活体成像底物 Nano-Glo® Fluorofurimazine（FFz）

NanoLuc® 萤光素酶为先进的体内成像应用提供了新的报告选择。它体积小，非常适合用在紧凑型基因组中进行基因工程改造，而且不依赖 ATP，可对细胞内和细胞外事件进行活体监测。底物特异性使 NanoLuc® 萤光素酶成为萤火虫萤光素酶理想的互补报告基因，从而改进了双萤光素酶体内成像解决方案。

Nano-Glo® Fluorofurimazine In vivo Substrate (FFz) 是一种优化的试剂，专门用于体内检测 NanoLuc® 萤光素酶、NanoLuc® 融合蛋白或重组 NanoBiT® 萤光素酶。这种经过优化的水溶性的体内检测试剂提高了底物的生物利用率，可产生明亮、稳定的光信号，并提供灵活的递送选择，其处理要求与体内工作流程兼容。

非常适合用于以下体内分析：

- 病毒分布
- CAR-T 细胞追踪
- 外泌体 / 细胞外囊泡
- 光遗传学
- 基于 BRET 的报告基因，用于增强型深部组织成像
- 和萤火虫萤光素酶组成多重报告基因检测

专为体内检测 NanoLuc® 和 NanoBiT® 技术而开发的新型底物和配方，与传统底物相比有显著改进。

√ 去除了有机溶剂，降低了细胞毒性

√ 增加水溶性，提高底物递送率

√ 更明亮的体内信号

√ 更灵活的递送选择

√ 与其他基于腔肠素的底物相比，信号稳定性更高

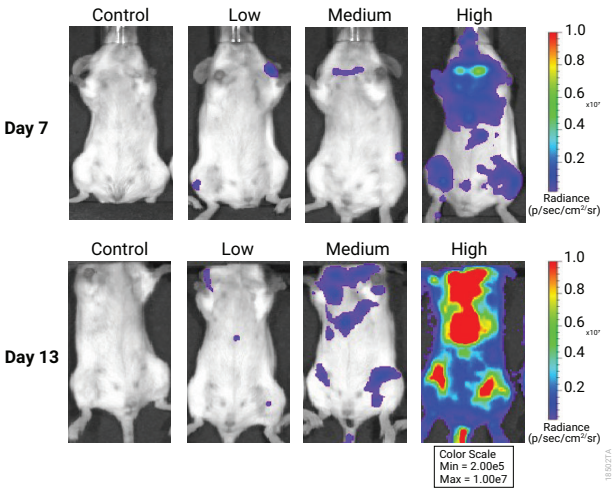


图 1. 注射 AAV9- NanoLuc® 的小鼠活体全身成像。给小鼠注射浓度逐渐增加的 AAV9-NanoLuc®，转导 7 天和 13 天后，注射 0.44µmoles FFz。在 7 天时开始出现组织嗜性，13 天后出现更强的信号和更广泛的组织嗜性。生物发光成像是在威斯康星大学小动物成像与放射治疗机构完成。

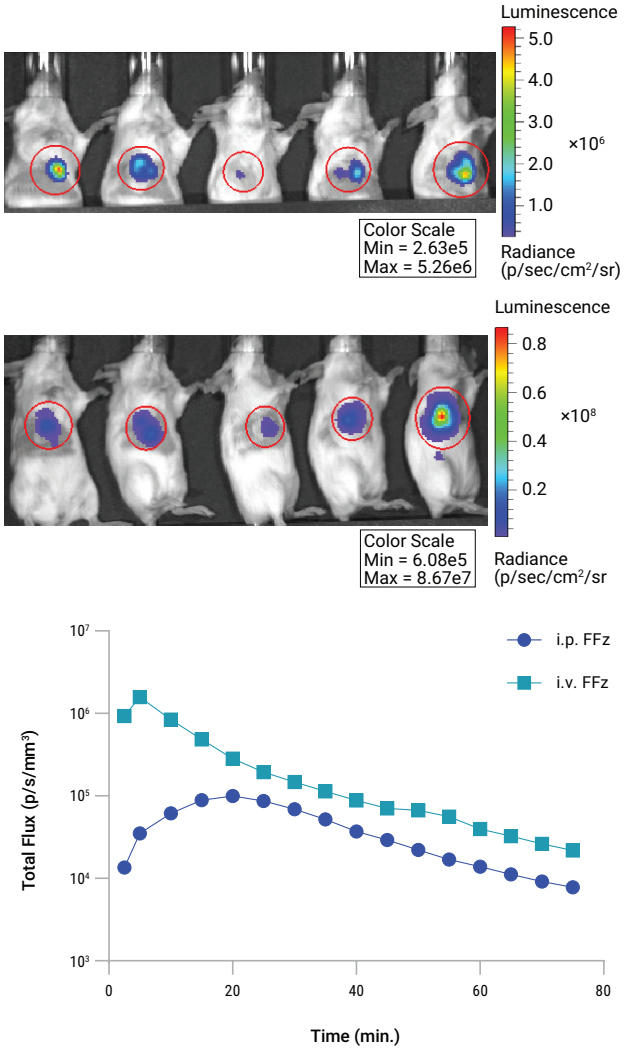


图 2. BALB/c 小鼠 4T1 原发性肿瘤的 NanoLuc® 信号。将表达 NanoLuc® 的 4T1 细胞原位植入雌性 BALB/c 小鼠的 3 号乳腺脂肪垫，让肿瘤生长 22 天。小鼠经腹腔注射 i.p.（上侧图片：圆形蓝线）或静脉注射 i.v.（下侧图片：方形绿线）FFz。生物发光成像是在威斯康星大学小动物成像和放射治疗机构完成。

引文列表

埃博拉病毒研究	Davies, K.A., *et al.* (2023) Fluorescent and bioluminescent reporter mouse-adapted Ebola viruses maintain pathogenicity and can be visualized in vivo. *J. Infect. Dis.* jiad136. https://doi.org/10.1093/infdis/jiad136
NanoLuc® 报告基因病毒	Hollander, J.M. et al. (2023) Adeno-associated virus-delivered fibroblast growth factor 18 gene therapy promotes cartilage anabolism. *Cartilage* epub ahead of print.
NanoLuc® 报告基因病毒	Kim, J.H. et al. (2022) Real-time tracking of bioluminescent influenza A virus infection in mice. *Sci. Rep.* **12**, 3152.
NanoLuc® 报告基因病毒	Ullah, I. et al. (2021) Live imaging of SARS-CoV-2 infection in mice reveals that neutralizing antibodies require Fc function for optimal efficacy. *Immunity* **54**, 2143–58.
NanoLuc® 报告基因病毒	Carossino, M. et al. (2021) Fatal neuroinvasion and SARS-CoV-2 tropism in K18-hACE2 mice is partially independent on hACE2 expression. *Viruses* **14**, 535.
NanoLuc® 报告基因病毒	Kanai, Y. et al. (2019) In vivo live imaging of oncolytic mammalian Orthoreovirus expressing NanoLuc luciferase in tumor xenograft mice. *J. Virol.* **93**, e00401-19.
NanoLuc® 报告基因病毒	Tran, V. et al. (2013) Highly sensitive real-time in vivo imaging of an influenza reporter virus reveals dynamics of replication and spread. *J. Virol.* **87**, 13321–9.
HiBiT 溶瘤病毒	Gasper, N. et al. (2020) NanoBiT System and hydrofurimazine for optimized detection of viral infection in mice−a novel in vivo imaging platform. *Int. J. Mol. Sci.* **21**, 5863–73.
CAR-T- 细胞疗法	Martins, T.A., *et al.* (2023) Enhancing anti-EGFRvIII CART cell therapy against glioblastoma with a paracrine SIRPγ-derived CD47 blocker. *bioRxiv* posted 03 Sep 2023. https://doi.org/10.1101/2023.08.31.5551222
CAR T- 细胞追踪	Wang, T. et al. (2023) Visualizing cell-cell communication using synthetic notch activated MRI. *Proc. Natl. Acad. Sci.* **120**, e2216901120.
CAR T- 细胞追踪	Theruvath, J. et al. (2020) Locoregionally administered B7-H3-targeted CAR T cells for treatment of atypical teratoid/rhabdoid tumors. *Nat. Med.* **26**, 712–9.
细胞追踪	Wang, L. et al. (2021) Application of bioluminescence resonance energy transfer-based cell tracking approach in bone tissue engineering. *J. Tissue Eng.* **12**, e2041731421995465.
RNA 调控	Ding, Y., *et al.* (2023) Orthogonal inducible control of Cas13 circuits enable programmable RNA regulation in mammalian cells. *bioRxiv* posted 20 March 2023. https://doi.org/10.1101/2023.03.20.533499
NanoLuc® 报告基因 RNA	Chen, R. et al. (2023) Engineering circular RNA for enhanced protein production. *Nat. Biotechnol.* **41**, 262–72.
环状 RNA 的翻译效率	Chen, R., *et al.* (2022) Engineering circular RNA for enhanced protein production. *Nat. Biotechnol.* **41**, 262. PMID: 35851375.
细胞外囊泡的研究和治疗开发	Driedonks, T., *et al.* (2022) Pharmacokinetics and biodistribution of extracellular vesicles administered intravenously and intranasally to Macaca nemestrina. *J. Extracell. Biol.* **1**, e59. https://doi.org/10.1002/jex2.59.
肿瘤细胞的细胞外囊泡研究	Perez, G.I., *et al.* (2022) In vitro and in vivo analysis of extracellular vesicle-mediated metastasis using a bright, red-shifted bioluminescent reporter protein. *Adv. Genet.* **3**, 2270011. https://doi.org/10.1002/ggn2.202100055
外泌体 / 细胞外囊泡	Rufino-Ramos, D. et al. (2022) Using genetically modified extracellular vesicles as a non-invasive strategy to evaluate brain-specific cargo. *Biomaterials* **281**, e121366.
外泌体 / 细胞外囊泡	Luo, W. et al. (2020) Spatial and temporal tracking of cardiac exosomes in mouse using a nano-luciferase-CD63 fusion protein. *Commun. Biol.* **3**, 114.

引文列表

外泌体 / 细胞外囊泡	Gupta, D. et al. (2020) Quantification of extracellular vesicles in vitro and in vivo using sensitive bioluminescent imaging. J. Extracell. *Vesicles* **9**, e1800222.
光遗传学和非凋亡性细胞死亡	He, L., *et al.* (2021) Optogenetic control of non-apoptotic cell death. *Adv. Sci. (Weinh)* **8**, 2100424. PMID: 34540558.
光遗传学	Li, T. et al. (2021) A synthetic BRET-based optogenetic device for pulsatile transgene expression enabling glucose homeostasis in mice. *Nat. Commun.* **12**, 615.
受体结合	Tang, Y. et al. (2019) A bioluminescence resonance energy transfer-based approach for determining antibody-receptor occupancy in vivo. *iScience* **15**, 439–51.
药物与靶标的相互作用	Valerie, N.C.K., *et al.* (2022) Coupling cellular drugtarget engagement to downstream pharmacology with CeTEAM. *bioRxiv* posted 19 Sep 2022. https://doi.org/10.1101/2022.09.19.505646
扁形动物的报告基因表达调控	Hall, R.N., *et al.* (2022) Heterologous reporter expression in the planarian Schmidtea mediterranea through somatic mRNA transfection. *Cell Rep. Methods* **2**, 100298. PMID: 36313809.
NanoLuc® 底物的性能分析	Gaspar, N., *et al.* (2021) Evaluation of NanoLuc substrates for bioluminescence imaging of transferred cells in mice. *J. Photochem. Photobiol. B.* **216**, 112128. PMID: 33529963.
新型 NanoLuc® 底物的介绍	Su, Y., *et al.* (2020) Novel NanoLuc substrates enable bright two-population bioluminescence imaging in animals. *Nat. Methods* **17**, 852-60. PMID: 32661427.

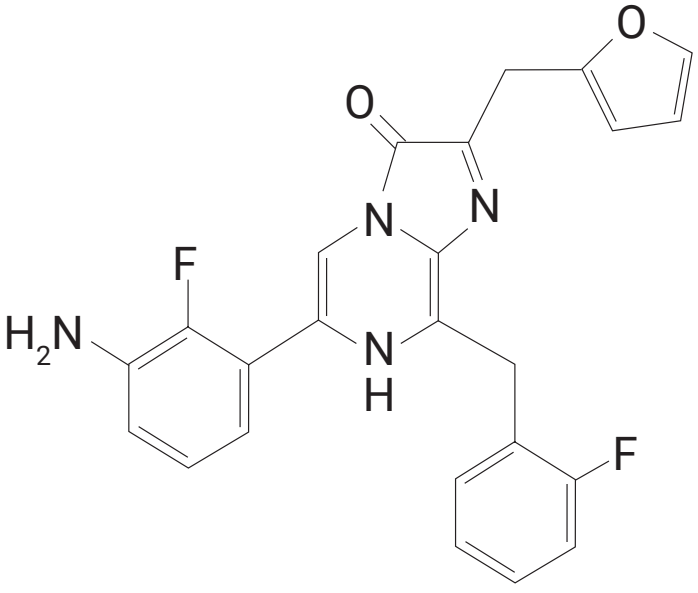


图 3. Fluorofurimazine 的结构图

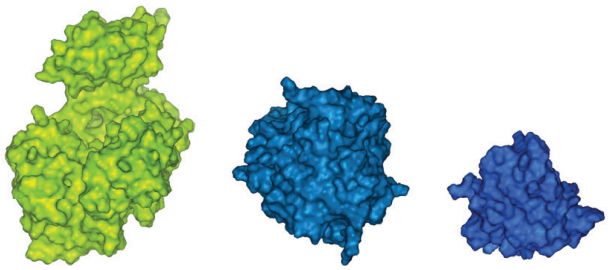
产品订购信息

产品	规格	目录号
Nano-Glo® Fluorofurimazine In Vivo Substrate	1 vial	N4100
	5 vials	N4110
Similar Product VivoGlo™ Luciferin, In Vivo Grade	50mg	P1041
	250mg	P1042
	1g	P1043

关于 NanoLuc® 萤光素酶

是一种体积小、亮度高的 19kDa 萤光素酶，从深海虾（Oplophorus）萤光素酶催化亚基分子进化而来。当与 furimazine 结合使用时，不依赖 ATP 的 NanoLuc® 萤光素酶反应的亮度是萤火虫或 Renilla 萤光素酶的约 100 倍，在哺乳动物细胞培养物中具有自然的辉光型发光动力学。

NanoLuc® 萤光素酶为许多应用带来了极高的灵敏度。从 NanoBRET™ 技术到 NanoLuc® 二亚单元技术 (NanoBiT®)，NanoLuc® 是在生理相关水平上研究细胞中遗传反应和蛋白质动态的基石。NanoLuc® 技术的灵活性为您提供了生物发光技术的积木，让您以前所未有的方式了解生物相互作用或进行化合物筛选。



FLuc 61kDa　**RLuc** 34kDa　**NLuc** 19kDa

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