一般社団法人日本生物物理学会　第 12 回 Biophysics and Physicobiology 論文賞受賞講演会
The 12th Award Seminar for outstanding Biophysics and Physicobiology paper

オーガナイザー：日本生物物理学会 Biophysics and Physicobiology 論文賞選考委員会
Organizers: Award committee for outstanding Biophysics and Physicobiology paper
日　時：11 月 14 日（火）12:50 〜 13:50 ／ Nov. 14 Tue.
場　所：1 号館 3 階 L 会場／ Bldg1 Room L
形　式：講演会／ Lecture

第 12 回 Biophysics and Physicobiology 論文賞受賞者

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クリプト藻由来チャネルロドプシンの発見から創薬ベンチャー創出へ
GtCCR4, a channelrhodopsin with high light sensitivity

Genetic delivery of photoreceptor genes to cells and tissues originally light insensitive turns into light-sensitive. This technique, optogenetics, has been applied in the manipulation of biological function with unprecedented spatio-temporal precision. Channelrhodopsins (ChRs) found in chlorophyte and cryptophyte alga are directly light-gated ion channels and have been widely applied to optogenetics tools for manipulating neuronal excitability. Furthermore, the optogenetics approach has great potential for the restoration of visual function from an inherited disease, retinitis pigmentosa, in which the patient loses light response of the retina.

In 2017, we identified phylogenetically distinct cation-conducting ChR (GtCCR4) from the cryptophyte algae *Guillardia theta* and investigated its molecular property by spectroscopy and electrophysiology (1).

One of the striking features of GtCCR4 is its high photo-sensitivity, ~25 folds higher than a widely known ChR2, without losing fast time response. Thus, GtCCR4 is able to trigger action potentials in high temporal resolution, similar to ChR2, but requires lower light power when expressed in neurons (2, 3). Inspired by such marked properties of GtCCR4, we launched a start-up company aiming for developing an effective gene therapy for curing retinitis pigmentosa.

(1) Yamauchi et al. “Molecular properties of a DTD channelrhodopsin from *Guillardia theta*” Biophys. Physicobiol. 14, 57–66, 2017
(2) Hososhima et al. “A light-gated cation channel with high reactivity to weak light” *Sci. Rep.* 13(1): 7625. 2023
(3) Hagio et al. “Optogenetic manipulation of neuronal and cardiomyocyte functions in zebrafish using microbial rhodopsins and adenylyl cyclases” *Elife* 12:e83975. doi: 10.7554/eLife.83975. 2023

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郷モデルの過去と現在
Go models: Past and the current status

Since the first paper by Nobuhiro Go, the so-called Go models have been broadly applied to computational studies on proteins and others. I start the talk with reviewing history of Go models, followed by some latest studies that are, to some extent, related to Go models.