



# MGH Vector Core

## Guide to our luciferase reporter enzymes

**Vluc:** The *Vargula* luciferase (Vluc)—also occasionally referred to in the literature as the *Cypridina* luciferase—is a secreted, 62 kDa monomeric protein whose substrate is vargulin. Maximal light emission is at 462 nm. Enzymatic activity of this protein can be monitored in a luminometer by taking aliquots of conditioned media. Alternatively, Vluc can be assayed by taking aliquots of blood from animals genetically engineered to express the protein, or from animals implanted with a stably-expressing cell type.

**Fluc:** The Firefly luciferase (Fluc) comes from the beetle *Photinus pyralis*. The 61 kDa enzyme is cytoplasmically localized, with O<sub>2</sub>, ATP and D-luciferin as substrates. Maximal light emission is at 562 nm. Because Fluc is not secreted, the cells must be lysed to assay luciferase activity *in vitro*. *In vivo*, Fluc-implanted or -expressing cells can be imaged with a CCD camera.

**Gluc:** The *Gaussia* luciferase (Gluc) is a secreted, 20 kDa monomer with a maximal light emission at 480 nm. The substrate for Gluc is coelenterazine. Like Vluc, Gluc activity can be assayed by taking aliquots of conditioned media. For *in vivo* applications, aliquots of blood from animals engineered to express Gluc, or from animals ectopically implanted with Gluc-expressing cells, can be assayed in a luminometer.

### References:

Tannous *et al.* (2005). "Codon-optimized *Gaussia* luciferase cDNA for mammalian gene expression in culture and *in vivo*." *Molecular Therapy*. **11**: 435-443.

Thompson *et al.* (1989). "Cloning and expression of cDNA for the luciferase from the marine ostracod *Vargula hilgendorfii*." *PNAS*. **86**: 6567-6571.

Wurdinger *et al.* (2008). "A secreted luciferase for ex vivo monitoring of in vivo processes." *Nature Methods*. **5**: 171-173.

de Wet *et al.* (1987). "Firefly luciferase gene: structure and expression in mammalian cells." *Mol. Cell. Biol.* **7**: 725-737.

