

# 광학적 접근 영상기법

## 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**

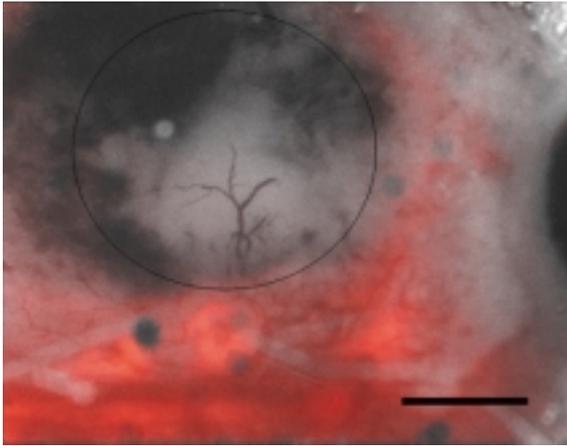
: ; ; ; ;

(1).

(optical imaging technique)

(2).

(optical imaging)



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

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

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

가 (4) 가 (firefly) (Luciferin) (luciferase) 가 (trans-fection) (2). CCD(charged coupled

device) camera 가 - 100 °C (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

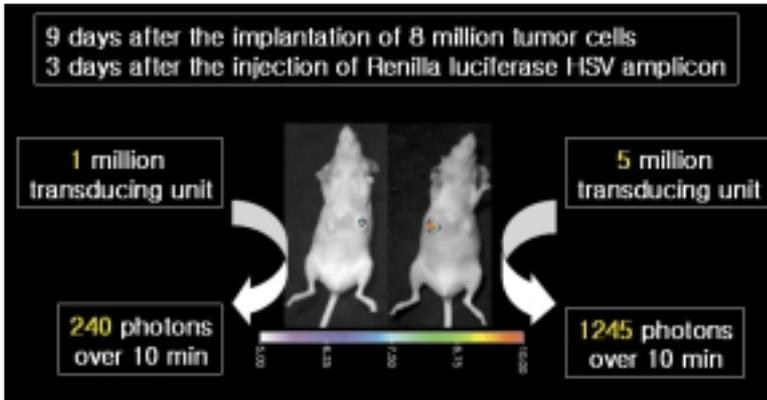
(fluorescent - labeled reporter) (radio - labeled ligand)

가 가

(8), MR(magnetic reso-

(2). nance) (9).

가



2. Nude mouse  
nilla

HSV amplicon

Re-

10  
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)

(fluores-

cent mediated tomography imaging)

(12).

3

가

cathepsin B

(precancerous polyp)

가

cathepsin B probe

, 1 mm

10

(3).

(mouse)

(13).

가

(fluorescent re-

porter)

Weissle-

der cathepsin B

probe(14) MMP(matrix metal-

loproteinase) probe(15)가

(19) 가 (photon counts) (1). 가 (multichannel imaging) (3) (labeling) , (intraop fluorescent microscopy) Firefly Firefly , Renilla Renilla (16). 가 Shah (20) Renilla (coro- nary aretery reanastomosis) TRAIL(Tumor Necrosis Factor - related Apoptosis - inducing Ligand) (fluorescent retinal angiography) 가 Firefly indocyanine green dye (perfusion) (real- time fluorescent coronary angiography) Firefly 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 cell) (graft survival) 가 (3),

100 ).

가 Renilla coupling) (func-  
 1,000 , tional MRI) (23)  
 ( 가 , MRI가

genomics, proteomics  
 가

optical coherence tomography  
 (OCT) (21).  
 가 (confocal  
 microscopy) 가  
 (ultrasound imaging technique)  
 OCT , OCT  
 (echo)  
 ( $\mu\text{m}$ ) 가  
 (catheter)  
 (vulnerable atherosclerotic pla-  
 ques)  
 (near - infrared spectros-  
 copic topography)  
 (oxy - hemoglobin)  
 (pulse  
 oximetry)  
 (22). 가  
 (neuro - vascular

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