

In Vivo Preclinical Imaging Trends 2011



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Executive Summary

- This market report summarizes the results of HTStec's industry-wide global web-based benchmarking survey on in vivo preclinical imaging carried out in January 2011.
- The study was initiated by HTStec as part of its ongoing tracking of emerging life science marketplaces. The questionnaire was compiled to meet the needs and interests of in vivo imaging vendor community.
- The main objectives were to comprehensively document current practices and preferences on in vivo imaging used in preclinical drug development, and to understand future user requirements.
- The survey looked at the following aspects of in vivo preclinical imaging as practiced today (2011) and in some cases as predicted for the future (2014): the key diseases/therapeutic area(s) targeted; main applications investigated; stage(s) within the drug discovery process planning to deploy an in vivo imaging system; single imaging modality made greatest use of; how multi-modality imaging is accessed; multi-mode imaging combinations made greatest use of; recognition of vendor proprietary approaches/software for 3D tomography; animal species and number of different animals imaged; importance of being able to image multiple animals at the same time; the maximum time frame in vivo imaging studies are run over; number of images typically taken of each animal per study; biggest bottlenecks (limitations) encountered; stage in the drug discovery process where in vivo imaging is expected to make the biggest impact; how in vivo imaging impacts drug development; reagents used for in vivo imaging; main limitations associated with in vivo optical imaging; emission ranges of most used optical in vivo imaging probes/fluorophores; estimated total annual spending on optical in vivo imaging reagents and consumables; breakdown of spending on optical in vivo imaging reagents and consumables; suppliers of the majority of optical imaging reagents purchased; purchasing plans/preferences for new in vivo imagers, new in vivo imaging systems currently most appealing, which modalities are most wanted, and reason for purchasing; in vivo imager manufacturer most associated with desirable characteristics or attributes; interest in outsourcing in vivo preclinical imaging to a fee-for-service provider; and any unmet needs in the in vivo preclinical imaging field.
- The main questionnaire consisted of 28 multi-choice questions and 2 open-ended questions. In addition, there were 5 questions related solely to survey demographics.
- The survey collected 76 validated responses, of these 72% provided comprehensive input.
- Survey responses were geographically split: 51% Europe; 39% North America; 7% Asia (excluding Japan); 1% Rest of World; and 1% Japan.
- Survey respondents were drawn from persons or groups currently involved in preclinical drug research and development that were performing or planning to undertake in vivo imaging of laboratory animals.
- Respondents came from 42 University/Research Institute/Government Lab/Not-for-Profit Facilities; 10 Biotech; 9 Large Pharma; 7 Medium-Small Pharma; 5 CROs; and 3 Academic Screening Centers.
- Most survey respondents had a senior job role or position which was in descending order: 14 professor/assistant professor; 10 principal investigator; 10 research scientist; 9 senior scientist/researcher; 7 director; 7 section/group leader; 7 post-doc; 5 other; 3 department head; 3 lab manager; and 1 vice president.
- Respondents represented the following labs: 18 applied research; 18 basic research; 17 labs with a combination of drug discovery roles; 7 leads-to-candidate (preclinical research); 5 other; 4 leads-to-candidate (ADME tox); 2 hits-to-leads (lead optimization); 1 compound profiling; 1 secondary screening; 1 assay development; 1 target validation; and 1 target identification.
- Survey results were expressed as an average of all survey respondents. In addition, where appropriate the data was fully reanalyzed after sub-division into the following 4 survey groups: 1) Drug Evaluation & Development; 2) Academic Research; 3) Europe; and 4) North America.
- The key disease/therapeutic area targeted with in vivo preclinical imaging was oncology/cancer.
- Monitoring treatment response, early indications of efficacy was rated the main application of in vivo preclinical imaging.
- The stage in the drug discovery process where respondents plan to most use/deploy an in vivo imaging system was target validation.
- The single most used imaging modality today (2011) was optical (bioluminescence).
- The majority of respondents preferred a single modality instrument.

- The preferred approach to accessing multi-modality imaging was by sequential imaging on separate single mode systems, utilizing co-registration of fiducial markers on the imaging cassette to align images.
- The most used multi-mode imaging combination today (2011) was PET+CT.
- Knowledge of various proprietary approaches/software used to facilitate tomographic 3D reconstruction, anatomical registration of optical images, advanced image analysis, quantification, and visualization tools was variable.
- The animal species most imaged by respondents today (2011) was the mouse.
- The median number of animals imaged per year was as follows: mice – 51-100; rats – 51-10; rabbits – 1-5; monkeys – none; dogs – none; all other animals – 1-5.
- The value of being able to image multiple animals at one time was rated of medium importance.
- The most used maximum time frame for running in vivo imaging studies over was 1 hour.
- A median of 6-10 images are typically taken per animal per study.
- Respondent feedback on the bottlenecks (limitations) they have encountered during in vivo preclinical imaging and any unmet needs in vivo preclinical imaging field were documented.
- In vivo imaging is expected to make the biggest impact on leads-to-candidate (preclinical research) stage of the drug discovery process.
- Monitors disease progression and therapeutic response in longitudinal studies was ranked where vivo imaging will exert the greatest impact on drug development.
- The reagents most used today (2011) in in vivo imaging studies were bioluminescent markers/reporters.
- Maximizing the depth of tissue penetration was rated the main limitation associated with optical in vivo imaging.
- Most use was made of optical in vivo imaging probes/fluorophores with an emission range of 700-800nm.
- The median annual (2011) budget for optical imaging reagents and consumables was \$10K – \$25K/lab.
- The biggest proportion of the optical imaging reagents budget was spent on fluorophores/dyes.
- CaliperLS (Xenogen) was the main supplier of respondent's optical imaging reagents.
- 47% of respondents had no budget or budget plans to purchase an in vivo imager over the coming years.
- The majority of budget plans outlined were in the early planning stage.
- The median approximate size of respondent's imager budget was \$100K-\$250K, and was expected to purchase a median of 1 imager. The majority of these plans were for purchases in 2012.
- The purchasing preferences of 40 labs interested in acquiring new in vivo imagers over the next few years were documented. Interest was greatest for acquiring CaliperLS (Xenogen), Siemens and Bruker Biospin instruments, with optical only the most wanted modality. The main reason cited for wanting to purchase a new in vivo imager was to gain access to an additional imaging modality.
- The in vivo imager manufacturer most associated with a list of desirable characteristics was CaliperLS (Xenogen).
- The current (2011) interest in outsourcing in vivo preclinical imaging to a fee-for-service provider was none (i.e. don't think we will ever outsource).
- A bottom up model was developed to estimate the global market for in vivo imagers deployed in preclinical studies using data derived from this survey. The market was estimated to be around \$55M in 2011, equivalent to sales of 140 imager units/year.
- A bottom up model was developed to estimate the global market for in vivo optical imaging reagents used in preclinical studies with data derived from this survey. The market was estimated to be around \$76M in 2011. Greatest market share was allocated to fluorophores/dyes and chemiluminescent & bioluminescent substrates. Greatest vendor share of this reagents market was expected for CaliperLS (Xenogen) followed by PerkinElmer/Vis-En and then Life Technologies/Molecular Probes.
- The full report provides the data, full details of the breakdown of the responses for each question, its segmentation and the estimates for the future (2014). It also highlights a few interesting differences between the survey groups.

Table of Contents

Executive Summary	2
Table of Contents	4
Survey Methodology	5
Main Activity of Survey Respondents & Their Response to Survey	7
Respondent's Geographic Origin	8
Respondent's Company or Organisational Origin	9
Respondent's Job Role	10
Respondent's Main Group Activity	11
Key Diseases/Therapeutic Areas Targeted With Preclinical Imaging	12
Main Applications Investigated With In Vivo Preclinical Imaging	13
Stages in Drug Discovery Using In Vivo Imaging Systems	14
Most Used Single In Vivo Imaging Modality	15
How Respondents Currently Access Multi-Modality Imaging	16
Multi-Mode Imaging Combinations Used or Wanted	17
Vendors Associated With Various Imaging Approaches	18
Summary of Survey Findings (1)	19
Animal Species Imaged	20
No. of Animals of Different Species Imaged Per Year	21
Expected Future Change in Imaging of Animal Species	22
Importance of Being Able to Image Multiple Animals at One Time	23
Maximum Time Frame of In Vivo Imaging Studies	24
No. of Images Typically Taken Per Each Animal	25
Biggest Bottlenecks Encountered During In Vivo Preclinical Imaging	26
Where In Vivo Imaging Will Make the Biggest Impact in Drug Discovery	27
How In Vivo Imaging Impacts Drug Development	28
Reagents Used For In Vivo Imaging Studies	29
Main Limitations Associated With In Vivo Optical Imaging	30
Emission Range of Probes/Fluorophores Used in Optical In Vivo Imaging	31
Unmet Needs in In Vivo Preclinical Imaging	31
Summary of Survey Findings (2)	32
Budget for In Vivo Optical Imaging Reagents	33
Breakdown of Spending on In Vivo Optical Imaging Reagents	34
Suppliers of the Majority of Respondents Optical Imaging Reagents	35
In Vivo Imager Purchasing Plans (1)	36
In Vivo Imager Purchasing Plans (2)	37
In Vivo Imager Purchasing Preferences (1)	38
In Vivo Imager Purchasing Preferences (2)	39
In Vivo Imager Purchasing Preferences (3)	40
In Vivo Imager Manufacturer Associated With Desirable Characteristics	41
Interest in Outsourcing In Vivo Preclinical Imaging	42
In Vivo Imagers Market Estimate	43
Vendor Share of In Vivo Imager Market	44
In Vivo Optical Imaging Reagents – Market Estimate	45
Breakdown of In Vivo Optical Imaging Market Estimate	46
Supplier Share of Optical In Vivo Imaging Reagents Market	47
Summary of Survey Findings (3)	48

General Information on HTStec and HTStec's Trends Market Reports

- HTStec Limited an independent market research consultancy founded in September 2003 whose focus is on assisting clients delivering novel enabling platform technologies (liquid handling, laboratory automation, detection instrumentation and assay reagent technologies) to drug discovery. Over the past 7 years HTStec has published more than 50 market reports on drug discovery technologies and authored over 30 review articles in Drug Discovery World (at least article one per issue).
- HTStec's Trends reports owe their origins to the need by developers and vendors of new enabling technologies in drug discovery to get up-to-date relevant market metrics on which to base informed business decisions.
- Typically focused on a specific market niche or segment, in many cases overlooked or frequently misunderstood by broader market studies.
- Investigations are mainly initiated in response to a sponsor's specific requests.
- HTStec's extensive experience of the market, both as a Pharma End-User and working for a major Life Science Tool Provider ensures the industry relevance of the market research collected.
- Based entirely on web-based feedback from potential customers drawn mainly from Pharma and Biotechs, although increasingly University and Research Institute labs are also being researched.
- Produced extremely rapidly and typically published within 3 weeks of starting the collection phase.
- Reports are short, concise and focused on giving readers the basic data, analyzed in several different ways.
- Limited to reporting the main findings alone, without exhaustive discussion on the relevance of the results.
- Market estimates are mainly based on bottom-up calculations and usually avoid attempts to forecast widely beyond the next 2-3 years. Full details on the derivation of market estimates are given so readers can apply their own factors and easily make alternative estimates if they prefer.
- Owing to the sensitivity of some of the data collected, all reference to the origin of participating companies is removed, data is pooled to get an industry average and the anonymity of all respondents fully preserved and guaranteed.
- Critically HTStec's Trends reports have generated much interest and acclaim amongst survey respondents, to whom they are made available free of charge (subject to acceptance of HTStec's copyright terms) so they can benchmark their internal processes.
- Unlike alternatives HTStec's Market Surveys and Report are aimed at giving readers, information they want and can rely on, not information they don't need, cannot easily discern or is of dubious authenticity.
- HTStec aims to be the premier global provider of highly focused market research on enabling technologies in drug discovery.
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