

광학적 접근

Optical Imaging in the Field of Molecular Imaging

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Abstract

Molecular imaging is leading an important role in the era of molecular medicine. Optical imaging, a rising star in the field of molecular imaging, largely consists of fluorescent imaging and bioluminescent imaging. In the fluorescence imaging, an illuminating light excites fluorescent reporters in the living subject, and a charged coupled device (CCD) camera collects an emission light of shifted wavelength. In the bioluminescent imaging, reporter genes code for the luciferase that is responsible for fireflies' glow. After the injection of the substrate luciferin, animals carrying the luciferase gene are imaged with a super - sensitive CCD camera to pick up the small number of photons transmitted through tissues. It has been shown that well - aimed and creatively built reporters let researchers explore and answer a lot of biologically important questions in living subjects. Despite its relatively short history, optical imaging is rapidly being implemented in various clinical areas as well as research fields.

Keywords : Molecular imaging; Optical imaging; Fluorescent imaging; Bioluminescent imaging; Molecular medicine

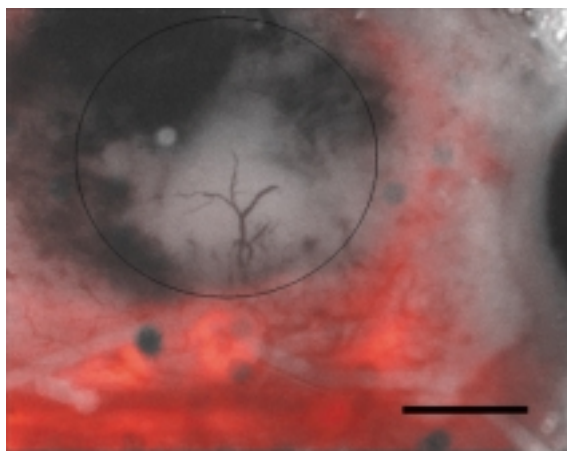
; ; ; ; ;

(1).

(optical imaging technique)

(2).

(optical imaging)



1. C57 BL/6 mouse (, contusional injury) 가 5 (fluorescent reporter)가 cathepsin () (cranial window) (scale bar = 1 mm).

(fluorescent imaging) (bio-luminescent imaging) (3).

(excitation) (emission) (1). (spectrum)

가 . (4) 가 (firefly) (luciferin) (luciferase) 가 (transfection) (2). CCD(charged coupled

device) camera 가 , - 100 ℃ (super - sensitive) CCD camera가 (3).

(molecular and cellular events) 가 . (5).

(gene of interest)가 가 (reporter gene)가

. - galactosidase GFP(green fluorescent protein) 가 (3), (6, 7) 가 가

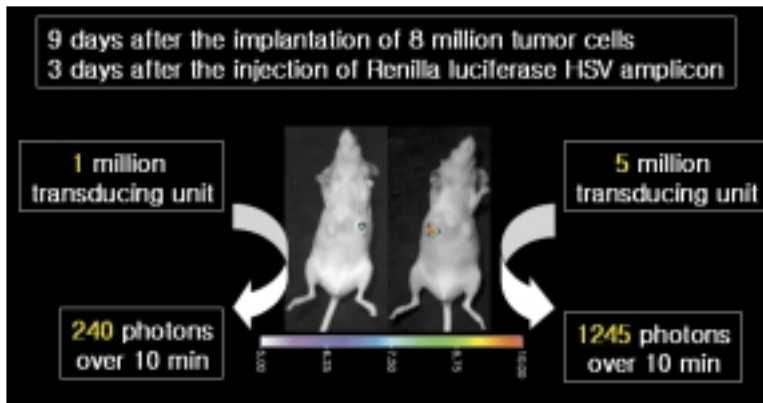
(fluorescent - labeled reporter) (radio - labeled ligand)

가 가

(8), MR(magnetic reso-

nance) (9).

가



2. Nude mouse
nilla 10 HSV amplicon 3 Re-

가 5
(photons) 5

가 , 가

가 (700~900 nm ;

, near - infrared)

가 (10).

folate

folate receptor

가 (11).

(light source)

(light detector)

(reflectance imag-

ing)

(biophysical computer modeling)

cent mediated tomography imaging) (12).

3

가

cathepsin B

cathepsin B probe

, 1 mm

(mouse)

(13).

가

(fluorescent re-

porter)

. Weissle-

der cathepsin B

probe(14) MMP(matrix metal-

loproteinase) probe(15)가

“ probe(on probe)”

probe

cathepsin B MMP

가 probe

(proteolysis)

(macrophage)가

cathepsin B

(1)

MMP

(precancerous polyp)

가

(3).

(19) 가 (photon counts) (1). 가 (multichannel imaging) (3) (labeling) , (intraop fluorescent microscopy) Firefly Firefly , Renilla Renilla (16). 가 Shah (20) Renilla (coro- nary artery reanastomosis) TRAIL(Tumor Necrosis Factor - related Apoptosis - inducing Ligand) (fluorescent retinal angiography) 가 Firefly indocyanine green dye (perfusion) (real- Firefly time fluorescent coronary angiography) 가 (17). Renilla TRAIL 가 caspase 가 (background noise)가 , DEVD - luciferin caspase (~ 2 cm) 가 (small animals) (가 (semi - quantitative) (1)(2), MR, CT, PET (18) (stem (3), cell) (graft survival) 가

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