
New mutant luciferases and new substrates for improved bioluminescence imaging in vivo

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Abstract

Whole body bioluminescent and fluorescent imaging is now widely applied in small animals to study all kinds of biological and molecular processes like i.e. gene expression, tumor progression and metastasis, apoptosis, inflammation, angiogenesis, proteolysis and to follow trafficking, differentiation and fate of cells (i.e. stem-, immune- and tumor cells). This has been done mainly by using gene reporters expressing luciferases or fluorescent proteins. Recently new mutated red shifted and near infrared fluorescent proteins and luciferases have been developed making optical imaging more sensitive and offering the possibility to multiplex and to image deeper. It is now also possible to use new luciferase substrates generating more or red shifted light, specific enzyme cleavable pro-substrates and caged substrates for luciferase making bioluminescent imaging even more sensitive, versatile and allows for a wide range of multiplexing.

In the current presentation examples will be presented how these new developments in *in vivo* bioluminescent imaging can be applied in cancer research, immunology and regenerative medicine.

Keywords: in vivo imaging in mice, gene reporters, multi, modality imaging, new substrates, near infrared, cancer, regenerative medicine

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