

Live-cell imaging of cell cycle and cell division

INTRODUCING THE PREMOTM FUCCI CELL CYCLE SENSOR.

The Premo™ FUCCI Cell Cycle Sensor enables live-cell imaging of cell cycle and division—as cells progress through the cell cycle, nuclear fluorescence changes from red to green. Based on the BacMam gene delivery system, the genetically encoded and prepackaged fluorescent protein (FP)–based reagents are ready for immediate use and optimization for your live-cell applications.

Color-coded G₁/S and G₂/M

Miyawaki and colleagues developed the fluorescence ubiquitination cell cycle indicator (FUCCI), a sensor that uses two different FPs fused to regulators of the cell cycle: Cdt1 and geminin [1]. Ubiquitin E3 ligases add ubiquitin to Cdt1 and geminin, thereby targeting these proteins to the proteasome for degradation. Temporal regulation of E3 ligase activity results in the biphasic cycling of geminin and Cdt1 through the cell cycle. In G₁, geminin is degraded, leaving only Cdt1 tagged with Red Fluorescent Protein (RFP), resulting in red-fluorescent nuclei. During the G₁/S transition, Cdt1 levels fall as geminin levels rise; because both proteins are present, both Green Fluorescent Protein (GFP) and RFP fluorescence is visible, and the cell appears yellow when green and red images are overlaid. In S and G₂ into M phase, Cdt1 is degraded, leaving only geminin tagged with GFP, so that cells in G₂ and M phase appear green. This color change from red to yellow to green serves as an important marker of progression through cell cycle and division (Figure 1A).

Ready-to-use Premo™ FUCCI Cell Cycle Sensor

Invitrogen has combined FUCCI with the powerful BacMam gene delivery system to form the Premo™ FUCCI Cell Cycle Sensor. BacMam uses a modified baculovirus that contains the FP chimeras. The genetically encoded and prepackaged reagents are ready for immediate use—there's no need to purify plasmid or worry about vector integrity and quality. Transduction is efficient and reproducible in most cell types, including primary and stem cells, without apparent cytopathic effects. No lipids, dye-loading chemicals, or other potentially harmful treatments are required. In addition, BacMam technology allows you to precisely titrate expression levels to optimize the reagent for your experiment. Simply add the reagent to your cells for 1–2 hours, treat with the enhancer for 1–2 hours, wash, incubate overnight, then visualize cell cycle progression in populations of cells using fluorescence microscopy or high-throughput imaging platforms (Figure 1B). Learn more about the Premo™ FUCCI Cell Cycle Sensor at www.invitrogen.com/bp60. ■

Reference

1. Sakaue-Sawano et al. (2008) *Cell* 132:487–498.

Product	Quantity	Cat. No.
Premo™ FUCCI Cell Cycle Sensor	1 kit	P36232



Figure 1. Imaging cell cycle progression in live cells with Premo™ FUCCI Cell Cycle Sensor. (A) Schematic of cell cycle progression with nuclear fluorescence changes. (B) U2OS cells were transduced with Premo™ FUCCI Cell Cycle Sensor. Images were collected over 15 hours.