

# TR-FRET Based Assay Trends 2009



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## Executive Summary

- This market report summarizes the results of HTStec's 3<sup>rd</sup> global Pharma and Biotech web-based benchmarking survey on TR-FRET (Time Resolved-Fluorescence Resonance Energy Transfer) based assays and reagents carried out in December 2009.
- This study was initiated by HTStec as part of its ongoing tracking of life science technologies and marketplaces. The main objectives were to comprehensively document current practices, requirements and future trends for TR-FRET based assay reagent technologies. The questions were aimed at providing vendors with updated information on the use of TR-FRET based assays since the previous (December 2007) report and direction as to where they should focus their future R&D efforts on reagent technologies. The data analysis was intended to determine whether geographic location and lab origin influenced respondent preferences and their experience in the use of TR-FRET based assays. The report also provides valuable insights for end-users of TR-FRET based assays and reagents.
- Equal emphasis was given to soliciting opinion from Pharma, Biotech and University/Research segments, in both North America and Europe.
- The survey looked at the following aspects of TR-FRET based assays and reagents as practiced today (2009) and in many cases as predicted for the future (2011): the relative use of generic assay technologies; metrics of a typical TR-FRET assay run in 2009; vendor's plate readers or imagers most used for TR-FRET assays; preferred reader or imager type when reading TR-FRET assays; assay or target classes of most interest to respondents; existing commercial TR-FRET assays used; assay preferences for a universal TR-FRET based kinase assay; why TR-FRET assays are chosen over alternative assay technologies; why alternative assay technologies are chosen over TR-FRET assays; use of commercial TR-FRET reagent offerings; TR-FRET reagent supplier most associated with various desirable characteristics and attributes; interest in outsourcing TR-FRET assays; total assay screening reagent budget and estimated future change; TR-FRET reagent budget and estimated future change; TR-FRET budget broken down into assay applications and estimated future change; TR-FRET budget broken down into offering/service types; budgets allocated per TR-FRET HTS screen; maximum price per TR-FRET data point for kits and tool box reagents; main reasons for choosing Cisbio's HTRF, PerkinElmer's LANCE and Invitrogen's LanathaScreen reagents.
- The main questionnaire consisted of 27 multi-choice questions and 3 open-ended questions. In addition, there were 6 questions related solely to survey demographics.
- The survey collected 52 validated responses (44 complete and 8 partially filled out) from 44 different organisations.
- Survey responses were geographically split: 48% North America; 48% Europe; and 4% Asia (excluding Japan).
- Survey respondents were drawn from individuals or groups actively engaged (key users) in assay development and screening who currently use or have recently used TR-FRET based assay and reagents. Feedback was also solicited from persons considering using them in the future or are about to initiate the investigation of TR-FRET readouts.
- Respondents came from 17 Medium-Small Pharma & All Biotechs; 14 Large Pharmas; 11 University, Research Institute, Gov't Labs & Not-for-Profit Facilities; 1 Other; and 1 Contract Research Organization.
- Most survey respondents had a senior job role or position which was in descending order: 14 section/group leader; 11 senior scientist/researcher; 10 research scientist; 6 director; 4 department heads: 3 principal investigator; 2 lab manager; 1 vice president; and 1 other.
- Respondents represented: 23 primary screening (HTS) labs; 12 assay development labs; 10 labs with a combination of drug discovery roles; 3 hits-to-leads labs; 2 other labs; 1 leads-to-candidate lab; and 1 basic research labs.
- Survey results were expressed as an average of all survey respondents. In addition, the data was fully reanalyzed after sub-division into the following 6 survey groups: 1) TR-FRET Preferred Technology; 2) TR-FRET NOT Preferred; 3) Large Pharma; 4) Medium/Small Pharma & All Biotech; 5) Europe; and 6) North America.
- 90% of respondents are currently using TR-FRET assays, and 52% stated TR-FRET was their preferred assay technology.

- Cisbio's HTRF and Promega's Luminescence assays were ranked the most frequently used generic assay technologies.
- The typical TR-FRET assay in 2009 was carried out in low volume 384-well plates and had the following median metrics: 10–25µL total assay volume; 200K–500K data points per screen; 4 TR-FRET screens per year; and 10% were cell-based TR-FRET assays.
- PerkinElmer was the most used plate reader vendor for reading TR-FRET assays. Filter-based plate readers were preferred for reading TR-FRET assays.
- The assay or target classes of greatest interest to survey respondents were protein kinases (non-RTK), protein-protein interactions, substrate modifying enzymes, GPCRs & receptor tyrosine kinases.
- The commercial TR-FRET assay applications most used were cyclic AMP and serine/threonine kinases.
- Respondent feedback was on TR-FRET was documented with respect: 1) the targets classes or analytes they would like to see offered; and 2) improvements or unmet needs in current offerings.
- With respect to a universal TR-FRET kinase assay the majority preferred an antibody-free universal kinase assay to one based on nucleotide (ADP) detection.
- The main reason influencing the choice of: 1) TR-FRET assays over alternative assay technologies was robustness & Z' factors; 2) an alternative assay technology in preference to TR-FRET assays was price.
- Cisbio's HTRF was the commercial TR-FRET reagent most used by respondents, with around 40% market share.
- Cisbio was the vendor most associated with the key attributes and desirable characteristics rated.
- The majority of respondents were not using and have no future plans to outsource TR-FRET assays to a fee-for-service provider. The most used fee-for-service providers (mainly for kinase compound profiling) were Millipore, Cerep and Invitrogen.
- Choice of Cisbio's HTRF was most influenced by assay performance; PerkinElmer's LANCE/LANCE ultra by previous experience; and Invitrogen's LanthaScreen by the specific assays offered.
- The median annual budget for ALL assay screening reagents in 2009 was \$100K–\$205K and is expected to increase a little in 2011.
- The median annual budget specifically for TR-FRET reagents in 2009 was \$50K–\$100K per lab, this represented around ¼ of the total assay screening reagent budget and it will stay approximately the same in 2011.
- The majority of the TR-FRET reagent budget was spent on kinase enzyme assays and cAMP cell-based assays. The biggest increases in future spending on TR-FRET assay applications are expected for cell-based assays.
- Off-the-shelf assay kits represented the biggest proportion of the TR-FRET reagent budget.
- The median budget for a TR-FRET HTS screen was \$25K–\$50K per lab.
- The median maximum price per TR-FRET data point was \$0.15/well for kits – large quantities (>100K data points); \$0.50/well for kits – small quantities (<100K data points); \$0.30/well for toolbox reagents. These prices assume a standardized assay volume of 20µL.
- A bottom-up model was developed around respondent's budget plans identified in the survey to estimate the global market for TR-FRET based assay reagent sales. The total market was estimated to be around \$75Million in 2009, equivalent to about 1,500 HTS screens per year. The market was segmented between Large Pharma and Small/Medium Pharma & All Biotech, and between Europe and North America. CAGR estimates were made for each segment in 2011.
- Several interesting differences in the survey group responses were identified, mainly with respect to the TR-FRET assay and budget metrics. Difference in the use of TR-FRET assays, applications and preferences were less obvious.
- PLEASE NOTE: In this report TR-FRET refers to *Time Resolved-Fluorescence Resonance Energy Transfer*. Examples of commercially available assay technologies based on the TR-FRET assay principle include: Cisbio's HTRF; PerkinElmer's LANCE and LANCE Ultra; Invitrogen's LanthaScreen; MDS Analytical Technologies IMAP TR-FRET; and Millipore KinEASE.

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## 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 50 market reports on drug discovery technologies and authored 30 review articles in Drug Discovery World.
- 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.
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