A Novel Renilla-Derived Luciferase with Enhanced Activity and Stability

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SUMMARY

UCLA researchers in the Department of Molecular and Medical Pharmacology have developed a novel luciferase variant with enhanced stability and activity.

BACKGROUND

Luciferase proteins first derived from firefly are indispensable in biological research. They are used for in vivo imaging, affinity studies by conjugation to antibodies and as reporter proteins in cell culture experiments. The most commonly used luciferase is a small protein derived from *Renilla Reniformis*. Although it is used routinely as a research tool, there are several limitations, as it is unstable in serum, has a low shelf life and a spectral peak of 482 nm that is unsuitable for in vivo imaging.

INNOVATION

UCLA researchers have optimized the *Renilla* luciferase protein such that it overcomes the current limitations. The optimized protein is stable with 10-fold higher yields. It is active in serum for 180 hours compared to the original protein, which is stable for less than 10 hours. It also has an optimized spectral peak compatible with in vivo imaging. Their optimized variant is thus suitable for assays that were previously incompatible with luciferase.

APPLICATIONS

- In vivo imaging in animal model systems
- In vitro assays of biological samples such as serum
- Reporter for cell culture assays
- Research tool for Bioluminescence Resonance Energy Transfer (BRET)

ADVANTAGES

- 150-fold enhanced stability
- 10-fold higher light emission
- Optimized emission spectra
- Compatible with in vivo imaging

STATE OF DEVELOPMENT

The protein has been tested extensively for stability and performance in mice, cell culture, serum and in reporter assays.

RELATED MATERIALS

- Loening, A. M., Fenn, T. D., Wu, A. M., and Gambhir, S. S. Consensus guided mutagenesis of Renilla luciferase yields enhanced stability and light output, Protein Eng. Des. Sel., 2006.
- Loening, A. M., Wu, A. M., and Gambhir, S. S. Red-shifted Renilla reniformis luciferase variants for imaging in living subjects, Nature Methods, 2007.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,378,086	02/19/2013	2005-010

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Luciferase, Luminescence, Imaging, In vivo imaging, Cancer imaging, BRET

CATEGORIZED AS

- **Imaging**
  - Medical
- **Materials & Chemicals**
  - Biological
- **Medical**
  - Imaging
  - Research Tools
- **Research Tools**
  - Other

RELATED CASES

2005-010-0

United States Of America	Issued Patent	8,258,277	09/04/2012	2005-010
United States Of America	Issued Patent	8,173,791	05/08/2012	2005-010
United States Of America	Issued Patent	7,939,649	05/10/2011	2005-010

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- A Novel Immuno-PET Tracer for Imaging of CD20
- System to Produce Biotinylated Proteins
- Humanized Antibodies to the Extracellular Domains of Human N-Cadherin
- Fully Human Antibodies and Fragments Recognizing c-Met

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