

// OPTICAL TOMOGRAPHIC (OT) DEVICE FOR COMBINATION WITH MR IN PRECLINICAL IMAGING

Ref-Nr: TA-P-734

HINTERGRUND

DKFZ has developed an optical imaging detector for fluorescence and bioluminescence in small animal imaging that is compatible with magnetic resonance imaging (MRI). This technology provides the possibility to study simultaneously tracer/marker kinetics of both optical (OT) and NMR-induced signals.

The device characterizes and quantifies functional and/or molecular biological processes at the cellular and sub-cellular levels, and anatomical structures (primarily through the MR signal) in animal studies. The invention describes an imaging system that is highly sensitive in identifying location, magnitude and time variation of specific molecular events (e.g. gene expression and enzyme activity) by simultaneously detecting optical markers in vivo. During the same acquisition procedure this spatially low-resolution (generally 500 µm) optical information is superimposed over the spatially high-resolution (generally 50 µm) anatomical details of the imaged object, improving the diagnostic accuracy of optical imaging by magnetic resonance imaging.

LÖSUNG

The device can be used to detect and stage tumors, to image specific cellular and molecular processes (e.g. gene expression, or more complex molecular interactions such as protein-protein interactions), to monitor multiple molecular events simultaneously, to track single- or dual-labeled cells using reporter genes or dual-modal labels visible to both optical and MR imaging, to optimize drug and gene therapy, to image drug effects at a molecular and cellular level, to assess disease progression at a molecular pathological level, especially to create the possibility of achieving all of the above goals of imaging in a single, rapid, reproducible, and quantitative manner.



Deutsches
Krebsforschungszentrum DKFZ

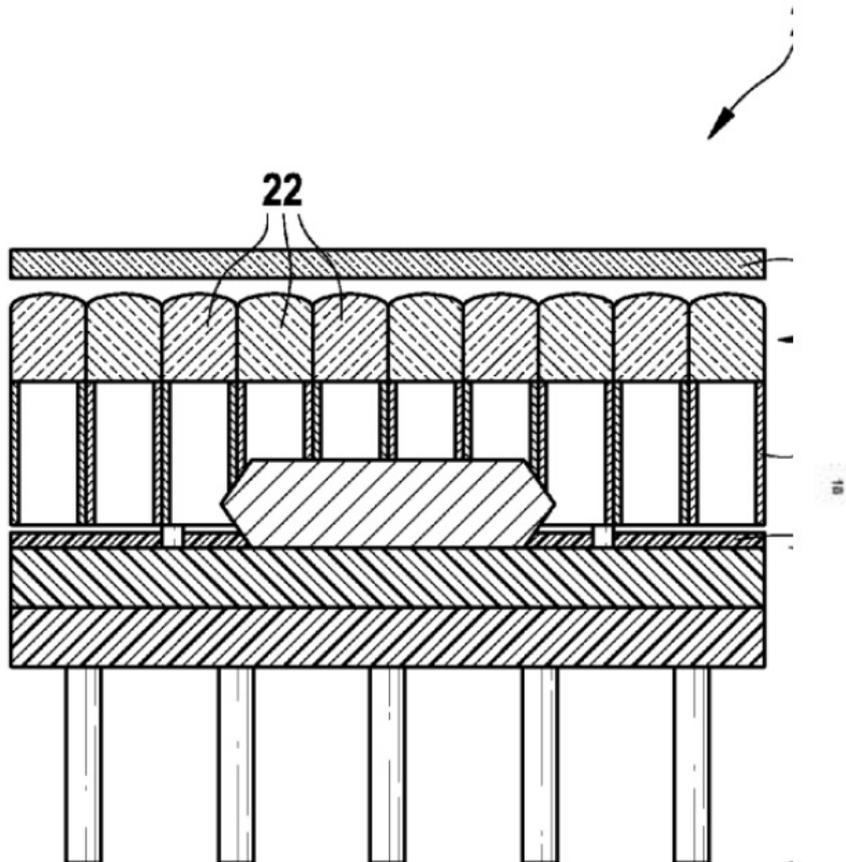
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ENTWICKLUNGSSTAND

Prototyp

CATEGORIES

//Medizinische
Geräte //Medizintechnik



Optical detector with micro lenses. (22) Micro-lenses

VORTEILE

- No necessity for contact between detector and object
- Thin CMOS detector (option for small device)
- High resolution/sensitivity
- Combination MR-OT possible
- Identical imaging geometries and animal positioning
- Shorter acquisition time and better study management

ANWENDUNGSBEREICHE

- Optimizing drug and gene therapy
 - Imaging drug effects at a molecular and cellular level
 - Monitoring multiple molecular events nearsimultaneously
 - Monitoring time-dependent therapeutic influences on gene products in the same animal
 - Studying the interaction between tumor cells and the immune system
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PUBLIKATIONEN & VERWEISE

“Iterative reconstruction of projection images from a microlens-based optical detector.” By Cao L, Peter J. published in Opt Express. 2011 Jun 20;19(13):11932-43. doi: 10.1364/OE.19.011932. PMID: 21716427.
See: <https://www.ncbi.nlm.nih.gov/pubmed?term=21716427>

“Image formation with a microlens-based optical detector: a three-dimensional mapping approach.” By Unholtz D, Semmler W, Dössel O, Peter J. published in Appl Opt. 2009 Apr 1;48(10):D273-9. PMID: 19340119.
See: <https://www.ncbi.nlm.nih.gov/pubmed?term=19340119>

“A novel optical tomographic instrument for multimodal imaging application in mice” in J. Nucl. Med. 2011; 52 (Supplement 1):1958; by Joerg Peter and Liji Cao; Medical Physics in Radiology, German Cancer Research Center, Heidelberg, Germany; Abstract No. 1958.
