cells were cultured with a protein named basic fibroblast growth factor (b-FGF).



Controlled cell ***Nanog* gene transduced cell**

Osteogenic differentiation of mesenchymal stem cells
(Dyed with red pigment that dyes bone cells only)

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