



Office of Technology Management

Signal Transduction: G Protein Coupled Receptor Fully Functional GFP Labeled G Proteins

Technology Reference

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Contact

Gordon Comstock
Office of Technology Management
1737 West Polk
Suite 312 AOB
MC 682
Chicago, Illinois
60612

gordonc@uic.edu

Phone: 312-996-7779

Fax: 312-996-1995

Inventor

Mark Rasenick

Field

Signal transduction
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Key Words

Intercellular
Fluorescence microscopy
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License Status

UIC seeking field of use exclusive licenses.

Patent Status

Patent pending

Overview

Currently $G\alpha_s$ proteins are labeled with green fluorescent protein (GFP) at either the C- or N-terminus inhibiting their function since both the C- and N-terminus are required for normal binding. Researchers and high throughput screeners cannot follow visually in real time the movement of fully functional $G\alpha_s$ in living cells.

Technical Summary

Green fluorescent protein (GFP) sequence is inserted into the middle of the $G\alpha_s$ subunit sequence of G protein producing a dual function $G\alpha_s$ -GFP molecule. First, the $G\alpha_s$ -GFP binds like native $G\alpha_s$ at the N- and C-terminus. Secondly, the GFP remains fully functional for following visually and in real-time the movement of $G\alpha_s$.

G protein is bound to the plasma membrane during the cell's "unstimulated" state. Visually $G\alpha_s$ -GFP appears as a ring outlining the intracellular periphery of the cell. After a hormone binds G protein-coupled receptor the G protein separates into $G\alpha$ and $G\beta\gamma$ subunit pieces. Activated $G\alpha$ then disperses in the cell to carry on the biochemical signal mechanism. Automated equipment and fluorescence microscopy can follow the changes that act as a marker for the activity of the G protein-coupled receptor for screening drugs or studying the signal transduction pathway.

Benefits

- Only G-protein to be fluorescently labeled and fully functional for use in signal transduction pathway.
- High throughput screening with automated visual measurement equipment.
- Fluorescence microscopy of $G\alpha_s$ for detailed signal transduction studies.

Areas of Application

- Fluorescent G-protein vector that potentiates high throughput screening for drug discovery in the G protein chemical pathway.

Publication

- Popova, J.S., Greene, A., Wang, J. and RASENICK, M.M. Phosphatidylinositol 4,5-bisphosphate modifies tubulin participation in PLC β 1 signaling. *J. Neuroscience*, 22:1668-1678, 2002.
- Sarma, T., Voyno-Yasenetskaya, T., Hope, T.J. and RASENICK, M.M. Heterotrimeric G proteins associate with microtubules during differentiation. *FASEB J.* (in press).
- Donati, R.J. and RASENICK, M.M. G protein signaling and the molecular basis of antidepressant action (invited review) *Life Sciences* (in press).

Stage of Development

- Cell line expressing $G\alpha_s$ - GFP available
- Work continues on inserting GFP into new G proteins