



Antibodies 2005:

Keys to Success In a Competitive Market

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Report Introduction

The 2005 Antibodies Report encompasses an overview of the antibody market, an introduction to the 2005 Antibody Survey, a thorough discussion of the survey findings, as well as conclusions and recommendations that are based on both market analysis and survey data gathered from researchers who use antibodies in their research. The Market Overview targets the technologies, tools, and reagents that support antibody production and proteomics applications that rely on antibody-based detection protocols. While sales of research products have slowed with downsizing of research departments in both the pharmaceutical and biotechnology industries, as well as from limited funding budgets for academic researchers, revenue from antibodies and related products for therapeutic and diagnostic uses is expected to grow annually, nearly doubling over the next five years. The goals and methodology of the 2005 Antibody Survey are outlined in the Survey Introduction, with important findings from each survey question described in the Discussion of Results. Comprising the bulk of this report, this section emphasizes antibody-based applications that drive this particular market. Additionally, key differences from the results of the 2004 Antibody Survey Report are highlighted. Overall conclusions and recommendations regarding the current antibody market are summarily presented in the final report section. The detailed survey questionnaire, data, and tabulated results can be found in the appendices.

Market Overview

According to the Human Genome Project, the estimate for the total number of genes in the human genome has been revised down from 30,000 – 35,000 to 20,000 – 25,000 (http://www.ornl.gov/sci/techresources/Human_Genome/project/20to25K.shtml). Despite the fairly low number of genes, the best estimates for the total number of proteins encoded by the human genome (the proteome) remain anywhere from 300,000 to 1 million. Ongoing efforts to study the proteome have kept the research antibody industry flourishing. Also reaping financial benefits are companies that provide reagents and devices required for antibody-related protocols. With basic science and drug developing researchers creating a tide of demand, the revenue stream from antibody-led protein hunts won't be drying up anytime soon.

"Interpreting proteomics is likely to be a daunting task as proteins are more complex than nucleic acids," said S. Ravi Shankar, an analyst at Frost & Sullivan. "Hence, technologies and instruments used for these experiments should be capable of adapting to the higher complexity and fragility of the human proteome."

Those technologies include methods to produce antibodies of the highest quality and tools to use them most efficiently. These endeavors resulted in \$374 million of revenue in 2003, according to Frost & Sullivan's 2004 report on the U.S. Research Biochemicals Market. Including revenue from restriction enzymes, nucleic acid isolation products, cell culture media and RNAi and siRNA products, the research biochemicals market netted \$1.6 billion in 2003 and could grow to \$2.3 billion by 2009. That accounts for a compound annual growth rate of 6.4%. The report also noted that the shift of focus from genomics to proteomics will mean increasing purchases of antibodies and cell culture reagents, which will keep sales figures rising.

Tools and accessories that support the use of antibodies are also riding the wave of purchases. These include magnetic and resin beads and chromatography columns for protein separation and purification. Consumption of supplies for microarrays, blots, electrophoresis, ELISA kits for protein profiling and other investigations also reflect antibody sales.

However, sales of research products have slowed as pharmaceutical companies reduce and downsize their research departments, the report explained. Mergers between companies further diminish the potential for sales. The academic and biotechnology front isn't very promising either. Budget reductions at the National Institutes of Health are restricting the purchase capacity of those dependent on governmental grants. Limited financial resources are driving customers to choose products that offer the best value. And companies that introduce innovative products will thrive.

In contrast, revenue from antibodies for therapeutic and diagnostic uses is expected to grow at an average annual growth rate of 11.5%, according to a 2005 report, "Dynamic Antibody Industry," published by the Business Communications Company. With an estimated market of \$15 billion in 2005, revenues should reach \$26 billion by 2010.

Survey Introduction

The 2005 Antibody Survey is intended to provide antibody suppliers with information about how they fare in the marketplace against their major competitors. Data were gathered from questions regarding the antibody-based applications that customers are using in their laboratory research, the types of antibodies they use (and from whom they regularly purchase antibodies), what custom antibody services researchers use, which important cellular targets lack commercially available antibodies, and how antibody-related product information is obtained. With this information, companies will be better able to position themselves in the growing antibody market by targeting applications of increasing interest to researchers. Additionally, vendors may consider expanding their customer service base for both products and to disseminate information about their antibody products, particularly by creating new product lines for important targets.

The 2005 Antibody Survey consisted of 27 questions. Of these, 2 were open-ended questions. Thirteen of the closed-ended questions included "other" as an answer choice, providing an opportunity for survey participants to comprise a more appropriate answer to the specific question that was asked. Demographic information was obtained from answers to 5 of the survey questions and from the addresses submitted by survey responders. The survey was administered on-line from August 15th – 24th, 2005, and the data tabulated and prepared for presentation.

Conclusions and Recommendations

The data gathered from the 2005 Antibody Survey indicate that researchers are sticking with their tried and true antibody-related methods and applications, but are willing to experiment with new antibodies in search of increased specificity and sensitivity, as well as to expand the targets they are currently able to detect. As most customers are clearly “shopping around” with every antibody purchase, vendors need to continue to listen to what researchers are asking for in order to gain market share. While Santa Cruz Biotechnology and BD Biosciences have near equal penetration into the antibody market, increased attention to providing user-friendly information on web sites, as well as prompt, accessible technical support and desired custom services, will be necessary for these vendors to stay on top as customer favorites. Antibody suppliers can peruse the list of targets for which antibodies are currently unavailable in order to expand product lines and refocus attention on the antibody types in highest demand.

Revenue from antibody-based technologies for diagnostics and therapeutics are predicted to grow steadily over the next 5 years. While other basic research applications are relatively stable, there continues to be a need for increased sensitivity and specificity of antibodies and detection reagents. The trend of custom services is moving away from peptide synthesis applications toward antibody and assay development, consistent with this trend toward growth in the preclinical and clinical areas of diagnostics and therapeutics.

With researchers increasingly looking on the internet for antibodies and related information, companies would be well served by redirecting marketing and advertising campaigns on-line. Such strategies will give customers the information they are seeking where they are looking for it already. By targeting the proper demographics, both vendor and customer will exceed each other's expectations and both will find great mutual benefit.

Appendix I: Questionnaire

In what type of institution do you work?

- Private Research
- Government
- Biotech
- Pharmaceutical
- Clinical Diagnostic Testing
- Academic
- Other

Which title best applies?

- Professor/Instructor
- Process Engineer
- Business Development Director/Manager
- Research Director/VP of Research
- Department Head
- Technician/Research Assistant
- Account Manager
- Graduate Student
- Staff Scientist
- Principal Investigator
- President/CEO/Owner/VP
- Lab Director/Chief Scientist
- Postdoctoral Fellow
- Procurement Manager
- Consultant
- Other

Which best describes your purchasing authority?

- Authorize
- Recommend
- Evaluate
- No Purchase Role

What is your principle area of research or work? (check all that apply)

- Bioinformatics
- Microbiology/Virology
- Immunology
- Genomics/Genetics
- Cell Biology
- Diagnostics/Pathology
- Drug Discovery
- Administration
- Biochemistry
- Marketing/Sales
- Pharmacology/Toxicology
- Molecular Biology
- Bioengineering
- Neuroscience
- Proteomics
- Purchasing
- None of the Above
- Other (please specify)

Do you work with antibodies?

- Yes
- No (exited from survey)

What types of antibody-based applications do you perform or plan to perform? (check all that apply)

- ELISA/EIA
- Western Blot
- Cell Enrichment
- Dot Blot
- Gel Shift
- Affinity Purification
- Immunofluorescence
- FACS/Flow Cytometry
- Radioimmunoassay
- ELISPOT
- Immunocytochemistry
- Multiplex Assay
- Immunoprecipitation
- In vivo Functional
- Immunohistochemistry
- Protein/Antibody Arrays
- Electron Microscopy
- Radial Immunodiffusion
- Blocking/Inhibition

Which of the following types of antibodies do you use? (check all that apply)

- Angiogenesis
- Modification State Specific (phosphor, acetyl, methyl)
- Stem Cell Markers
- Translational Control
- Nuclear Function
- Transcription Factors/Regulation
- Cell Cycle
- CD Markers
- DNA Damage and Repair
- Neurobiology
- Apoptosis
- Cell Signaling/Signal Transduction
- Secondary/Ig Specific
- Cytoskeleton
- Cell Adhesion
- Infectious Disease
- Cytokines and Growth Factors
- None of the Above
- Other (please specify)

From which company(s) do you purchase the antibody type(s) you chose in question 7? (A separate question is given for each antibody type chosen)

- Bethyl
- Calbiochem
- Upstate
- Santa Cruz Biotechnology
- Cell Signaling Technology
- BioSource
- Novus Biologicals
- Lab Vision
- Quantum Dot
- Sigma
- Jackson Immunoresearch
- Invitrogen (Zymed/Caltag/Molecular Probes)
- Chemicon
- Serotec
- Biogenesis/Antibodies by Design
- BD Biosciences
- Abcam
- Covance Research Products
- Affinity Bioreagents (ABR)
- R&D Systems
- Other (please specify)

How often do you purchase antibodies?

- Daily
- A few times a week
- Weekly
- A few times a month
- Monthly
- A few times a year
- Yearly
- Less than once a year
- None of the above

How often do you purchase an antibody you have never purchased before? (For example, a new antigen, a new conjugate or a new species)

- Daily
- A few times a week
- Weekly
- A few times a month
- Monthly
- A few times a year
- Yearly
- Less than once a year
- None of the above

Which of the following best describes your typical antibody purchase?

- I shop around only when purchasing an antibody not available from my usual supplier.
- I shop around every time I purchase an antibody.
- I always purchase from the same supplier.
- None of the above

When shopping for antibodies what do you look for? (check all that apply)

- Fastest delivery
- Best price
- Widest Selection (hard-to-find antibodies)
- Trusted Brand Name
- Highest Quality
- Other (please specify)

Which of the following would you identify as the biggest technical problem with your antibody-based methods?

- Lack of sufficient specificity
- Lack of available antibodies which are sufficiently specific
- Non-availability of direct conjugates
- Methods are not sufficiently quantitative
- Antibodies to certain targets are not available
- Other (please specify)

Where do you look for antibodies? (check all that apply)

- | | | |
|--|------------------------------|------------------------------|
| - Abcam | - Conferences | - SelectScience |
| - Sciquest | - Google | - Antibody supplier websites |
| - Biocompare | - Journal advertisements | - BioResearchOnline |
| - MSRS | - Antibody supplier catalogs | - Antibodyresource |
| - Linscott's Directory of Immunological and Biologica Reagents | - LabVelocity | - Journal references |
| - Email newsletters | - AfCS Antibody Database | - Other (please specify) |
| | - Colleague referral | |

What type of CUSTOM services do you use or plan to use? (Check all that apply)

- Ascites hybridoma expansion
- Polyclonal antibody development
- Antibody purification
- Antibody conjugation
- Immunohistochemistry
- Assay development
- In vitro hybridoma expansion
- Monoclonal antibody development
- Stable cell line development
- Custom plate coating
- Animal housing and care
- Peptide synthesis

Have you considered using custom recombinant monoclonal antibodies?

- Yes: I have used them
- Yes: I have considered it but decided not to use them
- No: I have never used them

Why did you decide not to use recombinant monoclonal antibodies? (open-ended)

How do you prefer to obtain technical support?

- Email
- Telephone
- Online

Are there antibodies against specific targets for which you have not been able to find a supplier?

- Yes
- No

Please list 1 to 3 specific targets for which you have not been able to find an antibody. (open-ended)

If no target is a particular protein modification, please specify amino acid and residue number.

Target 1 _____
Target 2 _____
Target 3 _____

Do you prefer to use directly conjugated primary antibodies or conjugated secondary antibodies?

- Directly conjugated primary antibodies
- Conjugated secondary antibodies

Which of the following commercially available secondary antibody conjugates would you use in your research?

(Check all that apply)

- Streptavidin
- Alkaline Phosphatase (AP)
- Horse Radish Peroxidase (HRP)
- Quantum Dots
- Alexa Dye
- PE
- CyDye
- IRDyes
- APC
- Biotin
- I do not purchase commercially available secondary antibodies – I perform secondary antibody conjugation myself
- I do not use secondary antibodies
- Other (please specify)

Which of the following directly conjugated primary antibody types would you use in your research?

(Check all that apply)

- Angiogenesis
- Modification State Specific (phospho, acetyl, methyl)
- Stem Cell Markers
- Cell Cycle
- CD Markers
- DNA Damage and Repair
- Neurobiology
- Secondary/Ig Specific
- Cytoskeleton
- Cell Adhesion
- Infectious Disease
- Translational Control
- Nuclear Function
- Apoptosis
- Cytokines and Growth Factors
- Transcription Factors/Regulation
- Cell Signaling/Signal Transduction
- I do not/would not use directly conjugated primary antibodies
- Other (please specify)