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Biomedical Imaging:

From Drug Target Discovery to Medical Diagnostics

by Hermann A.M. Mucke, PhD

Molecular imaging has become an increasingly indispensable tool in life sciences basic research, in translational medicine, and in routine medical diagnostics. This Biomedical Imaging report covers its top application areas: medical diagnosis and translational research, both relevant to pharmacology and drug development. This report:

- Reviews the current and emerging technologies of bioimaging
- Focuses on the use of molecular imaging in drug discovery and development, from cell-based screening to clinical trials
- Presents clinical and diagnostic applications in use today and tomorrow's trends
- Evaluates regulatory issues surrounding validation of molecular imaging biomarkers
- Provides profiles of industry players that develop and/or market equipment or probes for cellular, small animal, or clinical imaging
- Provides projections of likely bioimaging developments that will drive the field during the 2010s

New technologies and techniques pushing bioimaging applications

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Overview

Today, bioimaging technologies are not only a valuable tool for translational research; they have become an integral part of defining how, and with which precise goal in mind, drugs and medical devices are developed. Imaging has reached far upstream into the drug development pipeline, pervading preclinical and discovery-stage animal studies and reaching back to the earliest stages: lead optimization and even compound screening. In clinical studies, bioimaging has become all but omnipresent, providing an enormous amount of patient-specific information that, if linked to clinical and behavioral parameters, can often aid in a proof-of-concept understanding of investigational drugs.

Biomedical Imaging: From Drug Target Discovery to Medical Diagnostics describes the technologies of bioimaging, which have evolved to visualize a broad variety of functional parameters, mapping them to anatomical structures that are thereby "tagged" with additional information of high biological relevance. Equipment and methodology are diverse, comprising the most advanced confocal microscopes for spotting intracellular fluorescence signals, ultrasound probes with computerized attenuation correction, scanners that combine PET or SPECT with x-ray CT or MR, near-infrared optical molecular imaging, and "4D" time series of 3D reconstructions from tomographic slices.

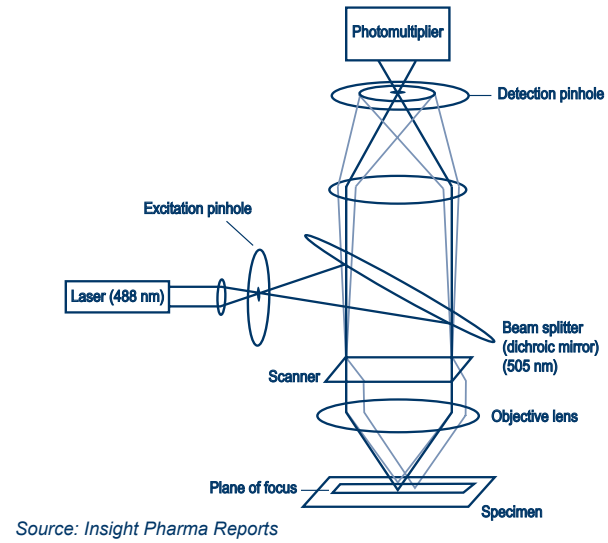
This report addresses the use of molecular imaging in drug discovery and development from cell-based screening to clinical efficacy trials, now and into the next decade. Applications to the pharmaceutical industry start with target and lead discovery and characterization, continue into translational research, and end with therapy monitoring for approved drugs.

Biomedical Imaging: From Drug Target Discovery to Medical Diagnostics analyzes diagnostic bioimaging uses in the physician's office or nuclear medicine centers, including cancer staging, planning, and response assessment; cardiorespiratory and vascular imaging; neuroimaging; and molecular imaging for eye diseases, arthritis, diabetes, and HIV. The report also discusses the market parameters for PET procedures, which are the key economic driver for clinical molecular bioimaging.

The US FDA has developed detailed rules for every aspect of diagnostic bioimaging and specific rules for PET tracers and tomographic scanners. This report reviews the regulatory background and analyzes the problems faced in validating imaging molecular biomarkers and getting them accepted. Also included are results from a Web survey that outlines the expectations of researchers and managers in the molecular bioimaging field.

Biomedical Imaging: From Drug Target Discovery to Medical Diagnostics concludes with projections of likely developments that will drive this fascinating field during the 2010s.

Schematic Representation of the Confocal Microscopy Principle



Source: Insight Pharma Reports

About the Author: *Hermann A.M. Mucke, PhD,* spent 17 years in academia and industry before he founded H.M. Pharma Consultancy (www.hmpharmacon.com) in 2000 to become an independent pharmaceutical consultant, analyst, and science author. His last industry position was Vice President R&D in a European pharmaceutical company, which he helped to take public on the Frankfurt Stock Exchange in 1999. Since then, Dr. Mucke, who holds a PhD in biochemistry from the University of Vienna (Austria), became a consultant and advisory board member for several European and American pharmaceutical companies and a regular reviewer of drugs and patents for Thomson Current Drugs and Ashley Publications. Dr. Mucke is based in Vienna.

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