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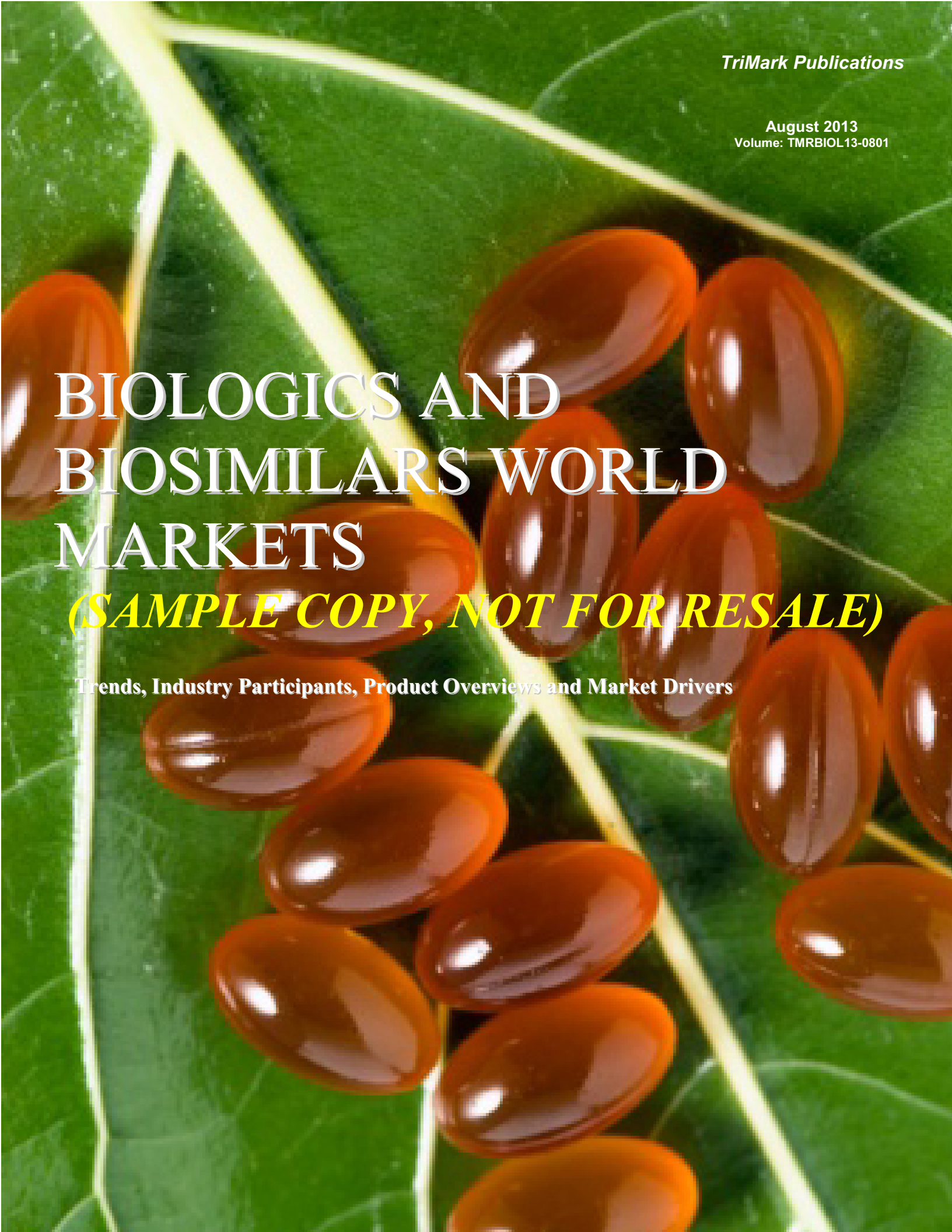

BIOLOGICS AND BIOSIMILARS WORLD MARKETS

(SAMPLE COPY, NOT FOR RESALE)

Trends, Industry Participants, Product Overviews and Market Drivers

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1. Overview

1.1 Statement of Report

The pharmaceutical and biopharmaceutical industries continue to be energetic, lucrative and growing segments, regardless of the slow ongoing recovery from worldwide economic problems. There are more than [redacted] therapeutics in R&D, both drugs (chemical substance pharmaceuticals) and biopharmaceuticals (biotechnology-derived pharmaceuticals), with [redacted] ongoing clinical trials. Among these, approximately [redacted]% or more than [redacted] to [redacted] candidate products in R&D are biopharmaceuticals. This is a significant increase from as short as [redacted] years ago and indicates a basic shift in the pharmaceutical industry from small molecule drugs to biopharmaceuticals for new, innovative and profitable products. This TriMark report is mainly focused on the development and market potentials of biopharmaceuticals (biologics) and biosimilar drugs.

Biopharmaceuticals are being developed by an ever-increasing number of companies, including Big Pharma and even generic drug companies, with many of these focused on developing biosimilars. As biopharmaceuticals are becoming important part of the pharmaceutical industry, several new firms are entering the field and existing manufacturers are expanding their bioprocessing capacity. While focused on cost-saving efforts, these biopharmaceutical firms are outsourcing many support and even critical tasks. The recent global economic downturn has done very little damage to the biopharmaceutical industry and there are now clear signs of real growth. Companies have started spending more in R&D and also are increasing their bioprocessing capacity.

The global market for biopharmaceuticals is now nearly $[redacted]; growing at about [redacted]% annually, definitely a very healthy rate. Launching of new products continue to support global market growth. The global market for recombinant protein therapeutics has exceeded the $[redacted]/year landmark. The impressive high growth rate in biopharmaceutical markets will continue to bring in investment in the industry, including at the expense of traditional small molecule drug developers. Larger companies are now paying attention to in-house manufacturing capacity instead of outsourcing their R&D and other tasks.

Biopharmaceutical firms in many emerging economies that are serving their domestic, regional or lesser-regulated international markets are witnessing rapid growth. Despite the fact that majority of drugs (mostly generics) are now being manufactured in China and India, no Asian country yet manufactures biopharmaceutical products marketed in the U.S. or the European Union (E.U.). South Korea is another country that has the potential to become one of the manufacturing centers of biopharmaceuticals. Nowadays, Ireland has become the choice for large companies to build their biopharmaceutical manufacturing facilities.

1.2 About this Report

This study first describes the existing and projected markets for pharmaceuticals in general, encompassing regional and country-wise trends. The data provided give an insight into the market potential of pharmaceutical drugs in general and also the sales revenues generated by specific drugs used in different therapeutic areas. Drugs losing patent protection from [redacted] to [redacted] are listed their volume of business in the past few years also have been shown. The predominance of generic drugs in the emerging markets is well documented with the support of graphs and tables. The report illustrates how the generics are gaining a foothold in the under-penetrated markets such as Japan and Western Europe with the assistance of government regulations and incentives. The report mainly discusses about the emergence of biologics and biosimilars and their potential role in shaping the future of global healthcare industry.

The main objectives of the analysis in this report are:

- To analyze the changing dynamics of the pharmaceutical market.
- To look into the ever increasing public healthcare expenditure that drives the growth of pharmaceutical market.
- To assess the potential global market for pharmaceutical drugs and the current market in different geographical regions.
- To identify the drugs losing patent protection until [redacted] by country.

- To estimate the loss of big pharmaceutical firms due to patent expiries.
- To evaluate the decline in market share for branded drugs by geography.
- To study the global and regional markets for generics.
- To analyze the utilization rates for generics in various countries.
- To identify the top ten generic markets in the world.
- To assess the savings from generics use in the U.S.
- To identify the therapeutic areas that lead in generics savings.
- To identify the top [redacted] generic launches from [redacted] to [redacted].
- To estimate the global market for biologics.
- To identify the largest selling biologics.
- To analyze the large number of clinical trials involving biologics.
- To identify the leading manufacturing firms in biologics.
- To estimate the uptake of biologics by region/country in [redacted].
- To find the number of biosimilars approved in the E.U.
- To estimate the global and regional markets for biosimilars.
- To identify the centers of fast-growing biosimilars markets.

By purchasing this study, the reader will gain:

- An understanding of the regulatory pathways for branded pharmaceuticals and the biologics.
- An understanding of how the generics and biosimilars have successfully eroded the strong and unassailable positions enjoyed by the branded and biologics.
- An insight into the number of patent expiries in the domain of branded and biologics drugs and the consequent wave of opportunities for generics and biosimilars in the next ten years.
- An understanding of how the pharmaceutical firms are changing their business strategies by shifting their focus from developed markets to the emerging markets in order to retain their share in pharmaceutical business.
- An insight into the vast number of biologics in clinical trials and their applications in various clinical needs.

Key questions answered in this review are:

- Does the pharmaceutical industry possess the required level of immunity to withstand the onslaught of economic vagaries around the globe?
- What are the growth rates for the pharmaceutical market in North America, Japan, Western Europe, Latin America, Eastern Europe and Asia/Africa regions?
- What are the comparative growth rates for branded and generic drugs?
- What is the average price difference between branded and generic drugs in the U.S. and European markets?
- What is the projected market value for branded, generic, biologic and biosimilar drugs from [redacted] to [redacted] in different geographic regions and countries?
- Which are the leading manufacturing companies of branded, generic, biologic and biosimilar drugs, what share do they have in the global and regional markets?
- Which are the leading MNC companies operating in the two largest emerging markets; China and India?

1.3 Scope of the Report

This analysis mainly dwells on the global and regional markets for branded, generic, biologic and biosimilar drugs to emphasize generic and biosimilars are gaining market shares from branded and biologic drugs. The report discusses in detail how the patent expirations of a large number of branded and biologic drugs are paving the way for the ascendancy of generics and biosimilars in the global pharmaceutical landscape. The report does not discuss the profiles of all the participating firms in the pharmaceutical industry, but focuses only on the leading manufacturing firms which control the market globally with a larger share in the market. The reader can consult other TriMark Publication reports on the TriMark website to gain insight into other pharmaceutical sub-segments.

1.4 Objectives

Between [redacted] and [redacted], the pharmaceutical industry is facing the largest and most unexpected loss of revenue in history. During this period, about [redacted] of the top [redacted] blockbuster drugs are losing patent protection, causing losses for almost all the big pharmaceutical firms. This period provides unlimited opportunities for the generics to flood the market and garner a larger share in almost all the geographical segments of the market. Lipitor, Plavix, Singulair, Seroquel, Actos, Lexapro and Zyprexa lost the patent protection in [redacted] and [redacted] and other drugs will be losing the protection between [redacted] and [redacted].

Biologics are medicines of large complex molecules manufactured through cell culture recombinant DNA technology and comprise recombinant insulin, growth hormone and monoclonal antibodies for treating conditions such as cancer and autoimmunity. The manufacture, testing and quality control of biologics is an expensive process, and therefore they represent some of the most expensive pharmaceutical products. However, they represented [redacted]% of global pharmaceutical spending, with sales value reaching about $[redacted] in [redacted]. Just as generics are to branded drugs, biosimilars are to biologics and adoption of biosimilars can effectively bring down the healthcare expenditure significantly.

Currently, the biosimilars market is relatively small focused only on a small number of diseases; but the market has been predicted to grow substantially particularly in the U.S. and the developing economies such as Brazil and South Korea. The U.S. is an important market representing about [redacted]% of the potential market that biosimilars firms need to tap into in the coming years. Faced with patent expiries, the pharmaceutical industry, generics and biotech firms are turning, for future revenues, to biosimilars. Thus, this report discusses in detail, the various strategies adopted by the pharmaceutical manufacturing firms to retain their market shares, expand their sphere of influence in different market segments and excel in their performance.

1.5 Methodology

The author of this report is a retired college professor with more than three decades of experience in teaching, biochemistry, biochemical pharmacology, biotechnology, genetics and cell biology. He also has six years of experience in editing healthcare related market research reports. Company-specific information is obtained mainly from industry trade publications, academic journals, news and research articles, press releases and corporate websites, as well as annual reports for publicly-held firms. Additionally, sources of information include non-governmental organizations (NGOs), such as the World Health Organization (WHO), and governmental entities like the U.S. Department of Health and Human Services (HHS), and U.S. federal agencies such as the National Cancer Institute (NCI), the National Institutes of Health (NIH), the Food and Drug Administration (FDA), the American Cancer Society (ACS) and the Centers for Disease Control and Prevention (CDC). Where possible and practicable, the most recent data available have been used. Some of the most valuable data were sourced from the most recently published report "World Preview [redacted], Outlook to [redacted]," by EvaluatePharma in June [redacted]. These data offer insight into the [redacted] sales of different classes of drugs including the top-selling biologics. Data on monoclonal antibodies (mAb) were sourced from articles from Antibody Society.

Some statistical information was taken from Biotechnology Associates' databases and from TriMark's private data stores. The information in this study was obtained from sources that we believe to be reliable, but we do not guarantee the accuracy, adequacy or completeness of any information or omission, or the results obtained by the use of such information. Key information from the business literature was used as a basis to conduct dialogue with and obtain expert opinion from market professionals regarding commercial potential and market sizes. Senior managers from major company players were interviewed for part of the information in this report.

Primary Sources

TriMark collects information from hundreds of Database Tables and many comprehensive multi-client research projects, as well as Sector Snapshots that we publish annually. We extract relevant data and analytics from TriMark's research as part of this data collection.

Secondary Sources

TriMark uses research publications, journals, magazines, newspapers, newsletters, industry reports, investment research reports, trade and industry association reports, government-affiliated trade releases and other published information as part of its secondary research materials. The information is then analyzed and translated by the Industry Research Group into a TriMark study. The Editorial Group reviews the complete package with product and market forecasts, critical industry trends, threats and opportunities, competitive strategies and market share determinations.

TriMark Publication's Report, Research and Data Acquisition Structure

The general sequence of research and analysis activity prior to the publication of every report in TriMark Publications includes the following items:

- Completing an extensive secondary research effort on an important market sector, including gathering all relevant information from corporate reporting, publicly-available data and proprietary databases.
- Formulating a study outline with the assigned writer, including important items, as follows:
  - Market and product segment grouping, and evaluating their relative significance.
  - Key competitors' evaluations, including their relative positions in the business and other relevant facts to prioritize diligence levels and assist in designing a primary research strategy.
  - End-user research to evaluate analytical significance in market estimation.
  - Supply chain research and analysis to identify any factors affecting the market.
  - New technology platforms and cutting-edge applications.
- Identifying the key technology and market trends that drive or affect these markets.
- Assessing the regional significance for each product and market segment for proper emphasis of further regional/national primary and secondary research.
- Completing a confirmatory primary research assessment of the report's findings with the assistance of expert panel partners from the industry being analyzed.

1.6 Executive Summary

The biopharmaceutical market keeps on expanding. There are now over [redacted] therapeutic candidates in R&D and about [redacted]% of them are biopharmaceuticals. There is a visible trend of a shift towards biopharmaceuticals, with the large traditionally small molecule drug-oriented Big Pharma firms shifting their focus on biopharmaceuticals. For these firms, biopharmaceuticals offer higher sales and profits per sale. The global biopharmaceutical market is now about $[redacted] per year. The biopharmaceutical market continues to increase globally, with a CAGR of about [redacted]% to [redacted]%, making biopharmaceuticals a fairly recession-proof, growing and profitable industry. Biotech drugs are anticipated to grow two to three times faster than the pharmaceutical market as a whole. Industry experts have estimated that there will be $[redacted] in patent expiries of biologic drugs by [redacted], and [redacted]% of today's biotech drugs will be off-patent by [redacted]. Sensing the market potential of biologics the larger global companies have declared programs to produce innovative drugs, biosimilars or follow-on biologics in all the major classes. Totally, [redacted] biologic drugs are available in the global market and among them [redacted] are proteins, [redacted] are antibodies and [redacted] are vaccines. Protein-based drugs are a fast growing class on the pharmaceutical market, with thousands of candidates in development. [redacted] of the top [redacted] prescription drugs in [redacted] were biologics. AbbVie's Humira (monoclonal antibody $[redacted]), Amgen's Enbrel (monoclonal antibody $[redacted]), Johnson & Johnson/ Merck's Remicade (monoclonal antibody $[redacted]), Sanofi-Aventis' Lantus (long-acting basal insulin $[redacted]), and IDEC's MabThera (chimeric monoclonal antibody $[redacted]) took the first [redacted] places in the global prescription drugs market.

The global demand for recombinant proteins now exceeds $[redacted], and the industry reached this milestone two years ago in [redacted]. The market for recombinant monoclonal antibodies alone now stands at about $[redacted] and this represents approximately [redacted]% of the recombinant protein market and [redacted]% of total biopharmaceuticals market. The antibodies are usually very specific in their action, do not cause severe side effects and therefore well-received in the market. As many new monoclonal antibodies have reached the final stage of clinical trials that will be available for expanded indications. The earliest approved monoclonal antibody was muromonab-CD3 in [redacted]. Yet, the monoclonal antibodies became financially viable only after the approval of rituximab, palivizumab, infliximab and trastuzumab in the late [redacted]. Technologies in genetic engineering enabled the synthesis of these highly successful biologic products. Global market for monoclonal antibodies was about $[redacted] in [redacted] and it is predicted to grow at a CAGR of [redacted]% through [redacted]. These biologics are mostly used in cancer therapies and the leading players in this sector are Roche, Abbott, Johnson & Johnson and Merck.

Biosimilars have also increased in number and gained importance. Presently, the markets for approved biosimilars in Europe remain relatively small, only about $[redacted] for a [redacted] products, generally no more than [redacted]% of the market for the established reference product. The utilization and market penetration of biosimilars has been slowly increasing, as E.U. member and other countries have started implementing their own cost-controls and recommendations for biosimilars use, and as these countries' health care systems adopt these products. Howsoever, unlike Europe, utilization and market penetration by biosimilars in the U.S. is likely to be more rapid, upon approval, with private sector insurers expected to rapidly adopt and require use of biosimilars wherever possible. Therefore, it is reasonable to predict that biosimilars will have a global market of several billion dollars over the next few years. Many more companies are entering the biosimilars industry and all these firms are most likely to bring in many other new products. Thus, biosimilars will only be fracturing the markets for successful biopharmaceuticals coming off-patent.

As of April [redacted], there were more than [redacted] biopharmaceutical drugs cleared in the U.S. and European markets, including [redacted] recombinant proteins and [redacted] monoclonal antibodies. There were [redacted] biologics cleared in both the U.S. and Europe, including [redacted] recombinant proteins and [redacted] monoclonal antibodies. There are a minimum of [redacted] biologic drug candidates with FDA applications either pending or expected within coming months. The U.S. accounts for approximately [redacted] of global biopharmaceutical sales. Thus, U.S. sales of biologic drugs have been estimated to be in the range of $[redacted] to $[redacted] annually. The U.S. economy and health care system can afford to support adoption of new biopharmaceuticals. The same is not true for other major market countries, where cost-conscious centralized government control of pharmaceutical markets, *e.g.*, U.K., can lead to reluctance to adopt certain biologics which are quite expensive. Growth in most of the rest of the world seems to be propelled more by overall economic improvement, including the development of a middle class, and other broad economic and social trends supporting improved health care in these countries. The most important class of biopharmaceuticals showing the fastest growth in market revenue is recombinant monoclonal antibodies. Monoclonal antibodies have become well-entrenched in the marketplace, having proven to be effective therapeutics candidates since the mid-[redacted]. Quite a large number of mAb products are blockbusters, with many of these used for cancer treatment.

