

Medical Device Market for Non-Invasive Cancer Treatment

March, 2017.

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Introduction

This research contains information for medical devices market in general and for cancer treatment. There is data for biggest M&A activity in this market and a list of companies which showed interest in cancer treatment.

Medical Devices Market -US

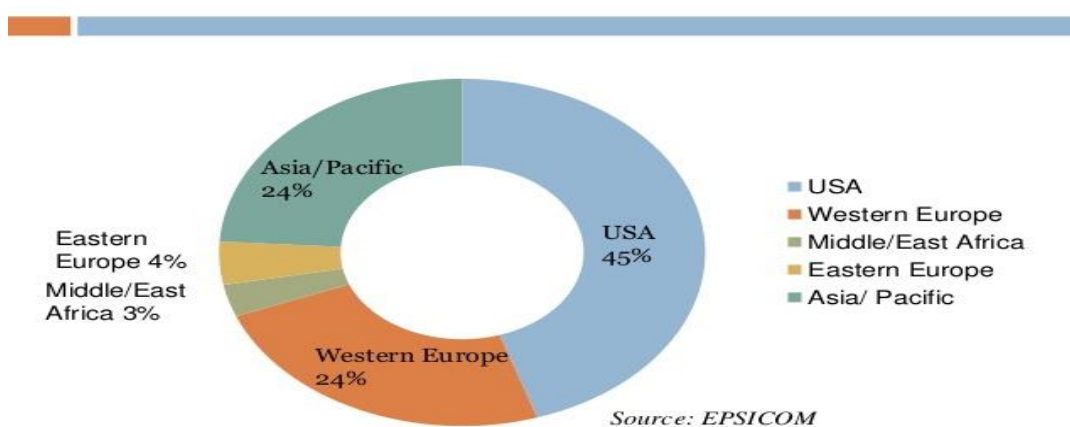
The global medical devices market offers tremendous opportunity for U.S. manufacturers, as well as significant challenges, for government policymakers seeking to support U.S. export competitiveness in overseas markets. Creating new and sustained export opportunities for U.S. companies will require a concerted effort to remove or diminish market access barriers, helping U.S. firms to capture a larger share of the world import market. Encouraging and fostering U.S.-based healthcare industries is critical to the future of the U.S. economy, which is why medical technology is a National Export Initiative priority. Despite uncertain economic conditions in key markets around the world, large and small players in the U.S. medical device industry show adaptability and tenacity, and companies are optimistic about the future. Medical device companies have found new opportunities for development in the face of uneven international economic growth and continually-changing regulatory systems.

Figure 1: Near-Term Medical Device Export Market Rankings

1. Germany	5. Belgium	9. France	13. Norway	17. Denmark
2. Japan	6. Switzerland	10. Australia	14. Sweden	18. Singapore
3. Netherlands	7. United Kingdom	11. Mexico	15. Italy	19. Ireland
4. Canada	8. China	12. Austria	16. Korea	20. Israel

http://www.trade.gov/topmarkets/pdf/Medical_Devices_Executive_Summary.pdf

GLOBAL MEDICAL DEVICE MARKET



<https://www.slideshare.net/Rushikeshmarkad/medical-device-industry-2015>

The United States remains the largest medical device market in the world with a market size of around **\$148 billion, and it is expected to reach \$155 billion by 2017**. The U.S. market value represented about 43 percent of the global medical device market in 2015. U.S. exports of medical devices in key product categories identified by the Department of Commerce(DOC) exceeded\$44 billion in 2015.

There are more than 6,500 medical device companies in the United States, mostly small and medium-sized enterprises (SMEs). More than 80 percent of medical device companies have fewer than 50 employees, and many (notably innovative start-up companies) have little or no sales revenue. Medical device companies are located throughout the country, but are mainly concentrated in regions known for other high-technology industries, such as microelectronics and biotechnology. The states with the highest number of medical device companies include California, Florida, New York, Pennsylvania, Michigan, Massachusetts, Illinois, Minnesota and Georgia. Other states with significant sector employment include Washington, Wisconsin, and Texas.

Medical Device Market Size

The largest medical device market in the world today is located in the United States. **It has already exceeded \$100 billion in total size and expected to exceed \$130 billion by the end of 2016**. From a global standpoint, this reflects about 40% of the total medical device market that currently exists. If US exports of medical devices are included, an additional \$40 billion per year gets added to the US total and exports are increased at an annual rate of 7%.

What is unique about the medical device market size in the United States is that no one large company dominates the industry. There are over 6,500 medical device companies that are currently in operation right now and most of them are either small- or medium-sized businesses. Over 80% of these businesses employ fewer than 50 employees.

<https://www.selectusa.gov/medical-technology-industry-united-states>

U.S. MEDICAL DEVICE INDUSTRY BY THE NUMBERS

\$110 BILLION

U.S. MEDICAL DEVICE MARKET SIZE AVERAGE



EXPECTED TO REACH
\$133 BILLION BY 2016



PERCENTAGE OF GLOBAL
MEDICAL DEVICE MARKET
REPRESENTED BY U.S. IN 2012

38%



EXPORTS OF MEDICAL DEVICES IN KEY PRODUCT CATEGORIES EXCEEDED \$44 BILLION IN 2012
(THAT'S UP MORE THAN 7% FROM PREVIOUS YEAR)

6,500 MEDICAL DEVICE COMPANIES

MOSTLY SMALL AND MEDIUM SIZED

80% HAVE FEWER THAN 50 EMPLOYEES

MANY HAVE LITTLE OR NO SALES REVENUE



<http://brandongaille.com/medical-device-market-size/>

Medical Devices Market- Asia

Ion Beam Applications S.A. (IBA), a company based in Louvain-La-Neuve, Belgium, is a leading provider of proton therapy and has secured deals in many Asian countries. In June 2015, IBA and Philips Healthcare agreed to provide proton therapy systems to India's Apollo Group at the Chennai hospital and Tata Memorial Center. In September 2015, South Korea's National Cancer Center announced the installment of IBA's pencil beam scanning (PBS) system. In December 2016, IBA's proton therapy system, ProteusONE, received regulatory approval from Japan's Pharmaceuticals and Medical Devices Agency (PMDA). IBA also signed a contract with Taiwan's Tomorrow Medical Systems Co. Ltd. to install a second ProteusONE system.

IBA will also install a proton therapy system in China, having signed a contract with Concord Medical Services Holding Ltd. in 2016.

Another proton therapy manufacturer, Varian Medical Systems (based in Palo Alto, California), will install its ProBeam system at Hefei Ion Medical Center (HIMC). HIMC will be China's first government-owned proton center and is expected to be operational by the end of 2018. Like IBA's ProteusONE, Varian's ProBeam uses PBS, which allows for precise treatment of tumors that are next to critical organs or have irregular shapes.

ViewRay, Inc. is another successful medical company in Asia. Based in Oakwood Village, Ohio, ViewRay manufactures the MRIdian system, a cancer treatment that combines both MRI and radiation. In recent months, two hospitals in Japan have purchased the MRIdian system. The first system is expected to be operational in the first half of 2017. ViewRay's first international MRIdian system was installed at Seoul National University Hospital in September 2015.

Pyrexar Medical, headquartered in Salt Lake City, Utah, also installed two of its HyperThermia systems in Korean hospitals at the end of 2015. HyperThermia uses therapeutic heating to treat cancer. Therapeutic heating also attempts to destroy cancer cells while minimizing damage to surrounding healthy tissue. HyperThermia damages oxygen-deprived cancer cells with a low pH. Healthy cells do not have these two characteristics and are left undamaged by the therapeutic heating.

Accuray, Inc., located in Sunnyvale, California, has also succeeded in the Asian medical device market. In December 2016, Hong Kong Sanatorium & Hospital (HKSH) signed an agreement with

Accuray to acquire three Radixact Systems to upgrade HKSH's CyberKnife M6 System. Radixact is Accuray's latest helical radiation therapy technology and their first systems only started treating patients in early December 2016. Upon installation, HKSH will become the first hospital in Asia to offer both the Radixact System and CyberKnife M6 System.

In addition to installing medical devices and technology in Asian hospitals, Western companies are also working with Asian companies to develop new treatments. On September 29, 2016, Intuitive Surgical of Sunnyvale, California announced a \$100 million joint venture with Shanghai Fosun Pharma Co. Ltd. Intuitive Surgical will work with the Chinese firm to make robotic products to tackle lung cancer. The joint venture will be based in Shanghai, where both the research and development and manufacturing of the products will take place.

https://www.medtechintelligence.com/feature_article/asia-cancer-market-update-2016/

MEDICAL DEVICE COMPANIES WITH CANCER DEVICE PRODUCTS

In cancer diagnostics and equipment, Western companies have a majority of the market share. GE, Siemens, Philips and Toshiba are particularly strong players in this sector. These companies are introducing modified cancer diagnostic and monitoring equipment designed for the Indian market. Again, medical equipment that will be most successful in the Indian market should be easy-to-use, portable, durable, cheaper and have fewer bells and whistles.

For example, in early 2014, GE launched a PET/CT scanner in India, priced 40% less than competing scanners. GE and Nuclear Healthcare have partnered to establish 120 molecular imaging centers in India by 2015. Every center will have an advanced PET/CT scanner, while some will also have PET Trace Medical Cyclotrons. Toshiba has been successfully selling radiology equipment to hospitals in second tier cities — who are buying more advanced oncology equipment in a rush to compete for patients.

Siemens and Philips are also market leaders in the Indian cancer imaging market. Since 2011, Philips has been selling its MRI-guided HIFU system to major Indian hospital chains like Apollo and Fortis. In addition, Philips has been promoting its TruFlight Select PET/CT system that aids in early detection of cancer. Siemens' CT simulators/scanners have also been popular in India.

GE has a particularly strong presence in the Indian cancer treatment market. At GE's Indian development center, the company is working on 100 new cancer treatment products. GE has already launched half a dozen such products, and plans to launch 10 to 15 more products throughout 2014.

GE has also partnered with local Indian companies to develop cancer related services and products. GE and the Indian institute of Technology Madras' Healthcare Technology Innovation Center (HTIC) announced a 3-year research and development agreement in January 2014. GE and India's Max Healthcare announced a partnership in March 2014 to develop cancer treatment protocols and pathways, a training institute and a virtual expert consultation program.

Advanced treatment options for cancer are increasingly spreading to India. For instance, last year Apollo Hospitals announced a partnership with Belgium's Ion Beam Applications to build India's first proton therapy center, which will be operational in 2016.

Western manufacturers of diagnostic tests for cancer are also succeeding in the Indian medical market. Mobile cancer screening laboratory units and portable equipment are in high demand. In February 2014, Qiagen launched a HPV test that was designed for areas with limited healthcare infrastructure and resources. The careHPV Test is portable, durable, easy to use and cost effective. The system utilizes self-contained reagents and easily understandable color-coded menus. It can withstand temperature variations and operate in situations of limited water or electricity.

HEALTHCARE PROVIDERS IN INDIA

The growing number of cancer cases is increasing the demand for cancer treatment and equipment. Many Indian hospital and healthcare companies — such as Apollo, Manipal, Healthcare Global and Max Healthcare — are key players in cancer treatment. Max Healthcare is increasing its cancer care investment by 40% annually. Healthcare Global has built 27 cancer care centers in the past 8 years and plans to invest almost \$120 million over the next 3 years.

Some Indian home healthcare companies are starting to offer in-home chemotherapy assistance. This increasingly popular type of service is more affordable and allows more Indians to access cancer care without having to travel long distances to a specialized hospital.

Western cancer product companies are also entering the Indian cancer treatment market. For instance, in March 2014, GE announced a partnership in India with U.S. based Cancer Treatment Services International (CTSI). The two companies will invest \$120 million to develop a network of 25 cancer care centers throughout India over the next 5 years.

<http://www.pacificbridgemedical.com/publication/india-growing-cancer-market-offers-opportunities-to-western-medical-device-companies/>

THE CANCER TREATMENT AND DIAGNOSTIC SECTOR IN CHINA

Over the past decade, China has invested heavily in improving healthcare — including strengthening the country's cancer system. Since 2009, the government has spent almost \$300 billion on healthcare reforms. This has included upgrading healthcare facilities and products as well as expanding medical insurance coverage, making better care more affordable for hundreds of millions of its citizens. The Chinese government is expected to spend another \$600 billion on healthcare by 2025. Additionally, Chinese medical insurance has expanded to cover almost 75% of inpatient care expenses for 8 common cancers, although such insurance is still limited.

<http://www.pacificbridgemedical.com/publication/chinas-rapidly-expanding-cancer-market-many-opportunities-for-western-medical-device-companies/>

Medical Devices Market for Cancer Treatment

Cancer/Tumor Profiling Market worth 61.87 Billion USD by 2021

The global Cancer/Tumor Profiling market is poised to reach USD 61.87 Billion by 2021 from USD 25.82 Billion in 2016, at a CAGR of 19.1% from 2016 to 2021.

Major factors fueling market growth are increasing number of cancer cases across the globe, the increasing utility of biomarkers, and availability of funding for cancer research. On the other hand high capital investments and low benefit ratio for biomarkers used in cancer/tumor profiling are expected to limit Cancer/Tumor Profiling market growth to a certain extent. Factors such as the increasing demand for personalized medicine and point-of-care diagnostic tests in cancer/tumor profiling are expected to offer a wide range of growth opportunities for players in the cancer/tumor profiling market.

The global Cancer/Tumor Profiling market is segmented on the basis of technology, technique, application, and region. On the basis of applications, the cancer/tumor profiling market is broadly segmented into personalized medicine, biomarker discovery, diagnostics, prognostics, and research applications. The personalized medicine segment is expected to account for the largest share of the global cancer/tumor profiling application market in 2016. Advantages such as reduced probability to adverse drug reactions, better prediction of cancer, and better targeted therapy for the treatment of cancer are contributing to the large share of the personalized medicine segment in the cancer/tumor profiling market.

Furthermore, based on technique, the cancer/tumor profiling market is segmented into genomics, proteomics, epigenetics, and metabolomics. The genomics segment is expected to account for the largest share of the cancer/tumor profiling technique market in 2016. Factors such as increasing investments, grants, and funds by governments; growing research in the field of genomics; and rising application of genomic sequencing in diagnostics are contributing to the growth of this segment.

The Cancer/Tumor Profiling market is dominated by established players such as Illumina Inc. (U.S.), QIAGEN N.V. (Netherlands), NeoGenomics Laboratories (U.S.), HTG Molecular Diagnostic (U.S.), and Genomic Health Inc. (U.S.).

U.S. Cancer Epidemic Leads To Strong Growth In Cancer Treatment Market

The American market for interventional oncology (IO) devices is a large, diverse, and changing, encompassing many different methodological approaches to the treatment of cancer. **In 2015, the IO market was valued at over \$3 billion USD.** Included in our analysis are the markets for external radiation therapy devices, internal radiation therapy devices, ablation devices, and particle embolization devices.

While the market is in a relatively stable state, expected fluctuations in the external radiation segment have had a strong impact on the overall forecast. In 2015, the market for linear particle accelerators (LinAccs) was over 60 percent of the entire IO market. One of the common denominators underlying the various segments of the IO market is the increase in the potential patient base.

External Radiation Devices Remain The Largest Market

In 2015, the external radiation (RTx) segment was by far the largest segment of the IO market. The RTx market is divided into LinAccs and proton therapy (PT) devices. While it is true that cobalt-60 (Co-60) machines are sometimes used, the U.S. market for these devices is virtually non-existent. The market for these devices is thriving in less-developed countries, but they have been almost entirely replaced by LinAccs in the United States. Having reached saturation a few years ago, the market for LinAccs is almost entirely made up of replacements. Proton devices are the new and upcoming technology in the field of RTx.

PT devices have been making steady inroads in the U.S. As an early adopting ground for growth, the U.S. often receives new technologies before they spread out across the globe. As of the end of 2015, 22 PT centers were scheduled to be in operation in the U.S. PT devices have a monumental price tag: Some machines can range upwards of \$200 million, making them, by far, the most expensive piece of medical equipment ever created. For example, the Mayo Clinic in Minnesota spent \$370 million building its two machines. Until recently, this technology was limited to large facilities.

However, companies have been making serious inroads in developing more cost-effective options. Mevion Medical Systems' s250 is dominating the market in terms of future growth. While only one is currently in operation, Mevion leads the market with 33 percent of the planned facilities expecting to use the s250. Varian Medical Systems has also been attempting to pioneer a new compact form of its ProBeam.

Internal Radiation Market Set To Recover By 2022

While the internal radiation (RTi) segment has been in a general decline, it is set to recover considerably over the report's forecast period. The RTi market is divided into high-dose-rate (HDR) products and low-dose-rate (LDR) products. The newest RTi modality, pulse-dose-rate (PDR), is not yet used in any considerable way within the United States, but is much more common in Europe.

One of the largest limiters for the LDR market had been the reduction in PSA tests. In 2012, several national U.S. authorities issued a statement advising against PSA testing for prostate cancer in asymptomatic men. This led to reductions in all LDR sub-segments. Total units sold of LDR seeds (Cesium-131, Palladium-103, and Iodine-125) and needles fell equally, as 90-95 percent of all LDR treatments administered were being used on prostate cancer.

However, as the health care model in the U.S. undergoes dramatic reform, it is predicted that both the LDR and HDR modalities will undergo substantial growth as they are provided new avenues to expand. In 2013, a push toward reimbursement based on "bundled payments" began. When a patient requires care for a specific issue, the bundle is defined as the group of treatments or services provided to the patient so that they may be restored to optimal health. This system places brachytherapy ahead of other modalities in a much more cost-efficient position. In addition, as a result of the Affordable Care Act (ACA), millions of previously uninsured Americans now have insurance. Both of these drivers will add substantially to the demand for RTi procedures.

<https://www.meddeviceonline.com/doc/u-s-cancer-epidemic-leads-to-strong-growth-in-cancer-treatment-market-0001>

Ultrasound Medical Devices Global Market - Forecast to 2023

The global ultrasound medical devices market is poised to grow at a mid range single digit CAGR to reach \$10,106 million by 2023. Ultrasound medical devices market is mainly classified into technology, display, portability, application and end-users.

The global ultrasound medical devices market by technology is divided into diagnostic ultrasound and therapeutic ultrasound. The diagnostic ultrasound is further classified into 2D ultrasound, 3D & 4D ultrasound and Doppler ultrasound. The therapeutic ultrasound segment includes High Intensity Focus Ultrasound (HIFU) and Extracorporeal shockwave lithotripsy (ESWL) ultrasound devices.

Among the ultrasound technology market, the diagnostic ultrasound segment dominated the market by occupying a largest share and therapeutic ultrasound market is the fastest growing segment from 2016 to 2023. In display, color ultrasound devices segment holds the largest share and fastest growing segment from 2016 to 2023. Likewise, under portability section trolley/cart based ultrasound devices segment holds the largest share and compact/handheld ultrasound devices is the fastest growing segment with a CAGR of 8.1% from 2016 to 2023.

Based on ultrasound application, the radiology/general imaging market dominated the market by occupying a largest share and cancer application market is the fastest growing segment from 2016 to 2023. By end-users, hospital is the largest segment and the fastest segment with a CAGR of 6.2% from 2016 to 2023. Geographical wise, Europe is the largest market followed by North America, Asia and Rest of the World. The Asia region is the fastest growing region with a CAGR of 6.5% from 2016 to 2023 suggesting an array of opportunities for growth and likely to be getting into the eyes of new investors in the ultrasound medical devices market. Growth in the Asian market is attributed to rising prevalence of lifestyle diseases and government initiatives in establishing innovative technologies and demand for sophisticated medical services.

<http://www.prnewswire.com/news-releases/ultrasound-medical-devices-global-market---forecast-to-2023-300425025.html>

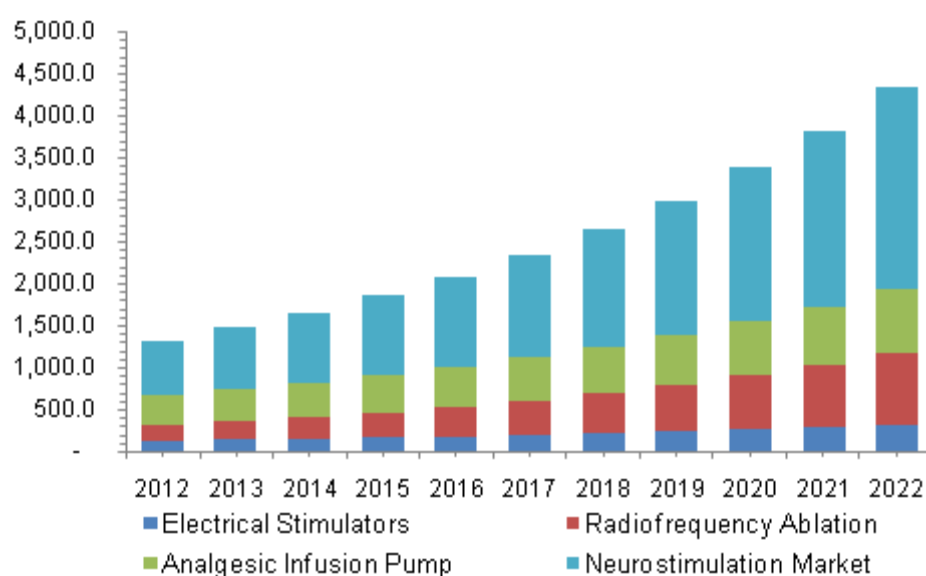
Pain Management Devices Market Size & Forecast By Type

The global pain management devices market was valued at USD 3,185.5 million in 2014 and is expected to increase at a rate of 13.4% over the forecast period. The high prevalence of diabetes coupled with rising geriatric population base is a high impact rendering driver for this market.

The market is expected to be primarily driven by the huge geriatric population base suffering from and susceptible to various diseases; for instance, the non-communicable diseases including cardiovascular disorders, cancer, and diabetes account for around 87% of the burden in the aged population globally.

Moreover, the rise in the number of people suffering from cancer has led to a consequential rise in the chronic pain among patients suffering from this disorder. The pain usually arises from a tumor compressing a nerve and other factors depending upon the stage of cancer. The therapies given to the patients are also the potential contributor towards the cancer pain. As per the estimates, around 20%-50% of cancer patients experience acute pain at the time of diagnosis and around 75% complain about pain during the disease progression.

North America pain management devices market share, by type, 2012 - 2022 (USD Million)



Regional Insights

North America dominated the overall pain management device industry in terms of revenue share in 2014 at 49.5%. This can be attributed to its favorable healthcare infrastructure, which facilitated the access to advanced pain management devices. Additionally, government initiatives such as Precision Medicine and Affordable Care Act coupled with well-planned reimbursement policies contributed to the growth of this industry in North America. Moreover, rising awareness amongst people along with high purchasing parity led to an increased demand for these devices.

Asia Pacific is expected to grow at the lucrative rate during the forecast period owing to the increasing governmental support to improve healthcare infrastructure. Moreover, economic developments in countries such as India and China with higher disposable incomes are expected to increase the demand for pain management devices.

Market Share Insights

The key players operating in this industry include B Braun Melsungen AG., Baxter International Inc., Boston Scientific Corporation, Codman and Shurtleff, DJO Global LLC, Pfizer, Medtronic Plc, Smiths Medical, St. Jude Medical, and Stryker Corporation. The key trends witnessed in this market are strategic alliances and mergers & acquisitions to gain an edge over competitors.

For instance, In May 2015, St. Jude Medical's acquired Spinal Modulation, Inc. a developer of Axium Neurotransmitter system, which targets a neural structure within the spine. This acquisition is expected to strengthen the product portfolio in pain management devices.

<http://www.grandviewresearch.com/industry-analysis/pain-management-devices-market>

Radiotherapy Device Market: Overview

Radiation therapy controls growth or kills malignant cells by damaging their DNA through ionizing radiation. **The radiation therapy devices market was valued at over US\$ 4 Bn by 2015 end. In 2015, the global stereotactic radiation therapy equipment market accounted for a small share in the global radiation therapy equipment market.** Cyber knife and gamma knife therapies are non-invasive and painless and integrate robotics and image guidance to locate and target lesions or tumors. Cyber knife and gamma knife are

known for their radiological accuracy of 0.15 mm to 1.1 mm respectively. Unlike cyber knife, gamma knife is mainly used to treat brain tumors. Hence, the overall segment is expected to register a significant CAGR during the forecast period.

<http://www.futuremarketinsights.com/reports/radiotherapy-device-market>

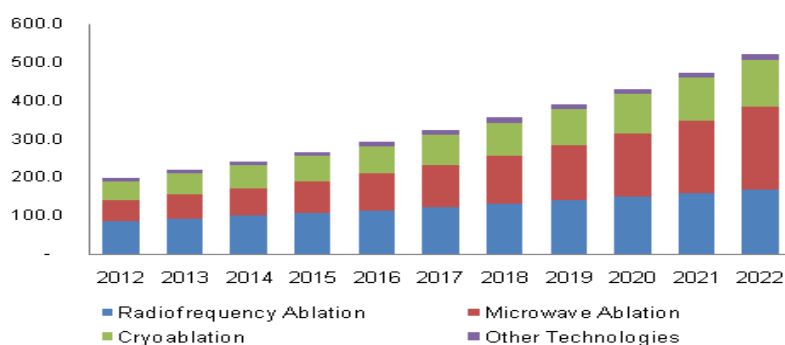
Tumor Ablation Market Size & Forecast

The global tumor ablation market size was valued at USD 756.0 million in 2015 and is expected to grow at a CAGR of 11.1% over the forecast period. Technological advancements in the field of thermal ablation technologies contributed towards market growth.

Rising prevalence of cancer is directly proportional to market growth. According to statistics published by the World Health Organization (WHO), cancer accounts for 13.0% deaths worldwide. Moreover, 70% increase in cancer incidences is expected over the next couple of decades. Over 100 types of cancer exist, which require unique therapy, thereby propelling the growth of this market. .

The demand for Minimally Invasive Surgeries (MIS) is on the rise. These procedures cause lesser trauma to patient and faster recovery than invasive procedures. Procedures such as radiofrequency ablation are minimally invasive and their rising demand is expected to contribute towards market growth.

North America tumor ablation market share, by technology, 2015 - 2022 (USD Million)



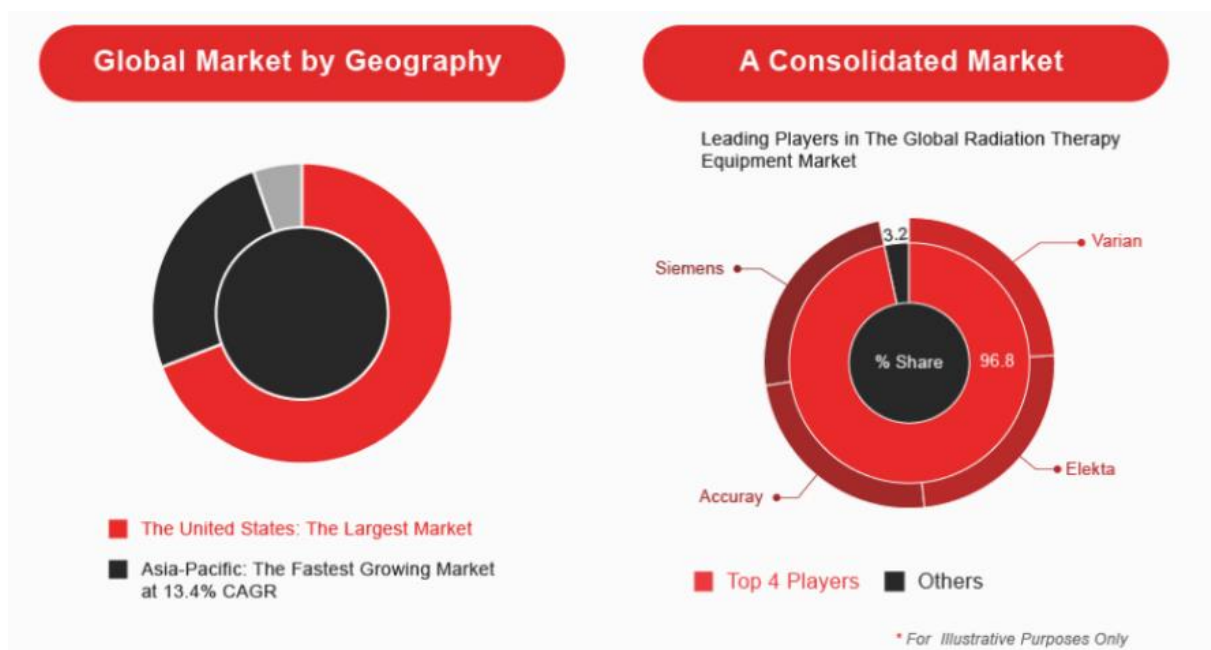
Competitive Market Share Insights

Key players operating in this market include HealthTronics, Galil Medical Inc., Angiodynamics, Medtronic Plc. (Covidien), Boston Scientific Corporation, SonaCare Medical, Misonix Inc., EDAP TMS S.A., and Neuwave Medical Inc. New product launches, collaborations, technological advancements, mergers, and acquisitions are the most popular initiatives in this industry.

For instance, in February 2015, Misonix, Inc. acquired Bonescalpel business from Aesculap. This acquisition helped in gaining competitive advantage in ultrasound surgical devices.

<http://www.grandviewresearch.com/industry-analysis/tumor-ablation-market>

The Global Radiation Therapy Equipment Market



http://www.strategyr.com/MarketResearch/Radiation_Therapy_Equipment_Market_Trends.asp

Ultrasound Device Market To Be Worth \$11.1 Billion By 2024

The global ultrasound device market is expected to reach USD 11.1 billion by 2024, according to a new report published by Grand View Research, Inc. Major drivers of the sonography market include expanding applications of the technique in therapeutic areas and government recommendations for periodic ultrasound screenings of the breast for breast cancer.

High Intensity Focused Ultrasound (HIFU) is widely used for the treatment of prostate cancer. HIFU has lesser side effects for prostate cancer than the other available treatments. The other use of ultrasound technique for therapeutic purpose includes treatment of kidney stones and gallstones using extracorporeal shockwave lithotripsy (ESWL).

2D, 3D/4D and Doppler ultrasound techniques are widely used in diagnostic imaging. 2D ultrasound segment captured the largest market share owing to the wide use of this technique in brain tumor and fetal screening. Most of the hospitals and healthcare facilities in developing countries offer 2D ultrasound as the device cost is relatively lesser and results in increasing the affordability of ultrasound imaging to patients. Along with 3D, 4D sonography has also become popular in obstetrics areas as it provides real-time movements of the fetus.

Intensifying competition in the private sector has triggered advancements of the latest medical devices in private hospitals. As a result, demand for handheld imaging devices is swiftly increasing. In addition, the shifting trend to home healthcare and remote patient monitoring is augmenting the adoption of handheld devices. However, the demand for relatively bigger cart/trolley-based devices is escalating with the rising adoption of therapeutic ultrasound, where heavy hardware and large display screens are necessary.

<http://www.grandviewresearch.com/press-release/global-ultrasound-device-market>

The lung cancer surgery market is projected to reach USD 29.99 Billion by 2021 from USD 21.58 Billion in 2016, at a CAGR of 6.8% from 2016 to 2021.

On the basis of device, the lung cancer surgery market is segmented into surgical instruments, monitoring and visualizing systems, and endosurgical equipment. In 2016, the surgical instruments segment is expected to account for the largest share of the market. The increasing

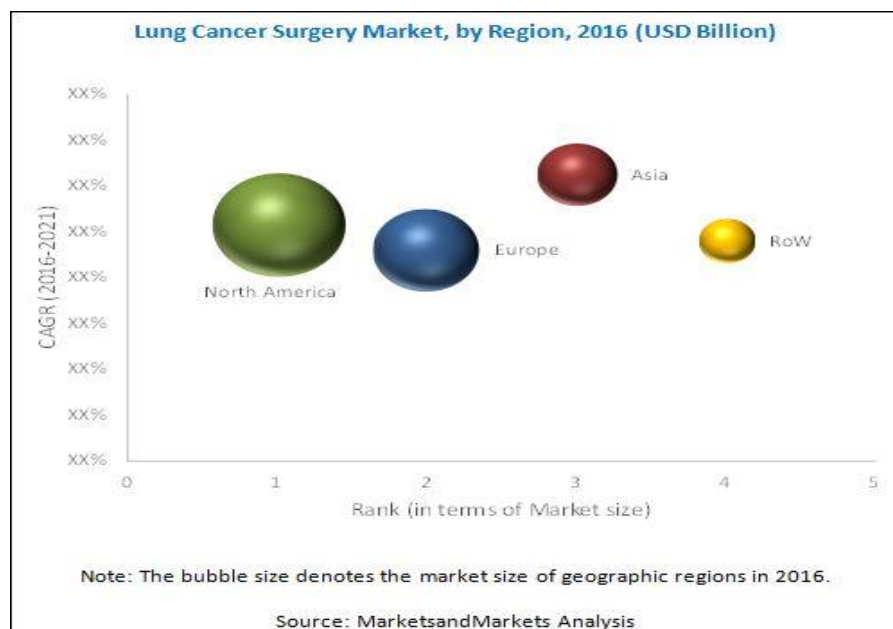
prevalence of lung cancer across the globe has resulted in a significant increase in the number of lung cancer surgical procedures performed, which in turn is expected to fuel the market for surgical instruments during the forecast period.

The major players in the lung cancer surgery market are Ethicon US LLC (U.S.), Intuitive Surgical Inc. (U.S.), Olympus Corporation (Japan), Accuray Inc. (U.S.), AngioDynamics Inc. (U.S.), Teleflex Inc. (U.S.), KARL STORZ GmbH (Germany), Ackermann Instrumente GmbH (Germany), Scanlan International Inc. (U.S.), and Trokamed GmbH (Germany).

<http://www.marketsandmarkets.com/PressReleases/lung-cancer-market.asp>

The global Cancer therapy market is estimated to grow at 17.6% CAGR to reach \$52.2billion by 2021. Breast cancer therapy is the largest market expected to reach \$30.8 billion by 2016 at an estimated CAGR of 15%.

<https://www.mordorintelligence.com/industry-reports/global-cancer-therapies-market-industry>



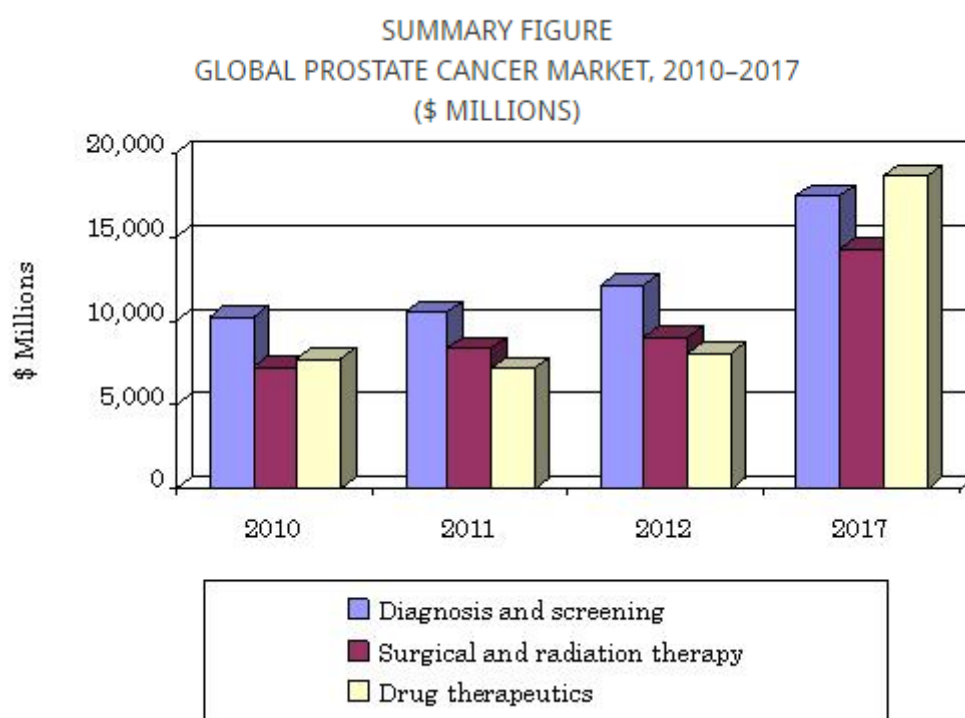
<http://www.marketsandmarkets.com/Market-Reports/lung-cancer-market-222.html>

The global prostate cancer market can be broken down into three main segments: diagnosis and screening, surgical and radiation therapy, and drug therapeutics.

The diagnosis and screening segment is expected to total \$12.1 billion in 2012 and \$17.4 billion in 2017, a CAGR of 7.5%

As a segment, **surgical and radiation therapy** should total \$9 billion in 2012 and nearly \$14.3 billion in 2017, a CAGR of 9.7%.

Drug therapeutics are expected to reach \$8.1 billion in 2012 and nearly \$18.6 billion in 2017, a CAGR of 18%.



[https://www.bccresearch.com/pressroom/phm/global-prostate-cancer-market-reach-\\$50.3-billion-2017](https://www.bccresearch.com/pressroom/phm/global-prostate-cancer-market-reach-$50.3-billion-2017)

Oncology Radiation Therapy to Reach \$8.1 Billion in 2019

The greatest growth in radiation therapy will be driven by demand in developing countries, particularly in India and China. New techniques have changed the way treatments are planned and doses are delivered.

In the 21st century, the frequency of cancer and the suffering often associated with it has significantly raised cancer awareness. Radiation therapy, along with chemotherapy and surgery, is used to treat cancer. It is estimated that radiation therapy is administered to 50% of all cancer patients. The discovery of X-rays and radioactivity lead to the development of radiation therapy treatment techniques. The market for radiotherapy was estimated at \$5.8 billion in 2014 and is anticipated to increase at a compound annual growth rate (CAGR) of 6.7% to \$8 billion by 2019.

External Beam Radiation Therapy (EBRT) commands the largest share of the radiation therapy market with an estimated 84% or \$4.9 billion in revenue. This segment is set to grow at a healthy rate of 6.6% during the forecasted period and is predicted to reach \$6.7 billion by 2019. The highest growth is forecast for the systemic radiation therapy market due to new radiopharmaceuticals poised to hit the market.

[https://www.bccresearch.com/pressroom/hlc/oncology-radiation-therapy-to-reach-\\$8.1-billion-in-2019](https://www.bccresearch.com/pressroom/hlc/oncology-radiation-therapy-to-reach-$8.1-billion-in-2019)

Global Radiotherapy Market was valued at approximately USD 5.75 billion in 2016 and is expected to generate revenue of around USD 8.53 billion by end of 2022, growing at a CAGR of around 6.8% between 2017 and 2022.



<https://www.zionmarketresearch.com/news/radiotherapy-market>

Merger and Acquisition

Buyer's Market Prevails for Medtech Firms (2010)

Medtech merger and acquisition (M&A) activity for the first 10 months of 2010 increased significantly over the depressed levels of 2009. A better M&A environment began to take hold in late 2009, and continued to warm up in 2010 as the U.S. economy began to recover from one of the most severe recessions and tight credit periods ever. Also, both potential buyers and sellers in 2010 were better able to assess and plan for healthcare reform and regulatory changes, and therefore were more prepared to get back on the M&A trail.

HT Capital Advisors tracked 262 medtech and related healthcare transactions in the first 10 months of 2010—228 closed transactions and 34 announced or pending transactions (see Table I). The aggregate dollar value of the 2010 transactions was about \$21.3 billion, excluding the \$28.3 billion Novartis paid for a controlling interest in Alcon Labs. Four transactions were valued at \$1 billion or more compared with 3 in 2009, 9 in 2008, and 17 in 2007. Acquisition price multiples based on revenues and EBITDA (earnings before interest, taxes, depreciation and amortization) increased significantly. As a multiple of acquisition price, revenue multiples averaged 4.1 in 2010 compared with 3.4 in 2009, 3.5 in 2008, and 4.2 in 2007. For the transactions tracked where the information was available, the average EBITDA multiple was 17.1 compared with 12.2 in 2009 and 20.9 in 2008. Just as in 2009, approximately 25% of 2010 transactions have been structured with some form of contingent payment tied to the achievement of revenue or earnings milestones.

The medtech M&A market in 2010 was clearly a buyers's market. Although the initial public offering (IPO) market warmed up for many industries, it remained in a deep freeze for the medtech industry. The tight credit markets began to loosen up, but primarily for large companies. Small- and middle-market medical device companies and their private equity and venture capital investors had no choice but to consider lower valuations if they wanted to complete a sale transaction. Many of the larger medtech companies successfully began bargain hunting (see Medtronic's acquisition of ATS Medical and Covidien's acquisition of Somanetics discussed later).

A Wide Variety of Diagnostic Acquisitions

The largest diagnostics acquisition was GE Healthcare's pending acquisition of publicly held Clariant Inc. for \$580 million (7.7× estimated sales of \$75 million, and a 33.7% premium over the market value prior to the announcement). Clariant is a leading company in the rapidly growing area of molecular cancer diagnostics, with systems that provide doctors with precise information about a patient's cancer and help them prescribe appropriate treatment. The acquisition has the potential to dramatically alter the clinical testing landscape because it could move GE Healthcare, which is an imaging systems powerhouse, closer to its goal of integrating imaging and clinical molecular diagnostics to both diagnose and monitor cancer and other diseases. The combination of imaging and molecular testing is the Holy Grail in the diagnostics spaces. GE Healthcare tried but was unable to do it with Amersham, a British company it acquired in 2004. In its press release announcing the acquisition, GE Healthcare said that it expects Clariant "to accelerate the development of new integrated tools for the diagnosis and characterization of cancer" and help pathologists and oncologists make more confident clinical decisions. **The market for cancer-profiling products was estimated at \$15 billion in 2009, and estimated to grow to \$47 billion by 2015.**

GE Healthcare also agreed to acquire Orbatech Medical Solutions Ltd., which produces the cadmium zinc telluride (CZT) detectors used in GE's Alcyon nuclear cardiology technology. GE's system produces views of cardiac anatomy and functionality quickly and with high clarity, with exposure time as short as three minutes. **The acquisition price was \$9 million cash plus \$5 million cash on certain milestone achievements.** GE Healthcare's parent, GE Corp., has a \$25 billion war chest for acquisitions, and we would not be surprised to see GE Healthcare announce more significant acquisitions in the future.

Women's health specialist Hologic Inc. acquired Sentinelle Medical, a leading provider of innovative magnetic resonance imaging (MRI) breast cancer detection and intervention products. Sentinelle was purchased for \$85 million (5.7× sales of \$15 million, plus contingency payments tied to sales increases over a two-year period).

Another transaction was C.R. Bard's acquisition of SenoRx Inc., a producer of x-ray- and MRI-guided breast biopsy systems, for \$200 million (3.6× 2009 sales of \$55.6 million). The acquisition expands Bard's diagnostic imaging business beyond ultrasound-

guided procedures to include breast biopsy devices that are also designed to operate also in x-ray and MRI imaging modalities.

Alere (formerly Inverness Medical Innovations), a provider of a broad range of diagnostic products that has grown significantly through acquisitions over many years, acquired South Korea-based Standard Diagnostics, which manufactures rapid diagnostic products. The acquisition **expands Alere's geographic coverage and increases its diagnostic product offerings for hepatitis, infectious diseases, tumor markers, and urine and protein strips. The acquisition price for a 75% interest was \$224 million (5.6× sales of \$40 million).**

Alere also acquired Epocal Inc., a Canadian producer of blood testing equipment with wireless transmission capability, for \$175 million plus a potential \$82.5 million in milestone payments. The Epocal platform complements Alere's Triage technology for wirelessly relaying point-of-care (POC) bedside test results to patient files. Alere has an extensive sales force, which Epocal lacked, to market Epocal's existing products as well as new POC systems yet to be developed.

Laboratory Corp. of America, medical laboratory test company with \$4.7 billion in annual sales, has an agreement to acquire the genetic testing business of Genzyme Corp. for \$925 million (2.5× 2009 sales of \$371 million).

<http://www.mddionline.com/article/buyers-market>

Deal Value (\$ Millions)	Buyer	Unit Purchased	Date Announced
10567.14	Novartis AG	Alcon Inc.	1/4/10
7200	Merck KGaA	Millipore Corp.	2/28/10
2489.97	Covidien PLC	ev3 Inc.	6/1/10
1080	St. Jude Medical Inc.	AGA Medical Holdings	10/18/10
580	GE Healthcare	Clariant Inc.	10/22/10
387.48	Johnson & Johnson	Micrus Endovascular Corp.	7/12/10
350.88	BioScrip Inc.	Critical Homecare Solutions Holdings Inc.	1/25/10
350	Medtronic Inc.	Invatec SpA	1/25/10
317.69	Medtronic Inc.	ATS Medical Inc.	4/29/10
291.92	Covidien PLC	Somanetics Corp.	6/16/10
280	New Mountain Capital LLC	Covidien PLC's specialty chemicals business	5/26/10
261.21	Endo Pharmaceuticals Holdings Inc.	HealthTronics Inc.	5/5/10
240	Baxter International Inc.	ApaTech	3/1/10
237.52	PH Glatfelter Co.	Concert Industries Corp.	1/5/10
235.14	Providence Equity Partners Inc.	Virtual Radiologic Corp.	5/17/10
225	CareFusion Corp.	Medegen Inc.	4/5/10
219.5	SSL International PLC	Beleggingsmaatschappij Lemore BV	2/12/10
192.14	C.R. Bard Inc.	SenoRx Inc.	5/5/10
189.74	Merge Healthcare Inc.	AMICAS Inc.	2/24/10
188.41	Nipro Corp.	Home Diagnostics Inc.	2/3/10
155.86	Alere Inc.	Standard Diagnostics Inc.	1/11/10
140.84	Hospira Inc.	Javelin Pharmaceuticals Inc.	4/12/10
130	Quidel Corp.	Diagnostic Hybrids Inc.	1/11/10
113.11	US Renal Care Inc.	Dialysis Corp. Of America	4/14/10
110	Alere Inc.	Kroll Laboratory Specialists Inc.	2/3/10
100	Shareholders	SonoSite Inc.	1/11/10
97.94	Welsh Carson Anderson & Stowe	National Dentex Corp.	4/5/10
97	St. Jude Medical Inc.	Lightlab Imaging LLC	5/20/10
90	Diagnostica Stago Inc.	Trinity Biotech PLC's worldwide coagulation business	3/12/10
85	Hologic Inc.	Sentinelle Medical Inc.	7/6/10
81	eResearchTechnology Inc.	Certain assets of CareFusion Corp.	4/29/10
80	C.R. Bard Inc.	FlowCardia Inc.	4/12/10
75	Sonova Holding AG	InSound Medical Inc.	1/6/10
71	SonoSite Inc.	VisualSonics Inc.	5/27/10
70	KV Pharmaceutical Co.	Hologic Inc.'s rights to Gestiva	1/11/10
63.4	International Vitamin Corp.	Multiple targets from Alere Inc.	1/19/10
62.6	Merit Medical Systems Inc.	BioSphere Medical Inc.	5/13/10
62.5	Medical Action Industries Inc.	AVID Medical Inc.	8/27/10
62	Medtronic Inc.	Axon Systems Inc.	6/2/10

Table I. A sampling of significant mergers and acquisitions in the medical device industry in 2010. Mergers are ranked by deal size. Source: Bloomberg

Medtech Mergers and Acquisitions Remain Robust in 2012

Both buyers and sellers experienced a healthy environment this year.

Despite the challenges and uncertainties medtech companies faced this year—which include the slow and cumbersome U.S. regulatory system, lack of a permanent R&D tax credit, and the anticipated 2.3% excise tax on the medical device industry—mergers and acquisitions remained strong in 2012. Major medtech companies made transactions across most medical device and diagnostics segments this year, and cross-border transactions were also strong. HT Capital Advisors tracked more than 200 M&A transactions in the medical device and diagnostics space for the first 10 months of 2012, compared with more than 260 transactions tracked in all of 2011. The average transaction value, based on publicly available data on 75 transactions, was \$178 million, compared with \$195 million for the prior year, based on publicly available data on 116 transactions. Seven transactions were valued at \$1 billion or more, compared with eight in the previous year and four in 2010.

Big Deal in Cancer Diagnostics

In a major diversification move, **the \$6.6-billion sales giant Agilent Technologies acquired Denmark-based Dako, a leader in tissue-based cancer diagnostics. Dako was sold by Swedish private equity firm EQT, which acquired it in 2007. The purchase price was \$2.2 billion ($5.8 \times$ sales of \$340 million).** For comparison, consider that **Roche Holding acquired Ventana Medical Systems for \$3.4 billion ($10.2 \times$ sales of \$290 million) in 2008.** Dako's products include antibodies, scientific instruments, and software sold in more than 100 countries. Molecular diagnostics and anatomic pathology is a profitable, high-growth sector of laboratory medicine. While the price might seem steep, the transaction was a prudent strategic diversification acquisition for Agilent that fits with its chemical analysis and life science operations. If clinical laboratory testing sees a convergence of different technologies as research scientists discover the secrets of proteins, RNA, and DNA from patient specimens, Dako's tissue processing technologies will complement Agilent's line of measuring instruments and diagnostic products. With Dako in its stable Agilent will be in a better position to compete with Thermo Scientific, Danaher, and Teradyne.

Largest Transaction of 2012

After scrutiny by U.S. and European antitrust authorities, global medtech titan Johnson & Johnson (J&J) finalized its acquisition of Switzerland-based Synthes Inc. for \$19.7 billion. The transaction was announced in April 2011 and closed in June 2012. To gain FTC approval for the transaction, J&J had to divest its DVP surgical system product line for treating serious wrist injuries, which it sold to Biomet. With U.S. headquarters in Pennsylvania and sales of about \$2.1 billion, Synthes is the leading producer of skeletal treatment devices in North America. The acquisition complements J&J's DePuy operation and makes it the largest global provider of trauma implant products and surgical tools.

<http://www.mddionline.com/article/medtech-mergers-and-acquisitions-remain-robust-2012>

Deal of the Year: Cancer Genetics, Inc. Acquisition of Gentris Corp

We closed the acquisition of **Gentris July 16, 2014** after having announced it only one month prior. We were very fused on closing the acquisition in a timely and expedited fashion so as to minimize disruption to the client base and work-flow of the site. **We paid \$4.75 million, comprised of \$3.25 million in cash and \$1.5 million in CGI stock, as well as additional performance-based earnouts of up to \$1.5 million.** At the time of the acquisition, Gentris had more than 40 employees and our plans are to continue to grow the operation.

<http://www.cancergenetics.com/deal-of-the-year-cancer-genetics-inc-acquisition-of-gentris-corp>

The Largest Acquisitions of 2016 (So Far)

The year so far has seen a slew of medical device M&A deals, though they were mostly only a “few” billion dollars a piece.

“There has probably been a new merger since I started talking,” healthcare investor Lisa Suennen joked in January at the WinterTech conference in San Francisco, after observing that the healthcare industry has generally seen a huge amount of consolidation in recent years.

2015 was the biggest year for M&A in the history of the medical device industry. It is only March, but this year is looking similar.

The year so far has seen at least nine major medical device industry M&A deals—worth more than \$34 billion.

Granted, the mergers the industry is seeing so far this year are not as large as some of the megamergers seen in recent years, such as Medtronic acquiring Covidien for about \$50 billion(which itself was unprecedented in scope), Zimmer and Biomet becoming Zimmer Biomet through a \$14 billion deal, and BD buying CareFusion for \$12 billion. (See our 2014 infographic. Or download our free report: Medtech Mergers & Acquisitions of 2015)

But the pickup of deals in February at least seems to back what experts told Qmed at the start of the year: that medtech’s merger frenzy is expected to continue.

The merger activity mirrors consolidation throughout the healthcare landscape as many players in healthcare, including hospitals and insurers, are seeing their profits threatened as the U.S. government begins to increasingly move away from the fee-for-service model. The new landscape favors large companies who can leverage economies of scale.

Here are the major deals announces so far this year:

1. Canon Buying Toshiba's Medtech Business for \$6 Billion

Canon said March 17 that it expects to greatly expand its presence in the medical device sector through its planned acquisition of Toshiba’s medical device business, the 21st largest medtech business in the world by revenue. Toshiba sold the healthcare business—diagnostic imaging equipment business covering everything from MRI to CT, ultrasound and x-rays—because of its

attractiveness: the overall company needs a cash infusion as it grapples with an accounting scandal involving nearly \$2 billion in overstated profits over the past seven years.

2. BD Sells Respiratory Device Business for \$250M

Becton, Dickinson and Co. announced in March that it will sell 50.1% of its Respiratory Solutions business to funds managed by private equity firm Apax Partners, forming a joint venture that will operate a new independent company. BD will remain a significant but non-controlling minority owner of the new company after the deal closes. The roughly-\$900-million-a-year respiratory devices business includes the company's Ventilation, Respiratory Diagnostics, Vital Signs, and AirLife business lines. About 5000 employees at facilities in Yorba Linda, CA; Palm Springs, CA; Plymouth, MN; Mexicali, Mexico; Cotia, Brazil; Hoechst, Germany; and Shenzhen, China will be part of the new company.

3. Dentsply Sirona Created Out of \$14.5 Billion Deal

DENTSPLY International and Sirona Dental Systems in February completed their \$14.5 billion “merger of equals.” With a previously estimated \$3.8 billion a year in annual revenue and 15,000 employees, the new Dentsply Sirona is touting itself as the largest maker of dental medical devices and technologies in the world. DENTSPLY International was already one of the largest medical device companies globally even before the merger.

4. Abbott Wagers \$5.8B to Acquire Alere

Abbott Laboratories acquisition of diagnostic firm Alere (Waltham, MA) is expected to bolster Abbott’s point-of-care diagnostic business, giving it projected total diagnostic sales of \$7 billion annually. Alere makes diagnostics for a variety of infectious diseases, including HIV, dengue fever, tuberculosis, and malaria.

5. Stryker Paying Nearly \$3 Billion on Hospital Products Maker

Stryker announced in early February that it will pay \$2.775 billion in cash to acquire Cary, IL–based Sage Products, which makes a host of products meant to prevent so-called “never events” in ICUs and

hospitals, including hospital-acquired infections. Started in 1971, Sage Products is a growing, \$430-million-a-year business that makes and distributes products for oral care, skin preparation and protection, patient cleaning and hygiene, and turning and positioning of patients, as well as heel care boots.

6. Stryker's \$1.28 Billion External Defibrillators Play

About two weeks after Stryker announced the Sage Products deal, news came out that it would also spend \$1.28 billion to acquire Physio-Control International (Redmond, WA), a maker and manufacturer of monitors/defibrillators, automated external defibrillators (AEDs) and CPR-assist devices. Physio-Control has a storied history, it pioneered the DC defibrillator in the late 1950s.

Stryker executives view the Physio-Control acquisition as complementary to the company's emergency medical services business. Sudden cardiac death kills about 300,000 adults annually in the U.S. alone, and external defibrillators are the go-to devices to prevent such deaths, according to Cleveland Clinic.

7. IBM Watson Pays \$2.6B for Health Analytics Firm

IBM clearly has high hopes for its artificial intelligence platform. Back in 2010, The New York Times reported on IBM's plans to pit Watson against human opponents in Jeopardy! "I want to create something that I can take into every other retail industry, in the transportation industry, you name it," said IBM senior vice president John E. Kelly III. IBM executives, though, decided on healthcare as one of the first commercial niches Watson would target. After the supercomputer handily defeated human opponents in Jeopardy in 2011, it began promoting Watson for potential medical applications including helping physicians diagnose patients in the emergency room and elsewhere. Many of Watson's capabilities could prove helpful in this regard, including its ability to process natural language, sift through massive amounts of data, generate hypotheses, and continually learn. It could also help insurers and hospitals identify waste—a high-priority in our cost-conscious environment.

8. TE Connectivity Spends \$895M on Creganna

The merger frenzy is not limited to the OEMs, either. The larger device makers are increasingly demanding more capabilities and efficiencies from their suppliers, and that translates into more M&A deals and partnerships in the contract manufacturing space. One of the latest came this month, when sensor and connectivity company TE Connectivity announced it would buy minimally invasive contract device maker Creganna Medical for \$895 million. TE Connectivity executives say the purchase of Creganna Medical will broaden their platform of implantable device design and manufacturing capabilities.

9. Smith & Nephew Buys Surgical Robotics Firm for \$275M

The British orthopedic giant in January completed its \$275 million acquisition of robotic surgical device maker Blue Belt Technologies. Blue Belt's (Plymouth, MN) Navio handheld, robotic-assisted technology guides the surgeon in creating a virtual surgical plan that removes the need for standard mechanical cutting guides and jigs. The handheld device helps the surgeon to prepare bone for implantation, according to the company's website.

<http://www.qmed.com/news/largest-acquisitions-2016-so-far>

A Major Cancer Diagnostic Transaction

Roche Holding completed several acquisitions in 2015. **The largest was its \$1-billion acquisition of a 56.3% ownership interest in Foundation Medicine, the leading provider of tumor testing procedures based on sequencing the genes of tumor samples to discover mutations that can assist in predicting which pharmaceuticals will be most effective for patients.** Roche, the largest producer of cancer drugs, indicated that it would utilize the testing procedures in the development of drugs to better tailor them for use in treatment of specific types of patients. Also, Roche, which is a provider of many types of diagnostic products, will market Foundation Medicine's testing products worldwide. Roche also

acquired CAPP Medical, a developer of next-generation blood analyzers for monitoring tumor therapy responses. Another Roche acquisition, which illustrates its strong commitment to providing advanced molecular diagnostic products, was its acquisition of Ariosa Diagnostics Inc., a provider of noninvasive prenatal testing services, including a maternal blood-sample test to access the risk of Down Syndrome and other genetic abnormalities.

<http://www.mddionline.com/article/medtechs-biggest-deals-2015-01-26-16>

Buyers and sellers

The US and European M&A markets have perennially been driven by therapeutic device deals. In terms of deal volume, the year ending 30 June 2015 was no exception. As 114 device deals represented about one-third of all medtech M&As. **Total deal value, however, shifted away from therapeutic devices thanks to the US\$12.2 billion boost to the “Other” category provided by the BD/CareFusion deal. Therapeutic devices accounted for more than US\$9.6 billion in total deal value, driven primarily by US\$1.8 billion spread across 23 deals in the orthopedic space and nearly US\$1.5 billion across 13 deals in the cardiovascular space. Non-imaging diagnostics companies accounted for 45 deals worth more than US\$6.2 billion, good for 19% of the dealmaking total.** The 34 deals in the research and other equipment category represent only 4% of all deal dollars (US\$1.3 billion), but this total omits the Danaher/Pall deal. (As a diversified conglomerate, Pall is excluded from this tally of M&A value.) Traditional medtechs like Medtronic, Zimmer and Becton Dickinson have for several years been the industry’s biggest dealmakers, spending tens of billions of dollars consolidating. Even excluding megadeals, during 2014-15 traditional medtechs deployed the most capital in M&A. This reflects the fact that M&A is the main driver of growth in the therapeutic device subsector. From July 2013 to June 2015, 56% of all M&A value came from traditional medtech buyers, up from 42% during the July 2009–June 2011 period. (Despite the percentage difference, in dollar terms this was only an increase from US\$34 billion to US\$34.6 billion.) Meanwhile, conglomerates (from US\$22.5 billion in 2009–11 to only US\$8 billion in 2013-15) and pharmaceutical companies (US\$3.2 billion to US\$482 million) saw their proportions slide in the most recent period. Private equity groups ballooned from less than US\$4 billion during 2009–11 to more than US\$13.6 billion during 2011–13, but that total fell to just over US\$9 billion in the most recent two-year period.

Chinese acquirers The July 2014–June 2015 period saw the largest medtech acquisition ever by a China-based acquirer. The Hong Kongbased alternative investment firm XIO Group bought Israel-based Lumenis for US\$510 million. Lumenis sells minimally invasive clinical solutions for the

surgical, ophthalmology and aesthetic markets. Four other Chinese companies made acquisitions during the period (three with disclosed terms totaled US\$153 million), but only two China-based companies were acquired during the same period, suggesting US and European medtechs are content, for the time being, to grow businesses in that emerging market organically after several years of M&A-driven growth.

[http://www.ey.com/Publication/vwLUAssets/EY-medical-technology-report-2015-pulse-of-industry/\\$FILE/EY-pulse-of-the-industry-report-2015.pdf](http://www.ey.com/Publication/vwLUAssets/EY-medical-technology-report-2015-pulse-of-industry/$FILE/EY-pulse-of-the-industry-report-2015.pdf)

RANK	COMPANY	2015 Revenues	2015 R&D Spend	Employees
1	<u>Johnson & Johnson</u>	\$27,522,000,000	\$1,652,000,000	126,500
2	<u>Medtronic</u>	\$20,261,000,000	\$1,640,000,000	92,000
3	<u>GE Healthcare</u>	\$18,299,000,000	\$5,273,000,000	51,000
4	<u>Siemens Healthcare</u>	\$16,526,841,300	\$5,405,230,500	43,000
5	<u>Philips Healthcare</u>	\$12,214,624,200	\$2,174,059,500	37,000
6	<u>Cardinal Health</u>	\$11,400,000,000	\$0	34,500
7	<u>Alcon</u>	\$10,827,000,000	\$9,030,000,000	100,000
8	<u>Baxter International</u>	\$9,972,000,000	\$1,421,000	66,000
9	<u>Stryker Corp</u>	\$9,675,000,000	\$614,000,000	26,000
10	<u>Fujifilm Holdings</u>	\$9,017,788,916	\$1,523,964,441	79,235
11	<u>Essilor International</u>	\$7,539,399,000	\$249,983,600	58,032
12	<u>Boston Scientific</u>	\$7,380,000,000	\$817,000,000	24,000
13	<u>B. Braun Melsungen</u>	\$7,219,739,120	\$290,672,420	54,017

14	<u>Danaher</u>	\$7,185,700,000	\$507,000,000	71,000
15	<u>Fresenius Medical Care</u>	\$6,842,636,200	\$485,340,500	32,899
16	<u>St. Jude Medical</u>	\$5,622,000,000	\$692,000,000	16,000
17	<u>3M Co.</u>	\$5,572,000,000	\$1,770,000,000	89,800
18	<u>Zimmer-Biomet</u>	\$4,673,300,000	\$188,300,000	10,000
19	<u>Olympus Corp</u>	\$4,655,759,410	\$631,700,397	30,702
20	<u>Terumo</u>	\$4,629,336,107	\$278,040,477	19,934

<http://www.medicaldesignandoutsourcing.com/2015-big-100/>

Potential buyers

Medtronic's Many Acquisitions

Medtech giant Medtronic made several smaller acquisitions that supported its commitment to its key therapy innovation growth strategy. The company enhanced its growing aortic and peripheral vascular divisions with the **\$110-million acquisition of Apdus Endosystems, a provider of devices for minimally invasive endovascular and aneurysm repair and thoracic endovascular repair**. On the same day it acquired Apdus, Medtronic also snapped up Cardiosight Technologies, a developer of cardiac assessment systems including a disposable vest with sensors that capture electrical signals in the heart and combine that information with CT scan images to produce 3-D maps to monitor and treat abnormal heart rhythms.

In another move, Medtronic acquired Advanced URO Solutions, the developer of an FDA-approved procedure that provides temporary stimulation to the tibial nerve to treat overactive bladder problems and other urinary-related medical issues. With the acquisition of Sophono Inc. Medtronic added minimally invasive magnetic hearing implants to its ear, nose, and throat operation. In acquiring Lazarus Effect for \$100 million, the company reinforced its commitment to providing innovative solutions to clinicians and patients fighting stroke. Lazarus Effect has focused on the development of acute ischemic stroke products that facilitate the capture and removal of clots. As did its competitors, Edward Life Sciences and Abbott Laboratories, Medtronic completed a mitral valve replacement transaction with the acquisition of Twelve Inc. which is developing a transcatheter mitral valve replacement device.

<http://www.mddionline.com/article/medtechs-biggest-deals-2015-01-26-16>

Johnson & Johnson Completes Acquisition of Cougar Biotechnology

Johnson & Johnson's tender offer for shares of Cougar Biotechnology common stock expired at 5 p.m. Eastern Daylight Time (EDT) yesterday with approximately 20,148,930 shares tendered, representing approximately 95.9% of Cougar Biotechnology's outstanding common stock. The acquisition was

completed yesterday through what is known as a "short-form" merger, without a vote or meeting of Cougar Biotechnology's remaining shareholders.

Cougar Biotechnology currently is conducting two Phase III trials for abiraterone acetate, a late stage, first-in-class compound for the treatment of prostate cancer. The first Phase III trial is testing abiraterone acetate in patients with metastatic, castration-resistant prostate cancer who have progressed after docetaxel-based chemotherapy has failed. The second Phase III trial is studying abiraterone acetate in patients with metastatic, castration-resistant prostate cancer who have yet to receive chemotherapy.

Cougar Biotechnology now operates as a wholly-owned subsidiary of Johnson & Johnson and will work with Ortho Biotech Oncology Research & Development, a unit of Centocor Research & Development, Inc., a Johnson & Johnson company.

"With the acquisition of Cougar Biotechnology and its talented team, we have strengthened our position in the global oncology market and our efforts to provide a meaningful difference in the lives of millions of patients worldwide," said William N. Hait, M.D., Ph.D., Global Therapeutic Head, Oncology, Ortho Biotech Oncology Research & Development. "Abiraterone acetate now becomes one of many new treatments we are developing, which we hope will change the course of cancer treatment by targeting cancer cells and the tumor microenvironment."

<http://www.investor.jnj.com/releasedetail.cfm?releaseid=395580>

Royal Philips NV

Royal Philips NV is reportedly planning to acquire more medical device companies as it attempts to add heft to its newly-created HealthTech business.

Philips is targeting smaller acquisitions, as well as multi-billion-euro deals, over the next six to 12 months, according to sources cited by Bloomberg. In particular, Philips is said to be on the lookout for device companies engaged in the areas of radiotherapy, imaging, and home care, both in the United States and in Europe, where Philips is based.

Although Bloomberg's sources say no specific companies are being targeted by Philips at this time, the report identifies two possible acquisition targets: Sweden-based Elekta AB and U.S.-based Varian Medical Systems. Elekta makes radiosurgery and radiotherapy solutions for oncology and brain

disorder patients. Varian markets radiosurgery, proton therapy, and associated imaging software solutions.

In 2012, Philips and Elekta co-founded a research consortium that is developing a new device that integrates a linear accelerator and a 1.5 Tesla MRI system for more precise cancer treatments.

In line with its strategic pivot into healthcare, Philips last year purchased catheter-based imaging company **Volcano Corporation for \$1.2 billion in cash, and formed a joint venture with Salesforce.com** to build a cloud-based platform for medical devices and equipment.

<https://www.meddeviceonline.com/doc/philips-targeting-medical-device-company-acquisitions-0001>

Ethicon

Ethicon Announces Agreement To Acquire NeuWave Medical, Inc.

NeuWave Medical Technology Offers Minimally Invasive Intervention Option for Patients with Soft Tissue Lesions

Ethicon, a medical device company of the Johnson & Johnson family of companies, today announced a definitive agreement to acquire NeuWave Medical, Inc., a privately held medical device company that manufactures and markets minimally invasive soft tissue microwave ablation systems. Their products are currently used by physicians in over half of the top cancer centers in the United States. This acquisition is consistent with the Johnson & Johnson Medical Devices' strategy of advancing innovation and investing in areas of unmet medical needs such as surgical oncology. Financial terms of the transaction have not been disclosed.

The closing of the transaction is subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act and other customary closing conditions. The transaction is expected to close during the second quarter of 2016.

<https://www.jnj.com/media-center/press-releases/ethicon-announces-agreement-to-acquire-neuwave-medical-inc>

Varian Medical Systems

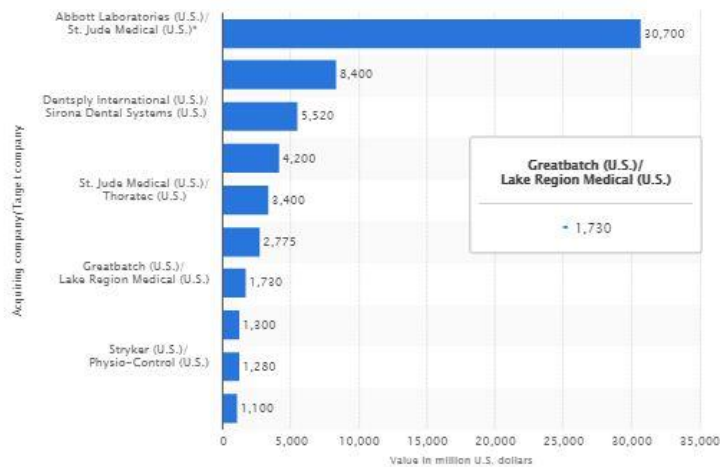
Varian Medical Systems Announces Agreement to Acquire PerkinElmer's Medical Imaging Business; \$276 Million Acquisition to Expand Digital Flat Panel Business for Varex Imaging

Varian Medical Systems (NYSE:VAR) today announced an agreement to acquire the Medical Imaging business of PerkinElmer, Inc. (NYSE:PKI) as an addition to the Varian Imaging Components business, which is slated to become an independent public company, Varex Imaging Corporation, through a previously announced separation expected to be completed in January 2017.

The acquisition is expected to close after the planned separation of Varex from Varian and following receipt of required regulatory approvals. **Varex will pay \$276 million to acquire PerkinElmer's Medical Imaging business**, which is a supplier of digital flat panel X-ray detectors that serve as components for industrial, medical, dental and veterinary X-ray imaging systems. This business, which has about 280 employees, is headquartered in Santa Clara, Calif. with operations in Germany, the Netherlands and the United Kingdom. The acquisition, which is contingent on the satisfaction of customary closing conditions, including obtaining third party and regulatory consents, is expected to be immediately accretive to Varex following the closing.

<http://newsroom.varian.com/2016-12-22-Varian-Medical-Systems-Announces-Agreement-to-Acquire-PerkinElmers-Medical-Imaging-Business-276-Million-Acquisition-to-Expand-Digital-Flat-Panel-Business-for-Varex-Imaging>

Selected top medtech mergers and acquisitions worldwide in 2015-2016, by value (in million U.S. dollars)



ABOUT THIS STATISTIC

This statistic depicts (selected) major medtech mergers and acquisitions worldwide between July 2015 and June 2016, by value. Dentsply International from the United States made one of the largest acquisitions in this period when it bought another U.S. company, Sirona Dental Systems, for 5.52 billion U.S. dollars.

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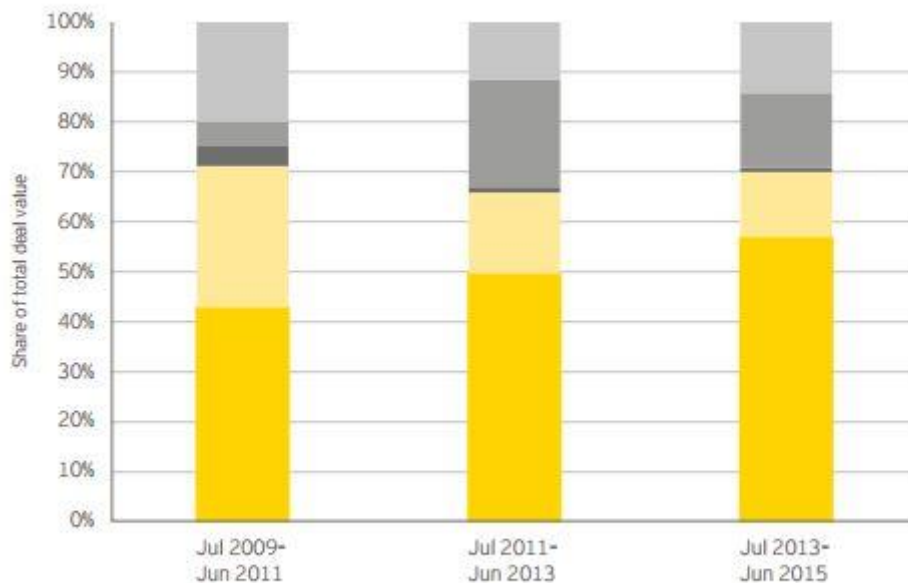
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<https://www.statista.com/statistics/277638/major-medtech-merger-and-acquisitions-by-value/>

US and European M&As by type of buyer (excluding megadeals)

Other Private equity Pharma Conglomerate Medtech



Source: EY, Capital IQ and Thomson ONE.
Chart excludes megadeals (> US\$10b).

<http://www.ey.com/gl/en/industries/life-sciences/pulse--medical-technology-report-2012---mergers-and-acquisitions---medtechdata>

Varian

The medical device industry has seen a slew of mergers in recent years. But medtech companies have also been engaged in pruning their portfolios in the last few years to adjust to a rapidly changing healthcare industry. Some big divestments include Johnson & Johnson shedding its Cordis business—the unit that pioneered the drug eluting stent category— that Cardinal Health scooped up for nearly \$2 billion last year.

More recently, Smith & Nephew shed its gynecology business, which Medtronic is buying for about \$350 million.

For Varian, the spin out is more about increasing its focus on being a cancer treatment company.

"The spin-off will create two strong, independent companies," said Dow Wilson, CEO of Varian Medical Systems, in a statement. "It will enable Varian to focus on expanding its position as a global cancer company with leading technology and services. The objectives and growth strategies of our imaging components and oncology businesses are now taking them in different directions."

Varian Imaging Components makes x-ray tubes, flat panel detectors, connectors, and accessories for imaging. It also functions as a supplier of workstations and software for computer-aided diagnostics and image processing.

This business, which generates about \$575 million in revenue had lately become a drag on the rest of

<http://www.qmed.com/news/varian-has-big-plans-cancer-treatment?page=7>

Radiation therapy equipment

KEY SUPPLIERS



CIRS Nov 25, 2010

CIRS is recognized world wide for tissue simulation technology and is the leader in the manufacture of phantoms and simulators for quantitative densitometry, calibration, quality control and research in the field of medical imaging and radiotherapy.



Elekta, Inc. Mar 18, 2009

Elekta is a human care company pioneering significant innovations and clinical solutions for treating cancer and brain disorders.



RaySearch Laboratories Dec 13, 2012

RaySearch's market-leading optimization algorithms for VMAT, IMRT and 3D-CRT alongside a comprehensive set of tools for traditional 3D planning form the core of the most advanced treatment planning system on the market today- RayStation!



Modus Medical Devices Inc. May 17, 2012

Modus develops innovative QA tools for IGRT, IMRT, SRS and rotational RT, for commissioning and routine QA protocols. QUASAR™ phantoms and software are used in leading radiation therapy centres worldwide.

CORPORATE PARTNERS



Oncology Systems Limited (OSL) Mar 21, 2017

Oncology Systems Ltd specialises in supplying radiotherapy technology for the treatment of cancer.



Molecubes nv Mar 20, 2017

MOLECUBES is an innovative manufacturer of benchtop preclinical imaging PET, SPECT and CT enabling researchers to aim for high quality images thanks to fast and simple workflows and intuitive wireless interface.



PerkinElmer Jan 9, 2017

PerkinElmer is a leader of innovative preclinical imaging solutions including instruments, imaging agents, service and leading applications support.



DOSIsoft Jan 5, 2016

Founded in 2002, DOSIsoft is a leading software editor specialized in RT Planning, Patient QA (pretreatment control in vivo dosimetry) and Molecular Imaging. Over 160 centers in 18 countries use its solutions to treat patients suffering from cancer.



Bruker Jul 8, 2015

Today, worldwide more than 6,000 employees are working on providing the best technological solution for each analytical task.



LifeLine Software, Inc./RadCalc May 14, 2009

LifeLine Software, Inc. offers RadCalc® software that provides fully automated independent dosimetric validation calculations for Conventional, IMRT, VMAT, CyberKnife, Superficial, and Brachytherapy treatments.



IBA Dosimetry Aug 2, 2010

IBA Dosimetry is the world leader in innovative Quality Assurance solutions that maximize efficiency and minimize errors in Radiation Therapy and Medical Imaging.



PTW Aug 10, 2009

PTW is the world's oldest and largest manufacturer of clinical radiation dosimetry and quality control equipment.



Accuray Nov 13, 2006

Accuray is the premier radiation oncology company that develops, manufactures and sells personalized innovative treatment solutions that set the standard of care, with the aim of helping patients live longer, better lives.



Sun Nuclear Feb 3, 2014

Sun Nuclear Corporation is the worldwide market leader in QA and dosimetry solutions for Radiation Oncology.



Standard Imaging, Inc. Nov 27, 2013

Founded in 1989, Standard Imaging has become a leading supplier of radiation calibration and quality assurance instruments for healthcare.



LAP of America Laser Applications L.L.C. Jun 28, 2011

LAP of America Laser Applications, L.L.C has been delivering state of the art patient alignment laser systems for radiation therapy, nuclear medicine, and diagnostic radiology since 1997.

<http://medicalphysicsweb.org/cws/Companies/CompanyCategory.do?page=1&categoryId=165>