

Fox Chase Cancer Center

Research Development Report

Reporting Period:

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Commercial Development of Research

The Office of Research & Development Alliances (ORDA) supports the mission of Fox Chase Cancer Center to accelerate the integration of emerging technologies into team-based science to reduce the burden of cancer in all individuals *by facilitating relationships with industry in order to translate clinical and basic research findings into products and services for the public good*. By evaluating and protecting the intellectual assets of Fox Chase, managing discussions and negotiations with industry, and introducing pre-clinical and clinical research activities the ORDA enables the effective and efficient transfer of those assets for the benefit of the public and provides a source of revenue to fund further research and to reward, retain and recruit Fox Chase investigators.

The ORDA serves as the liaison between Fox Chase's research community and the pharmaceutical, biotechnological, medical device, diagnostic and venture capital communities. The ORDA continues a long standing policy and tradition at Fox Chase to develop and nurture these collaborations to disseminate intellectual capital for the public benefit. This policy was enhanced when the US Congress sought to incentivize more translation of scientific findings through passage of the 1980 Bayh-Dole Act. That legislation created a uniform patent policy among federal agencies that fund research, enabling small businesses and non-profit organizations, including universities, to retain title to inventions made under federally-funded research programs.

Generally, the ORDA provides three primary services:

(1) The promotion of collaborative research relationships and strategic partnerships between various industry sectors and Fox Chase Cancer Center. Fox Chase has long been recognized as a leader in both clinical research and basic laboratory research. Corporate sponsorship enables early-stage research and technologies to be further developed into pre-clinical and, ultimately, clinical applications, thus promoting academic, clinical and corporate goals. The ORDA is the primary point of contact for establishing industry-sponsored research agreements (SRAs) and clinical trial agreements (CTAs) at Fox Chase. We facilitate the development, negotiation and execution of all SRAs and CTAs within Fox Chase and we work to ensure compliance under all such agreements. Acting as the liaison between Fox Chase, its investigators, and corporate sponsors, the ORDA also consults with other internal departments as necessary while negotiating SRAs and CTAs. Further, the ORDA ensures that all such agreements are consistent with the Fox Chase's Intellectual Property Policies and Procedures Policy and Conflict of Interest Policy, as well as appropriate federal regulations and guidelines. The ORDA also negotiates and

manages material transfer agreements and other collaborative agreements with industry on behalf of Fox Chase Investigators. Additionally, the ORDA is charged with development of financial and operational evaluations of proposed technology/ equipment to foster the clinical and research programs of technology-intensive departments. The ORDA is responsible for making recommendations for technology acquisitions, directing a competitive bidding process and closing negotiations for equipment purchases, in conjunction with Finance and Purchasing. The ORDA is also responsible for establishing strategic partnerships with industry such as those previously established with VisEn Medical, Life Technologies, Quintiles, and the Institute for Individualized Health, each described briefly below.

(2) The collection and processing of invention disclosures while working with the inventors to file patent applications when appropriate. The ORDA works with Fox Chase investigators, staff and outside intellectual property law firms to protect intellectual property (IP) that results from activities carried out on Fox Chase time, at Fox Chase expense, using Fox Chase facilities or materials, or under the auspices of Fox Chase. All such IP is protected through patents, copyrights and/or trademarks. In the case of patents, the ORDA works closely with outside IP law firms to evaluate the patentability of invention disclosures, and to draft and file patent applications in the United States and internationally, if appropriate. In addition, the ORDA works with outside counsel to ensure protection of copyrightable materials, secure trademarks, and to protect original artistic or literary work of Fox Chase investigators and staff.

(3) The facilitation of transferring patentable and non-patentable intellectual property, know-how and trade secret technologies to industry through exclusive and non-exclusive licenses, option agreements and the formation of start-up companies. The ORDA identifies discoveries that may be commercially developed, and works with inventors and corporate partners to launch new products into the marketplace. The ORDA strategically markets Fox Chase's intellectual property portfolio, including patented materials, non-patented research materials and software by working with inventors and using the ORDA's extensive network of corporate contacts to partner with companies that are capable of developing our technologies. The ORDA negotiates all option and license agreements to suitable partners in an attempt to introduce technologies into the marketplace as quickly as possible. As an element of this partnership and as part of a license agreement for our technologies, companies oftentimes support additional research within Fox Chase laboratories to further develop the licensed technologies.

Outlined below are the actions and strategies that are implemented by the ORDA to increase commercialization activities and the speed of commercial development.

- The ORDA meets regularly with each current principal investigator and each recently hired investigator to become familiar with the aims of the investigator's research projects. The ORDA staff reminds investigators to disclose results of their research to the ORDA prior to any publications or presentations outside of Fox Chase. ORDA staff also attends internal seminars presented by the investigators in order to benefit from the perspective offered by other researchers in the audience.
- After research results are formally disclosed to the ORDA using a Invention Disclosure Form, the staff performs a thorough scientific and commercial evaluation of the technology.

These evaluations include assessment of novelty, utility, non-obviousness, stage of development, the problem addressed, and the size and growth rate of the market. Feedback is then solicited from appropriate industry contacts on the level of interest from existing companies. In the event that ORDA staff determines that the disclosure might form the basis of a new company, efforts are directed towards finding an entrepreneur to lead the company and secure proof-of-concept funding. The assessment also recommends the best means of protecting the discovery in order to maximize its commercial potential and benefit to the citizens of Pennsylvania.

- When it is determined that a patent application should be filed, a patent attorney whose background and experience would allow them to appreciate the technology will be asked to prepare an application with input from the researcher and the ORDA. The ORDA solely contracts with law firms having attorneys with advanced scientific degrees in fields similar to the intellectual property being protected.
- If it is determined that a license to an existing company is the most appropriate route of commercialization, a marketing campaign will be undertaken using the means of contact described in “Outreach to Businesses Regarding Recent Research Developments” below. Particular attention is paid to making small businesses in Pennsylvania aware of the discoveries and the opportunities they present.
- If it is determined that the technology would benefit from further research at Fox Chase to establish proof of principle, an application will be submitted to its in-house Innovator Fund Advisory Committee or an organization such as BioAdvance for review and potential investment. Additionally, Fox Chase has a rich history of making investments in its research programs to help support its investigators conduct applied research, particularly when such support cannot be obtained from conventional funding sources or federal agencies.
- In FY11, Fox Chase recorded 49 invention disclosures and filed 42 patent applications. In addition, \$1.2 million in gross revenues was generated during FY11 from payments under its license agreements. In FY11, Fox Chase executed 13 laboratory sponsored research agreements, 125 material transfer agreements, 103 confidentiality agreements, 22 consulting agreements, and 56 clinical trial agreements with industry.

Research Licensing Agreements

The ORDA at Fox Chase has developed the following standard agreements for use in the licensing of research results related to medical devices, drugs or other research discoveries, and for establishing certain strategic partnerships with industry:

1. License Agreement
2. Option Agreement
3. Tangible Research Materials License Agreement
4. Software Transfer Agreement
5. Material Transfer Agreement
6. Confidential Disclosure Agreement

7. Sponsored Research Agreement
8. Corporate-sponsored Clinical Trial Agreement
9. Collaborative Research Agreement
10. Trademark License Agreement

Training Students and Health Professionals

- FCCC laboratories provide opportunities for scientific training for undergraduate students. During the summer of 2011, ten students from a variety of colleges were recipients of the Board of Associates undergraduate summer fellowships, funded by a generous donation from the FCCC Board of Associates. An additional twenty-five undergraduate summer assistants were supported from investigators' research funds.
- Under the auspices of a P20 grant from the NIH (NIH P20 CA138079, Lincoln University - Fox Chase Partnership in Cancer Research and Training), we are engaged in training four minority undergraduate students from Lincoln University every summer. As part of this training, these students are provided housing in Fox Chase properties, and receive 10 weeks of research training in molecular biology and population science. For the first week, students receive didactic training that includes instruction on the responsible conduct of research, navigating tools in the library such as Endnote and Web of Science, and safety classes in chemicals and radiation. The remaining 9 weeks of training are at the bench, and students are taught cutting edge techniques in cancer biology. A second P20 application has been submitted in collaboration with the Community College of Philadelphia to develop a program in workforce training for biomedical technicians; if funded, this program will begin in earnest in Fall 2011.
- Graduate students at FCCC carry out thesis research under the supervision of faculty who hold adjunct appointments at Drexel University College of Medicine, the University of Pennsylvania, Thomas Jefferson University, Temple University, and Lehigh University, as well as faculty who participate in the Fox Chase-Russian State Medical University (RSMU) Sister Institute Program. Generally, all students have completed the major course work requirement for their doctoral degree and are engaged in full-time research when they begin at Fox Chase. In 2011, 7 students from the RSMU program are completing research toward their M.Sc. or Ph.D., and 6 students from Drexel University are carrying out their Ph.D. research at Fox Chase Cancer Center. All of these students are supported by investigators' research funds. In addition, this year three Ph.D students from the Drexel University program, who trained at FCCC, successfully defended their thesis and completed the requirements for their Ph.D. degree.
- Training in the Ethical Conduct of Research is provided twice per year to members of the postdoctoral and graduate student community at Fox Chase, organized by Dr. Maureen Murphy. Both sections of this course are required for all postdoctoral and graduate trainees at the Center. Training in the Ethical Conduct in Research was offered in March 2011; topics that were covered included Identifying and Resolving Conflicts of Interest, Notebook Keeping, Authorship Issues, Image Manipulation, Policies Regarding Research on Human Subjects, and Ethical Treatment of Animals. Topics are presented as a series of case studies,

followed by discussion sessions. In the second component of this course, taught in the Fall and scheduled for September 2011, Drs. Glenn Rall and Clifford Perlis reviewed and discussed ethical issues in animal research and human subjects research, respectively. All trainees are required to attend both the Spring and Fall sessions of this course, and all participants receive a certificate of completion.

- Fox Chase Cancer Center maintains several active programs for graduate training of physicians. The activities of these programs range from preceptorship for medical students through research fellowships within the disciplines of medical oncology, surgical oncology, radiation oncology and pathology.
- Department of Medical Oncology is responsible for the training of Temple University medical students and residents who rotate at Fox Chase Cancer Center for their training experience. Fourth year medical students are provided a subinternship experience. Second and third year residents do a rotation in the inpatient service during which they receive intensive exposure to medical oncology. These residents are also given the opportunity to rotate in the ambulatory care department where outpatient oncology can be observed. In addition, the Medical Oncology Department maintains active fellowship training programs in hematology/medical oncology administered jointly with Temple University. The Surgical Oncology Department maintains a fellowship program in surgical oncology as well as providing many training opportunities for Temple University surgical residents. The Pathology Department also provides a fellowship-training program. The Radiation Oncology Program at Fox Chase Cancer Center has an independent residency with its own certification.
- The Section of Urologic Oncology in the Department of Surgical Oncology is an active participant in the training of residents and fellows. The Section is a key component of the general urology residency training program of the Temple University Medical College Department of Urology. PGY-4 and PGY-5 level residents gain extensive clinical experience at Fox Chase Cancer Center during 6 months of rotations in each of those resident years. Fourth year medical students from Temple University Medical College are additionally offered one month subinternship elective rotations with the Section. In 2006, the Section initiated a 2-year subspecialty fellowship in urologic oncology, and this training program was recognized and approved by the Society of Urologic Oncology (SUO) in 2008. This SUO accredited fellowship in urologic oncology provides a more in-depth post-graduate training in the surgical and non-surgical management of urologic cancers. Annually 2 fellows are selected for entry into the training program.
- The fellowship in Interventional Endoscopy and Gastroenterology at Fox Chase Cancer Center provides comprehensive training for board-eligible physicians in Gastroenterology. The aim of the one-year fellowship is to prepare the trainee for a career in academic gastroenterology with a concentration in advanced therapeutic endoscopy at a tertiary care referral center. Fellows learn techniques of endoscopic cholangiopancreatography (ERCP) for diagnosis and palliation of cancers of the pancreaticobiliary system, and endoscopic ultrasound (EUS), which is a valuable tool for tissue diagnosis and staging of tumors of the esophagus, stomach, pancreas and rectum. Additionally, the trainee develops proficiency in the placement of palliative stents into the digestive tract for obstruction related to incurable

malignancy, endoscopic removal of large precancerous lesions of the esophagus, stomach and colorectum, and current techniques of radiofrequency ablation and cryotherapy for dysplastic Barrett's esophagus and esophageal tumors. Finally, Fox Chase has one of the world's largest experiences with double balloon enteroscopy, a technique to visualize and treat abnormalities along the length of the small intestine. The fellow's responsibilities also include academic productivity: he/she is expected to produce manuscripts for publication as well as research abstracts for presentation at the annual Digestive Disease Week meeting.

- The purpose of the Continuing Medical Education (CME) Program is to actualize the FCCC mission *“To prevail over cancer, marshaling excellence of heart and mind in the collaborative practice of bold scientific discovery, pioneering prevention and compassionate care.”* The educational curriculum addresses the various aspects of the professional practice of oncology and the scientific breakthroughs in cancer care that primarily serve as best practices in the field of oncology. The CME Program provides the medical staff with new concepts in patient safety that contribute to excellence in care at FCCC and quality goals associated with physician credentialing and professional practice evaluation standards. Fox Chase Cancer Center values adherence to validated guidelines for care as established by authoritative national organizations in the field of oncology, and the CME Program is one vehicle for ensuring that evidence-based guidelines are incorporated into care.

CME content is based upon educational needs derived from professional practice gaps in knowledge, competence and performance in the context of desirable physician attributes as defined by various state and national organizations. Educational initiatives fall into two categories: Cancer Education, Research and Prevention and Compassionate Safe Care. CME activities are provided to learners in several formats: Live courses, Regularly scheduled series, Internet activities and Enduring activities.

The CME Program targets learners across a wide range of hematology and oncology specialties and includes other physicians and surgeons that have a role in the diagnosis and management of patients with cancer. The learners include medical, surgical and radiation oncologists, other oncology specialties, primary care physicians and other specialists treating patients with cancer. Primary cohorts of learners are: physicians and staff at FCCC; physicians and interdisciplinary teams in the Fox Chase Cancer Center Partners' Program; and local, regional, national and international physicians.

The CME Program endeavors to increase learner knowledge about new developments in cancer prevention, screening, diagnosis, treatment and oncology-related topics with an emphasis on the application of strategies to integrate this information into their professional practice. It is intended that learners will report greater confidence and/or improved professional performance and quality of care in the management of cancer patients, cancer survivors, their families and those at risk of cancer. When patient outcomes are assessed, it is expected that learners will report an observed improvement in those outcomes.

The CME program is nationally accredited by the Accreditation Council for Continuing Medical Education (ACCME).

In 2010, the CME program sponsored 13 continuing medical education activities consisting of six (6) live activities, three (3) Internet enduring activities, one (1) jointly sponsored activity and three (3) regularly scheduled series for a total of 59.25 hours of instruction. Participants included 1985 physicians and 3723 non-physicians, representing 50 states, Washington, DC, Puerto Rico and Guam, and 56 countries. Compared to 2009, we demonstrated an 81% increase in the number of physician attendees, a 527% increase in the number of non-physician attendees and a 44% increase in the number of activities.

- In 1998, Fox Chase Cancer Center embarked on a novel partnership with the Russian State Medical University (RSMU) in Moscow to provide training at our Center for RSMU Masters and Ph.D. level students. This partnership, originally conceived by Erica Golemis at Fox Chase and Olga Favorova, Professor of Molecular Biology at RSMU, has provided internship opportunities for 31 RSMU students over these past years. With each passing year, the program has expanded to include not only more students, but also more affiliations with premier Russian research institutions. Despite the growing number of sister institutions, the matching and oversight processes are essentially the same: enthusiastic and talented students are selected by professors at the Russian institute; these students then select potential mentors at our Center based on common research interests. Final matches are made by the Supervisory Committee at Fox Chase. Students typically intern at Fox Chase for approximately 15 months, although a number of them have elected to continue their studies and pursue their Ph.D. research in the host laboratory. Soon after the students' arrival at Fox Chase, an Advisory Committee is formed for each student, consisting of their mentor and at least two other faculty members with similar research interests. These committees meet with the student twice a year to provide research guidance and to afford the student an opportunity to present their work throughout the internship. Each Advisory committee reports back to the Supervisory Committee. The success of the initial Partner Program with Prof. Favorova and RSMU allowed for associations to be established with other high quality institutions in Russia. A program sponsored by Fox Chase and Moscow Engineering Physical Institute (MEPI) provides up to two students per year an opportunity to acquire skills in bioinformatics, software design, and protein modeling. Affiliations with Smolensk State Medical Academy (SSMA) and Kazan Federal University proved to be very fruitful in the past four years, and nine students have already benefited from this partnership. We are also currently evaluating other institutions as prospective partners, including Novosibirsk and St-Petersburg State Technical Universities. Several "pilot" students from these institutions are currently doing research at Fox Chase. In addition to students' training, the program provided an opportunity for several exchange visitors to work at FCCC, resulting in the collaborative research publication. FCCC faculty also gives yearly classes at RSMU, and we have just received an invitation to extend this to Saint Petersburg State Technical Universities.

Currently, 7 students are working in research laboratories at Fox Chase, pursuing their Ph.D. degrees. Of the 45 students who have completed their internships, all have elected to further their education in biomedical research, and many of these students have gone on to Ph.D. programs in the U.S., Europe or Russia. Collectively, these students have contributed to over thirty peer-reviewed manuscripts, and have presented their work at multiple international

meetings. We anticipate that the number of students and Fox Chase faculty who will benefit from this program will continue to increase.

- Fox Chase Cancer Center Partners is a select group of community hospitals in Pennsylvania and New Jersey linked with Fox Chase Cancer Center. This affiliation enables community cancer centers to develop or enhance community-based oncology programs. As part of the affiliation, medical staffs at Partner hospitals have access to innovative and unique research protocols developed at Fox Chase and can be administered to patients in the local community. FCCC and its affiliates have also joined forces in research, treatment, prevention and education efforts and work together to increase enrollment in clinical trials. More than 7,000 patients have been enrolled in clinical trials through this collaboration since 1986.

Commercial Research Development Training

- The ORDA meets individually with each new researcher that joins Fox Chase. During this meeting, the ORDA provides information on Fox Chase's Intellectual Property Policy and procedures and the services provided by the ORDA. The researcher is asked about research projects, existing relationships with industry, and avenues of inquiry being pursued that have the potential to lead to discoveries with commercial potential. This initial meeting serves to introduce the ORDA staff to the researchers so that they are able to recognize each other by face, which greatly facilitates future informal interactions.
- ORDA staff regularly (weekly) schedules meetings with research staff to keep abreast of new developments in the laboratories. During these meetings, the ORDA advises researchers about the process of disclosing, protecting and commercializing intellectual property.
- The ORDA holds a seminar for research staff at least once each year during which licensing and commercial development of research are discussed. Speakers are invited from outside Fox Chase and have included patent attorneys and entrepreneurs. In FY11, the ORDA hosted two such seminars, one focused on start-up opportunities for entrepreneurial faculty and one focused on intellectual property disclosure and management.
- Much of the investigator/inventor education takes place when a particular discovery is disclosed to the ORDA. When a new discovery is disclosed, a formal assessment of protectability and commercial potential is made, and is shared with the inventor. If it is decided that the discovery merits the investment of institutional resources to attract a commercial partner, there is an ongoing dialog with the researcher during patent filing and prosecution, as well as during the selection of companies to contact.
- The ORDA regularly presents updates to Fox Chase's Senior Leadership, Investment Committee and Board of Directors. These presentations inform leadership about the services provided by the ORDA and those senior administrators in turn assist the ORDA in the education of the researchers and staff. Additionally, several of Fox Chase board members hold executive positions in life science or venture capital firms and are helpful in recommending others among their personal networks that may be interested in hearing about research at the Fox Chase.
- The ORDA maintains a webpage on Fox Chase's homepage that includes a Frequently Asked Questions section and other information intended to educate staff about the

commercialization of research. This website was updated in FY11.

- Finally, the ORDA maintains an open-door policy and provides education to researchers at every opportunity.

Outreach to Businesses Regarding Recent Research Developments

- The ORDA has begun regularly hosting representatives of biotechnology and pharmaceutical companies at Fox Chase with the objective to learn about corporate development pipelines and preclinical research endeavors, and in turn, for companies to hear about Fox Chase preclinical research and Phase I clinical research programs.

Companies hosted or with meetings were held during the year included Novartis, ShanghaiBio, CMA, Fujifilm, TetraLogic, Dynamis, Covenant Group, Ignite, Life Technologies, Technology Patents Licensing, Inc., Life Sciences Pharmaceuticals, GCCA, Eli Lilly, BioServe, Gonzales Tiagha, Amgen, Net Scientific, Illumina, Kayentis, BioLineRx, Sangrook Medical Co., BioStrategy Partners, TetraLogic, HistoRx, Covenant Group, PwC, Institute for Individualized Health (I2H), Charles River, BioWa, yet2.com, Intellectual Ventures, Teva Ventures, Skyline Diagnostics, Transperfect, Shire Pharmaceuticals, GlaxosmithKline, Millennium, Bayer Healthcare Pharmaceuticals, Pfizer, Rhenovia Pharma, Prudentas, Ipsen Group, Quintiles, CMA, Visen, Olympus, Immunocore, MedImmune, Konkwest, Quintiles, Dabur Research Foundation, Teva Ventures, Lockheed Martin, MolecularMD, Epitek, Fujirebio, Hospital 307, Sage Bionetworks, Perkin Elmer, Fujifilm, Cobbs Creek Healthcare, Exsar, Ilag Ventures, IP Auctions, Merck, Morphotek, Cephalon, Royalty Pharma, Open Innovation, IP Auctions, WebMD, Intellectual Ventures, Sanofi-aventis, Net Scientific, Sarokin Consulting, Precision Therapeutics, Agensys, ImClone, Oncospec, Research Corporation Technologies, Raindance, BioAdvance, Aueon, Genentech, Metabolon, Caprion Proteomics, Labcorp, Merck, Quest, Westlake Pharma, Asterand, Harlan Labs, Champions Oncology, SRI, Hormel, Caliper, Dompe, TetraLogic, AthenaHealth,, Venrock, Inspire, Milestone Venture, Castlight, Vitals, Cardinal Partners, OpAns, Onco SmartTech, Epitek, NetScientific, Arsenal Capital Partners, OncoSmartTech, Cherry Tree Capital, MacroArray Technologies, Incubation Factory, ExSar, Opans, Incubation Factory, Empire Genomics, Oncobiologics, Athena Pharmaceuticals. Also met with numerous (~100) companies at the annual BIO International Convention in Washington, DC, and the annual AACR meeting.

- The Fox Chase Marketing and Public Affairs Department prepares press releases and notifies the media about significant research milestones achieved at Fox Chase, including the publication of papers and the filing and issuance of patents. These offices also propose stories to regional and national media outlets about research being conducted at Fox Chase.
- Researchers publish papers and present their work at conferences and are frequently contacted by their colleagues from industry. Researchers are encouraged to cultivate these relationships and inform the ORDA of potential collaborations that evolve there from.
- Technologies available for licensing are described in listings on the ORDA section of the Fox Chase homepage. Technologies are also listed with commercial websites that provide

descriptions to subscribing life science companies and venture capital firms.

- The ORDA writes descriptions of technologies available for licensing which are strategically distributed to industry business development executives, venture capitalists and other potentially interested parties.
- Fox Chase prints publications that describe ongoing research projects being conducted by Fox Chase faculty and staff. These publications are widely distributed by Fox Chase staff to industry, venture capitalists, candidates for employment, etc.
- Members of the Fox Chase Board of Directors are kept informed through presentations at board meetings and in discussions with Fox Chase administration.
- When the ORDA receives an invention disclosure, the ORDA staff identifies those companies most likely to be interested in the technology. The appropriate individual at each company is then contacted by letter, email or phone to make them aware of the nature of the technology, its stage of development and its competitive advantages.
- The ORDA and Fox Chase researchers maintain a network of contacts that they regularly update about new developments in Fox Chase's laboratories.
- The ORDA staff regularly attends technology rich conferences including BIO, AUTM meetings, LES meetings, BioPharma America meetings, etc.
- All ORDA staff members are encouraged to play an active role in their respective professional organizations. The visibility created by this activity facilitates new relationships between the Fox Chase Cancer Center and industry.
- The ORDA created brochures that describe Fox Chase's Biosample Repository, R&D Facilities, The Institute for Personalize Medicine and the Phase I Clinical Trial Program. These brochures are being widely distributed to industry and have been the basis for initial discussions around research collaborations.

Research Development Collaboration

As part of our mission, the ORDA develops preclinical and clinical strategic alliances with the biopharmaceutical industry, and expands all business relationships with industry. In FY11, the ORDA specifically:

- Developed and negotiated a 10-year year multi-million dollar strategic partnership with Life Technologies to establish the Cancer Genome Institute at Fox Chase;
- Negotiated a joint venture with the Institute for Individualized Health and Life Technologies to establish the Cancer Genome Institute (CGI) at Fox Chase Cancer Center; and
- Is developing and negotiating a multi-million dollar collaborative research and strategic partnership to create a Circulating Tumor Cell Center of Excellence with Quintiles Laboratories, Ltd.

Recent other such initiatives include:

- Development and negotiation of a 5-year multi-million dollar strategic partnership with Fujifilm on endoscopy-related products; and
- Development and negotiations of a multi-million dollar strategic partnership, including an equity stake and product royalties, with VisEn Medical (now a Perkin Elmer subsidiary) and Olympus Corporation to advance pre-clinical development and Phase 1 clinical trials of an enzyme activated imaging agent.

We are also establishing Fox Chase Cancer Center International, a Pennsylvania-based endeavour created to align the exceptional skills and resources of cancer research, diagnosis and treatment resident at Fox Chase with the extraordinary growth of cancer treatment requirements internationally (*e.g.*, China, Dubai, India, Brazil). Fox Chase International will establish a subsidiary in certain countries as subsidiaries of Fox Chase International for required operation in those countries. The plan of Fox Chase International is to establish relationships with hospitals internationally that require greater skill, expertise and training in treating cancers, that have significant demand for services and the funding to pay for services but lack these assets in their countries and align them with the available expertise resident in a world-class cancer center such as Fox Chase. Fox Chase International has already established contacts within China and its medical establishment and has the ability to contract for services with several leading regional hospitals within China that would seek to contract for virtual diagnosis and treatment services, physician and nurse training and the establishment of tissue banks throughout China that could have great financial value and benefit cancer research in China and the US. The plan is to execute the same services that are being provided at Fox Chase Cancer Center to US cancer patients and hospitals to the growing Chinese and international market for cancer diagnosis and treatment, and services through affiliations with key hospitals and health care providers in that country.

Fox Chase is a founding member of The Biotechnology Greenhouse of Southeastern Pennsylvania (BioAdvance). Fox Chase has submitted applications for BioAdvance's consideration for technologies that need further investment before commercialization can be achieved. Support was also solicited from existing companies, with first priority being given to companies in Pennsylvania.

Fox Chase has a history of establishing new firms around a platform technology, as it has demonstrated success in the creation of spin-off companies. One of its first spin-off companies founded in 2005 with patented technologies discovered at the Center, NexusPharma is developing novel therapies based on small molecule protein-protein interaction inhibitors. The Center patents provide the basis for NexusPharma's platform technology, and enable the discovery and development of novel therapies by modulating protein-protein interactions with small molecules to advance the treatment of cancer through approaches based on non-cytotoxic mechanisms.

Another Fox Chase spin-off, Dynamis Pharmaceuticals, focuses on the discovery and development of therapeutic pharmaceuticals for treatment of diabetic complications. Fox Chase Cancer Center granted Dynamis an exclusive world-wide license, including the right to grant sublicenses, to make, have made, use and sell products and processes related to metabolic

pathways of fructoseamine-3-kinase and 3-deoxyglucosone (3DG), adversely reactive molecules that cause the formation of free radicals and advanced glycation end products. Today the company is focused on developing new pharmaceuticals to treat the effects of aging, to prevent or minimize the devastating effects of diabetes mellitus, and Dynamis has developed and introduced an anti-aging cream to the professional spa market with a distributor and sales team.

Notably, these companies have been successful recipients of Ben Franklin funding, BioAdvance funding and federal SBIR funding.

The ORDA participates actively in regional trade organizations such as the Greater Philadelphia Venture Group, Women's Investment Network, and the Pennsylvania Biotechnology Association in an effort to identify Pennsylvania companies whose interests coincide with those of Fox Chase. The research interests of these companies are maintained in a database so that an appropriate group of companies can be contacted when a collaboration opportunity arises.

In FY11, Fox Chase executed 13 laboratory sponsored research agreements, 125 material transfer agreements, 103 confidentiality agreements, 22 consulting agreements, and 56 clinical trial agreements with industry.