## Drug patent expirations in January 2007*

| Tradename | Applicant | Generic Name | Patent Number | Patent Expiration |
|-----------|-----------|--------------|---------------|------------------|
| CADUET | Pfizer | amlodipine besylate; atorvastatin calcium | 4,572,909 | JAN 31,2007 |
| CARDIOLITE | Bristol Myers Squibb | technetium tc-99m sestamibi kit | 4,894,445 | JAN 16,2007 |
| CARDIOLITE | Bristol Myers Squibb | technetium tc-99m sestamibi kit | 5,324,824 | JAN 16,2007 |
| CARDIZEM CD | Biovail | diltiazem hydrochloride | 4,894,240 | JAN 16,2007 |
| CERVIL | Controlled Therap | dinoprostone | 4,931,288 | JAN 16,2007 |
| COLAZAL | Salix Pharma | balsalazine disodium | 4,412,992 | JAN 08,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 4,894,220 | JAN 30,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 5,037,635 | JAN 30,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 5,288,480 | JAN 30,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 5,344,641 | JAN 30,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 5,538,715 | JAN 30,2007 |
| COLCATE TOTAL | Colgate Palmolive | sodium fluoride; triclosan | 5,776,435 | JAN 30,2007 |
| LOPRESSOR | Novartis | metoprolol fumarate | 4,892,739 | JAN 09,2007 |
| MIRALUMA | Bristol Myers Squibb | technetium tc-99m sestamibi kit | 4,894,445 | JAN 16,2007 |
| MIRALUMA | Bristol Myers Squibb | technetium tc-99m sestamibi kit | 5,324,824 | JAN 16,2007 |
| MUSE | Vivus | alprostadil | 4,801,587 | JAN 16,2007 |
| NASACORT | Sanofi Aventis Us | triamcinolone acetonide | 4,767,612 | JAN 23,2007 |
| NORVASC | Pfizer | sodium fluoride; triclosan | 4,572,909 | JAN 30,2007 |
| VISUDYNE | Qlt | amiodipine besylate | 4,883,790 | JAN 20,2007 |
| VISUDYNE | Qlt | verteporfin | 5,283,255 | JAN 20,2007 |

*Drugs may be covered by multiple patents

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## Public-private partnerships

### Euro 2 million EU grant for VASOPLUS pro-angiogenesis

ThromboGenics NV and Geymonat SpA announced that the European Union has approved a €2 million grant to the VASOPLUS consortium, a development program for a new class of pro-angiogenesis agents. The funded research for VASOPLUS will be conducted within a consortium that will comprise ThromboGenics, Geymonat, Roche Diagnostics (Germany), Eurogentec S.A. (Belgium) and three expert academic groups: University of Leuven (Cardiology Department) in Belgium, Consiglio Nazionale delle Ricerche in Italy, and University of the Free State in South Africa.

The financial support, which will come from EU’s Framework Program 6, will contribute over the next 2 years to the further development of placental growth factor (PlGF) and analogues of this pro-angiogenic cytokine for treatment of ischemic heart disease, peripheral arterial occlusive disease (PAOD), tissue regeneration and wound healing. The pro-angiogenic growth factor PlGF is a homologue of vascular endothelial growth factor (VEGF). However, PlGF interacts with receptors in a manner that is different from VEGF. While VEGF has shown promise in the treatment of ischemic conditions, its therapeutic potential is hampered by dose-limiting side effects. Therefore, it is thought that PlGF, due to its more specific activity and targeted pro-angiogenic effect, may allow for an improved risk-benefit ratio, with fewer side effects than VEGF. Toxicology and safety pharmacology studies have been completed both by ThromboGenics and Geymonat in a number of relevant in vivo models, and showed that PlGF is well tolerated even at doses much higher than needed for efficacy.

http://www.thrombogenics.com
http://www.geymonat.com
Networks and institutes

The International Centre for Genetic Engineering and Biotechnology (ICGEB)

What is it? What does it do?
The International Centre for Genetic Engineering and Biotechnology conducts innovative research in life sciences for the benefit of developing countries. It strengthens the research capability of its Members through training and funding programmes and advisory services and represents a comprehensive approach to promoting biotechnology internationally. The center is dedicated to advanced research and training in molecular biology and biotechnology and holds out the prospect of advancing knowledge and applying the latest techniques in the fields of biomedicine, crop improvement, environmental protection/remediation, biopharmaceuticals and biopesticide production.

ICGEB brings biotechnology to developing countries by strengthening their research capabilities, developing state-of-the-art research and training scientists to the benefit of its member states.

Location
Located in Trieste, Italy and New Delhi, India, the center forms an interactive network with affiliated centers in ICGEB member states.

The ICGEB premises cover an area of 7000 m² in Trieste and 10 000 m² in New Delhi. These laboratories are fully equipped with the most technologically advanced scientific instrumentation.

History and Organization
The ICGEB was launched in 1983. The implementation of the programme was made possible through funds provided by the host governments of Italy and India. Since 1999 all member states participate in the financing through a scale of assessment adopted by the Board of Governors.

Today the ICGEB is an autonomous, intergovernmental organization. It is part of the United Nations System.

It is composed of a Board of Governors, made up of representatives from each Member State, the Council of Scientific Advisers, with eminent scientists who oversee the scientific excellence of the center, and the Secretariat which is constituted by the Director-General, Prof. Francisco E. Baralle, the Directors of the two components, Prof. Mauro Giacca - Director ICGEB Trieste, and Prof. Virander S. Chauhan - Director ICGEB New Delhi and by the Director administration and external relations, Decio Ripandelli.

The center has 54 full member states, a further 16 countries are still pending ratification of, or accession to, the statutes of ICGEB.

At present more than 300 people from 28 different countries are working in the ICGEB laboratories as research scientists, postdoctoral fellows, PhD students, research technicians and administrative personnel.

Research at ICGEB Trieste
Scientific activity focuses on several advanced projects in current biomedical research.

Research at ICGEB New Delhi
The two main research areas at ICGEB New Delhi focus on mammalian and plant biology.

Biomedical projects are pursued in virology (hepatitis B and E viruses, human immunodeficiency virus and SARS virus), immunology (biology of the immune response and tuberculosis), structural biology (development of synthetic antibiotics, crystal structure determination of proteins and polypeptides) and in the field of malaria both in basic research and vaccine and drug development.
In the plant biology area, research projects address the study of insect resistance and biopesticidals, abiotic and biotic plant stresses and crop improvement through biotransformation.

**Core facilities available at ICGEB**
Scientists at both ICGEB components have access to modern facilities in advanced optical microscopy, proteomics, flow cytometry, viral vector production, high-level biocontainment laboratories and greenhouses.

In Trieste and New Delhi intense activity is carried out in the biotechnology field for the development of technologies aimed at the production of recombinant therapeutics and diagnostics.

**Relationship with the industrial sector**
ICGEB supports innovative approaches for industrial relations at a global level and enhances joint ventures and other partner-oriented approaches for the commercialization of the results of research in biotechnology.

**Institutional activities**
ICGEB plays an important role in biosafety-related issues and in the environmentally sustainable use of biotechnology.

The center provides an on-line, biobibliographic database on Biosafety, a search mechanism on risk assessment for the release of genetically modified organisms (GMOs). This activity has now been expanded with the new Biosafety Outstation at Ca’Tron.

The center is active in enhancing the safe and peaceful use of biotechnology and is promoting the adoption of ethical codes for researchers working in life sciences.

In addition, technical advice is provided to member states on request for the formulation of national bioscience policy, definition of research goals, development of national biindustries, and the establishment of national biotechnology laboratories.

To harmonize and speed up projects of common interest the ICGEB maintains close contact with numerous international agencies, e.g. from the United Nations (FAO, UNIDO, UNEP, UNESCO), with the World Health Organization (WHO), with the European Molecular Biology Laboratory (EMBL) and the International Atomic Energy Agency (IAEA).

http://www.icgeb.trieste.it/index.htm

**Academic awards**

**Wiley Prize in Biomedical Sciences**

The sixth annual Wiley Prize in Biomedical Sciences will be awarded jointly to Dr. F. Ulrich Hartl, Director at the Max-Planck Institute of Biochemistry, in Munich, Germany, and Dr. Arthur L. Horwich, Eugene Higgins Professor of Cellular and Molecular Physiology at the Yale University School of Medicine, and Investigator, Howard Hughes Medical Institute.

Dr. Hartl and Dr. Horwich were chosen for their elucidation of the molecular machinery that guides proteins into their proper functional shape, thereby preventing the accumulation of protein aggregates that underlie many diseases, such as Alzheimer’s and Parkinson’s.

“The Wiley Prize is being awarded to Dr. Hartl and Dr. Horwich for their significant contribution in protein folding,” said Dr. Günter Blobel, Chairman of the awards jury for the Wiley Prize. Dr. Blobel was awarded the Nobel Prize for Physiology or Medicine in 1999. The Wiley Prize awards jury also includes Dr. Oasis Al-Awqati, a physiologist at Columbia University’s College of Physicians and Surgeons, Dr. David J. Anderson, a developmental neurobiologist at the California Institute of Technology, Dr. Joan Steitz, a molecular biologist at Yale University, and Professor Kay E. Davies, a human geneticist at the University of Oxford, U.K.

The Wiley Prize in Biomedical Sciences recognizes contributions that have opened new fields of research or have advanced novel concepts or their applications in a particular biomedical discipline. It honors a specific contribution or a series of contributions that demonstrate significant leadership and innovation. The award, which is given by the Wiley Foundation, includes a $25,000 grant, and the opportunity to present a public lecture at The Rockefeller University, the venue for the awards ceremony.

http://www.wiley.com
Biotechnology round the world

Biotech in Italy

Italy’s life sciences industry

Italy is a world market leader in life sciences. Its companies cover the whole spectrum of pharmaceuticals, biotechnology, biomedical applications, bioinformatics, biomechanics and nano-biotechnology, and there is widespread integration with traditionally strong Italian sectors such as agro-food, chemicals and textiles. There are two main factors for continued foreign investment interest in Italy’s life sciences industry: its highly prolific research and innovation funded annually by private R&D investments and its long-standing tradition of production directly involving 400 companies as well as hundreds of industry-related businesses, most of which are multinationals.

The Italian market has already attracted the attention of the most important multinationals in the life sciences industry. About 100 foreign companies already invested in Italy with around 10,000 employees and operate in a wide range of market segments such as the cardiovascular field, oncology, genome and proteome research, research and production of diabetes-fighting drugs, viral diseases, vaccines, and diagnostics. Particularly relevant are: Abbott, Astrazeneca, Baxter, Boehringer Ingelheim, Bristol-Myers Squibb, Chiron, Elan Pharma, Eli Lilly, Ethicon, Glaxo-SmithKline, Merck Sharp & Dohme, Novartis, Pathos, Pfizer, Roche, Sanofi-Aventis, Schering Plough, Serono, Servier, Takeda, and Wyeth.

Pharmaceuticals

In the Pharmaceutical sector Italy is the third largest market in Europe in terms of turnover and workforce. The sector is experiencing a phase of change, thanks in part to a thorough process of reorganization, that will see it increasingly oriented towards high-end value-added activities: in the Italian pharmaceutical industry three-quarters of the workforce are qualified researchers or technicians. Italian pharmaceutical companies are characterized by substantial exports (worth 9 billion Euro annually), above-average profits in Europe and high levels of R&D investments, which generate almost 10% of the national private research spending.

Biotechnology

Although relatively new, the Italian biotechnology industry - one of the national most dynamic sectors - ranks fourth in Europe in terms of number of companies with constantly rising annual turnover now amounting to some 2900 million Euro. The 163 businesses active in the sector employ almost 8400 units, more than half of which are active in research. Future prospects for the industry are encouraging, especially considering the kind of substantial investments made in R&D, amounting to around 40% of turnover in 2004, a level similar to that in the USA. Growth has received a further boost from the growing trend among pharmaceuticals multinationals to out-source research projects. The biotechnology industry is made up of small innovative businesses that frequently emerge as spin-offs and management buy-outs of research laboratories sold off by multinationals. These companies are extremely productive in terms of research and high performing in the development of new applications and clinical trials. Of the estimated 600 projects currently underway, about 10% are at the pre-clinical and testing phase (Phase I, Phase II, and Phase III). Almost half of all these companies are patent holders. The largest share of the biotech market (70%) is concentrated in the health sector with particular emphasis on therapeutic trials and diagnostics. The agricultural biotechnology also makes up an important part of the market with 15% of active companies. A number of businesses active in pharmaceutical research, development and production and that offer consultancy services as well as supply important chemical and biological products round off and reinforce the sector’s profile. There are some 300 companies engaged in the development of biomedical equipment, diagnostic instrumentation, IT and electronics equipment, not to mention the numerous related applications in such traditionally strong Italian sectors as agro-food, fine chemicals and textiles. The biomedical industry in particular, with its 20,000 strong workforce and thanks to widespread sharing of knowledge between assorted sectors (from machinery and electronics to chemicals, biology, IT and material sciences), is one of Europe’s most innovative producers of medical devices and in-vitro medico-diagnostic devices. Many important developments in Bioinformatics deserve special attention thanks also to the efforts of public research centers. A growing number of specialized small and medi-
um-sized enterprises are flourishing in the provision of niche services to international giants like Bayer, Menarini, and Sanofi-Aventis: analyzing, evaluating and displaying data, creating internet-accessible bioinformatics platforms, and a whole range of consultancy services besides. Another noteworthy development concerns “Cheminformatics”, which involves the application of IT and knowledge management to the protein structures or other tiny molecules of pharmacological interest to speed up and rationalize the discovery of new medicines and optimize the process of drug discovery. The life sciences companies are situated throughout Italy and stimulate industrial clusters by providing with specializations and skills in oncology, neurosciences, genomics, bioinformatics, biomedicine, diagnostics, and nанo-biotechnology. A majority are situated in Lombardy, a leading Biotechnology region in Europe and the world. Recently, three Biotechnology Districts have been set up—one in the Lombard capital Milan, another in Trieste (Friuli Venezia Giulia) and a third in Cagliari on the island of Sardinia. An additional one is going to be set up in Southern Italy (Puglia).

The Italian Biotech Database

The Italian Biotech Database is the complete online directory to get immediately in touch with all you need to know about the Italian Biotech community. The online database (accessible through the www.italian-biotech.com website) offers in depth information, data, fact sheets and useful contacts for 350 among the most prominent operators in the Biotech field and in the even wider Life Sciences Italian market listed by sector and sub-sectors. The online catalogue lists businesses, suppliers, public organizations, investors and consulting firms showing a complete company profile with product information, description of technologies used, financials, clients and collaborations activated. The Italian Biotech Database is sponsored by InvestInItaly and developed in collaboration with Assobiotec, the Italian Bioindustry Association, the National Research Council (CNR) and the Italian Ministry of Education, University and Research (MIUR).

Opportunities in clinical trials

Italy offers a great scope of opportunities in the field of Clinical Trials. In recent years, changes to regulatory procedures, based on European rules, have decentralized decision-making to special Ethics Committees. This move, combined with the presence of an extensive network of about 150 competent 150 centers (including hospitals, IRCCS institutes and universities), has led to a drastic reduction in times to market and costs that make Italy one of the most appealing locations for carrying out clinical trials. Concentrated primarily in phase III and phase II, clinical trials in Italy are routinely conducted under the internationally recognized clinical protocol and standards of quality control. The market for trials already amounting to circa 600 studies each year, is sure to grow substantially in the future. The therapeutic areas of greatest interest originate in the fields of oncology, cardiology and immunology and the main objects of study include Gemcitabine therapy, Acetylcarnitine, Erythropoietin (EPO), Levocarnitine, and Influenza antigens. Pharmaceutical companies are the prime movers in the area of clinical trials. Over 200 businesses are responsible for carrying out testing principally on antineoplastic and immunomodulatory medicines, drugs for the treatment of the nervous system, and antimicrobials. Among several important non-profit organizations that carry out clinical trials, the San Raffaele Hospital in Milan, the San Matteo Hospital in Pavia, the Suor Orsola Malpighi Hos-
Openings in the Italian market

The Italian market for Pharmaceuticals, worth over 18 billion Euro annually with per capita spending of almost 350 Euro, is a major draw for investors. Not only large, the market is constantly growing through the introduction of new product lines designed to meet the needs of Italy's increasingly sophisticated consumers. The future is likely to see further consolidation as a result of demographic change among the Italian population that has extended average life expectancy by many years. According to data released by the OECD (Organization for Economic Cooperation and Development) ageing in Italy is more intense and rapid than anywhere else in the world and has raised average life expectancy rates at birth to 77 years for men and 83 for women. For companies investing in Italy there is also considerable market potential for Biotechnology applications in traditionally lively sectors of the Italian economy. These range from improvements in agricultural cultivation to environmental clean up and industrial applications for enzymes in the food, chemicals, textiles, leather, ICT and paper industries. This market is destined to develop rapidly due to the growing demand for innovation in the area of industrial and agriculture production as well as research and quality control.

Latest news
Boehringer invests again in Italy

The German pharmaceutical giant Boehringer Ingelheim has decided to invest 60 million Euro to build a new plant, denominated Sintesi II, for the production of pharmaceutical active principles.

The new plant will be located in Bergamo, in Northern Italy, at the Bidachem S.p.A. premises, one of the five major chemical structures of the multinational group in the world and will see the construction of 9 new reactors that will be fully operative in 2009.

The new plant will have an impact on the creation of new jobs that will pass from the current 114 to approximately 190.

It will furthermore enhance the production capability of Bidachem by 60%, with a turnover that is expected to reach 100 million Euro by 2010. Sintesi II will produce mainly some new substances for clinical development. Boehringer, founded in 1885, has its headquarters in Ingelheim (Germany) and is operative on global level with 144 affiliated companies, in 45 different countries and with 36 000 employees.

New laboratories for blooming Sardinia’s biotech industry

In November 2006, at the Scientific Park Solaris of Pula, in Sardinia, a new laboratory for bioinformatics, called CRS4, has been inaugurated. The laboratory represents one of the important technology platforms of Polaris. The CRS4 (Center for Research Development and Superior Studies in Sardinia), carries out research based upon IT, networks and high performance computing and will support research in the bioinfo sector.

Bioinfo allows the development of new methods for computational analysis of biochemical and genetic data and the application and computing tools for biomedical research and, in particular, for personalized medicine. The new laboratory is added to and integrates the other technological platforms present at Polaris: genotyping and gene expression profiling, pharmacology, medical devices, proteomic biotechnologies, spectranetrics and analytical chemistry. The new laboratory confirms that Sardinia plays a leading role in the biotech sector. According to a recent report by Blossom-Assobiotech, Sardinia is sixth among Italian regions for number of biotech companies and first among those of Southern Italy.

InvestInItaly is the Italian organization for investment promotion created by Sviluppo Italia (the National Agency for Enterprise and Inward Investment Development), and ICE (the Italian Trade Commission), the government agency which promotes the internationalisation of Italian companies.

http://www.investinitaly.com

Why Biotech in Italy
- 6,000 industry scientists
- 20,000 university researchers
- More than 20,000 graduates every year in biotechnology, pharmacy and medicine.
- 60% new companies over the last 5 years
- Over 40% of R&D spending on revenues
- Competitive costs
- Major achievements in diagnostics, neurosciences and oncology
Teaching biotechnology

YouTube for researchers: A film says more than a thousand words

The Journal of Visualized Experiments (JoVE) is a free online research journal for publishing visualized (video-based) biological experiments, available on the web. This is an initiative of Dr. Moshe Pritsker, a postdoc from Massachusetts General Hospital in Boston (MA, USA), who published the first series of videos online on November 30, 2006. The idea is that difficult techniques like cell or embryo manipulations can involve little tricks or movements, details which become clear when actually watching an experiment, rather than reading the protocol. Such experience is now assembled and provided on the web on a platform which functions much like the web phenomenon YouTube.com.

Regulatory issues and directives

GMO risk assessment

The authors of two letters to the editor in Nature Biotechnology in January 2007 disagree about how to conduct ecological risk assessments (ERAs) of genetically modified (GM) crops. In an earlier article from Nature Biotechnology in January 2006, Romeis et al. had described a specific approach to GM ERAs, which emphasized reliance on early-tier laboratory tests. But in their letter to the editor, Lang et al. argue that toxicological early-tier laboratory tests (measuring, for example, the effect of Bt maize on monarch butterflies) will often be “overly simplistic” with respect to realistic exposure to hazardous agents and modulating environmental factors. Therefore, Lang et al. “strongly advocate” additional field or semi-field tests as part of ERAs of GM crops, “regardless” of early-tier laboratory results. In a reply to Lang et al., Romeis et al. argue that early-tier laboratory tests can be designed to measure many of the factors that concern Lang et al., such as cumulative effects over time. They also state that: “Lang et al. ignore the fact that all transgenic plants will be assessed as to their familiarity and substantial equivalence compared with their non-transformed (non-GM) near isolones and with commercial crop varieties before commercialization. This includes a detailed characterization of the plant under field conditions. On the basis of this detailed assessment, risk assessors will define the potential stressors that need to be addressed in the ERA.”

Lang et al., Nat. Biotechnol. 2007, 25, 35–36.
Romeis et al., Nat. Biotechnol. 2007, 25, 36–37.
Charter and code of conduct for recruitment of researchers

Janez Potocnik, European Commissioner for Science and Research, received a statement of support for the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers from EIROforum (a collaboration between seven European intergovernmental scientific research organizations, the CERN, EFDA, EMBL, ESA, ESO, ESRF and ILL). “The EIROforum partners warmly welcome this valuable initiative by the European Commission” said Prof. William G. Stirling, Director General of ESRF and present Chairman of EIROforum. “This is an important step towards the implementation of the European Research Area. The European Charter for Researchers addresses the roles, responsibilities and entitlements of researchers and their employers or funding organizations. It aims at ensuring that the relationship between these parties contributes to successful performance in the generation, transfer and sharing of knowledge, and to the career development of researchers. The Code of Conduct for the Recruitment of Researchers aims to improve recruitment, to make selection procedures fairer and more transparent, and proposes different means of judging merit. Merit should not just be measured on the number of publications but on a wider range of evaluation criteria, such as teaching, supervision, teamwork, knowledge transfer, management and public awareness activities.

In their statement, signed at the EIROforum Assembly on 15 November 2006, the seven EIROforum organizations support the general principles contained in the Charter and the Code, and will endeavor individually, where appropriate, to implement recommendations that have not yet been undertaken, or which could be improved within their own organizations. The two documents were carefully studied by the organizations’ human resources experts, who noted the high level of compliance with the guidelines of the Charter and the Code in the EIROforum organizations, where most of the recommendations are implemented and part of internal practice. The implementation of the recommendations of the Charter and the Code of Conduct will be done in full compliance with the relevant intergovernmental conventions and agreements, staff rules and regulations, applicable to each of the EIROforum organizations.

http://www.eiroforum.org

“Merit should not just be measured on the number of publications but on a wider range of evaluation criteria, such as teaching, supervision, teamwork, knowledge transfer, management and public awareness activities.”

CLEAN – Soil, Air, Water

Acta hydrochimica et hydrobiologica is now re-launched as CLEAN – Soil, Air, Water. Environmental sciences have become ever more important and interdisciplinary. Therefore, the re-launch will extend the scope of the journal: From 2007 onwards CLEAN – Soil, Air, Water (A Journal of Sustainability and Environmental Safety) will combine environmental aspects of the four branches soil, air, water, and sustainability and technosphere, while focusing on prevention measures and forward-oriented approaches rather than on remediation and pollution cleanup. One of the aims of CLEAN – Soil, Air, Water is to provide a bridge between East, West, North and South, focussing on different problems and approaches worldwide. To this end, the journal aims at closing the gap between developing and developed countries. The first issue of CLEAN is now available online.

http://www.clean-journal.com
Research Project

Rapid, low-cost DNA testing

Professor Lewis Rothberg, University of Rochester, received a NYSTAR grant to continue working on a recent discovery by his group: how to rapidly test DNA to improve our health and make sure we’re drinking clean water and eating uncontaminated food. Rothberg’s new method can help in forensic searches, test water, and aid medical research. Rothberg’s innovative procedure quickly and inexpensively identifies genetic sequences in any sample of DNA.

In fact, his new method can be used to help forensic labs identify criminals, test ponds and pools before children swim in them, and identify harmful genetic sequences in medical research, to name only a few applications.

The technology is a novel fluorescence DNA screening assay, which rapidly determines whether specific DNA target sequences are present in an analyte. Analytes contain other DNA sequences as well as the DNA target sequences, and the assay filters out only the targets. Professor Rothberg’s assay is based on the electrostatic properties of DNA, attaching to ionically charged gold nanoparticles. The new assay determines whether a fluorescently tagged short probe sequence of single-stranded DNA matches a sequence in the target analyte. It is as simple as that, yet nobody has ever done it before. The method is so new that the University of Rochester filed patents for it in 2004 and 2006. In May 2005, Professor Rothberg created a company called Diffinity Genomics, Inc. with two partners to further study and commercialize his technique.

Professor Rothberg’s method is part of a much larger process that analyzes DNA. First, DNA is extracted from the blood, tissue, or food. This typically takes up to 1 h. Second, as there is generally not enough DNA to analyze, it must be chemically amplified. This also takes approximately 1 h. The new process comes after these two steps, saving a final 1 h of work involving gel electrophoresis. Perhaps more important than the savings in time and money, the new method works to determine single-base mutations in DNA; this cannot be done on gels without further processing. Professor Rothberg concludes, “This could be very important for applications in personalized medicine where a particular DNA sequence will be linked to a prescribed therapy. In fact, we see this happening already.”

http://www.science.rochester.edu

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New method for identifying DNA sequences: Here, the probe sequences are shown as black coils. The red circles are fluorescent tags on the ends of the black coils. Following dehybridization and annealing for approximately 1 min, the fluorescent tags bind with a complementary sequence in a target (dark blue coil). The result is then mixed with gold nanoparticles and salt: A fluorescence measurement is made immediately. If the probe has hybridized to a sequence in the analyte, it is protected from adsorption on the gold and the fluorescence of its tag persists. If not, it adsorbs to the gold particles and the fluorescence is quenched. (Image courtesy of University of Rochester)