

Brains at work

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Spain: betting on innovation

SPAIN'S ECONOMY IS AMONG THE MOST VIBRANT IN EUROPE, BUT GROWTH HAS BEEN DRIVEN BY CONSTRUCTION AND SERVICES. GOVERNMENT GRANTS AND A DYNAMIC PRIVATE SECTOR ARE LOOKING TO INNOVATION, HOWEVER, AS THE SOURCE OF FUTURE DEVELOPMENT.

For some years, Spain has been one of the brightest economic spots in Europe. Gross domestic product has been climbing 3% to 4% a year, and 2007 marks 14 consecutive years of growth. Unemployment has been falling steadily and Spain continues to appeal to foreign investors. The country boasts a broad industrial base and a well-developed services sector, as well as a world-class infrastructure and modern transport and telecommunications networks.

So what's not to like? The impressive figures have been built on job creation, especially in the construction industry, rather than productivity. Spain, the world's eighth-largest economy, lags behind smaller countries like Ireland, Finland and Belgium in R&D expenditure, according to the Organization for Economic Cooperation and Development. Annual productivity gains are just 0.5%.

Spain has "one of the economies most exposed to a downswing, for precisely the factors that led to its boom," says Dr. Fernando Fernandez, Provost of Antonio Nebrija University in Madrid. "Construction is sensitive to interest rate increases, and rates are going up in the European Union and the U.S. "Construction has always been cyclical. We already had signs that the pace of construction was unsustainable."

Some 800,000 houses were built last year in Spain. This year, it is likely to be between 300,000 and 500,000. Construction, which

makes up 18% of the economy, is labor intensive. "A downturn will create unemployment," Fernandez says.

"Spain is lagging in human capital investment and technological development. It is important for Spain to avoid being locked into specialization in relatively low-technology sectors where it is likely to face growing competition from countries with lower labor cost," says an OECD survey of the country.

In the space of a few years, Spain narrowed a wide gap with the rest of the EU in its standard of living. Now it needs to widen its economic scope to sustain growth.

To that end, Spain, like many countries, is trying to stimulate innovation in the push toward a knowledge-driven economy. Innovation and knowledge activities drive productivity, says Jose Luis Escrivá, Chief Economist at BBVA Group in Madrid. "Total productivity has a strong long-term relationship with the increase of economic well-being."

Measured by the World Economic Forum's Business Competitiveness Index, Spain has been sliding for the past six years, to No. 30 in 2006 from No. 23 in 2001, says Dr. Eduardo Ballarín, Professor of General Management at the IESE Business School of the University of Navarra, who worked on the project. The index assumes that wealth is created by the productivity with which a nation can utilize

SPAIN **Brains at work**

its human, capital and natural resources to provide goods and services, and that depends on the microeconomic capability of the economy. The country's rank "indicates that strong macroeconomic results in Spain do not accurately reflect the underlying level of competitiveness," Ballarin says.

And this stems from a lack of labor flexibility and efficiency, Ballarin notes. "More could be done to reduce the burden of bureaucracy and red tape and to boost the quality of institutions of higher education, including those engaged in scientific research and technological innovation."

Fernandez agrees: "The best thing a government can do to encourage innovation is to create a fiscal environment that encourages taking risks. That means little red tape and not too many taxes." He credits the government with good intentions and acknowledges a good system of deductions for R&D, but says it would be better to generally lower tax rates. Spain is considering reducing some corporate tax rates to 30% (although in many EU countries, taxes are in the 20% to 25% range).

"The shift from being a conventional-sector economy, like ours, to an added-value one is difficult, and it cannot be solved through budgeting alone," says Joan Clos i Matheu, Minister of Industry, Tourism and Trade. "What matters to us now is not the budgeting, but the establishment of an infrastructure that will enable us to efficiently spend the money."

"This recent interest in developing R&D in Spain needs a lot of hard work because we've got no tradition [of it] here," says Pedro Solbes Mira, Minister of Economy and Finance. "If Europe invests less in R&D than the U.S., Spain invests less than Europe," he says. "If we don't foster demand, we won't be able to retain talent. This is what we are trying to do with the ongoing government support programs for researchers and companies."

The government created the Ingenio 2010 program to promote innovation and to raise R&D spending to 2% of GDP by 2010, with 1.1% of GDP financed by the business sector and 0.9% by the public sector. Under those auspices the government has launched a number of initiatives to stimulate growth sectors such as biotechnology, cancer research, and alternative energy where Spain could establish a competitive advantage.

The Torres Quevedo Program, for example, grants subsidies for companies and technology centers to attract highly skilled personnel to launch innovative projects. The program helped place 800 scientists and highly qualified researchers in private companies in 2005 –

three times the number in 2003. The success of the program has led to a 40% increase in its annual budget.

The OECD calls Ingenio 2010 "particularly detailed and well-funded," and says its multifaceted approach "is already producing positive preliminary results." Indeed, R&D efforts across Spain are already yielding dividends in the form of patent applications, up 35% in 2005, an increase exceeded only by China's.

On the private-sector side, venture capital and private equity are growing rapidly. "Although the size of the market is still small when compared to that of other advanced economies, the speed of its growth is overwhelming," says BBVA's Escriva. "For example, between 2004 and 2006 [compared with 1994 and 1996], fundraising has multiplied by 31 times, investments by 18, the assets managed by 10, and the number of entities operating in the market by 2.3," he says.

Indeed, business investment now makes up 48% of R&D investment in Spain, according to the EU. But total R&D spending comes to just 1.05% of GDP – about half the average for the original 15 EU members and far below the 3% goal set at a meeting in Lisbon in 2003.

Private-sector institutions like COTEC have helped promote innovation and increase awareness of technology across society. The business-led body aims to establish innovation as "a cultural value and a norm pervading business activity." By encouraging SMEs to work together as a way of modernizing their technological base, promoting the adoption of a national innovation strategy, and encouraging the emergence of Spanish technological champions, COTEC aims to boost Spain's competitiveness.

Spain has also been revamping its university system, granting it more independence. The European Trend Chart on Innovation says the main education-related challenge for Spain is to remedy a growing deficit in technical degrees, despite the steady increase in the share of the population with a university education. Universities and research institutions remain distant from the corporate world, Fernandez says. Spain ranks 44 on industry/university research collaboration in the World Economic Forum's competitiveness report.

Solbes, the Minister of Economy and Finance, understands the challenge: "We need to improve education. We should think five or six years ahead because we have problems in terms of competition and R&D. We still have a lot to do and we can't waste time."

■ BY CATHERINE BOLGAR

Home-grown research

CIB IS AT THE FOREFRONT OF BIOLOGICAL RESEARCH IN SPAIN AND AIMS TO BECOME A LEADING EUROPEAN FACILITY.

Spain's state-run research centers have a key role to play in implementing the government's plan to boost R&D spending, and in training scientific and technical personnel.

CIB, the government-run Center for Biological Research, has been at the forefront of biology and biotechnology research in Spain for over 50 years. CIB forms part of the CSIC, the Council for Scientific Research. It was founded in 1953 and is funded by contracts with industry, public aid and the EU.

Since the opening of new state-of-the-art facilities in 2004, and an increase in funding under the current administration, CIB has become more competitive with research institutions elsewhere in Europe. It is attracting researchers from across the world for increasingly ambitious projects.

Vicente Larraga, Director of CIB since 2005, says that scientific research in Spain is beginning to approach the level of other European countries. "Spain was behind other countries, Canada, France, Germany and the U.K., but we will catch up," he says.

"We have to discover niches where we have an opportunity, such as biotechnology."

Larraga says that with the increased resources, he has been able to attract leading scientists in key research areas, such as the structure of proteins. "I want CIB to become an institute that is recognized across Europe," Larraga explains. "With the support of the CSIC and the Spanish state, CIB can become a leading center. Just to be able to compare ourselves with Germany is gratifying."

Larraga adds that a key challenge for the future of biotechnology research in Spain is to encourage local companies to invest more in R&D and to continue the work of CIB in the private sector. In Spain, unlike in other countries, the bulk of R&D spending still comes from the government. Larraga remembers that when he discovered a vaccine for a parasitical disease, it was U.S. multinational, Pfizer, that contacted him, not a local firm. "It was flattering, but it should have been a Spanish company," he says.

Leading from the front

IF TECHNOLOGY AND INNOVATION IN SPAIN ARE STARTING FROM A SMALL BASE, THEY ARE GROWING RAPIDLY. AND SOME SPANISH COMPANIES FROM BIOTECHNOLOGY TO FASHION RETAIL ARE ALREADY LEADING THEIR FIELDS.

Spain conjures images of style, not science. It has Manolo Blahnik shoes, Alejandro Amenábar movies, Santiago Calatrava buildings, Ferrán Adrià's molecular gastronomy, and is less known for technology. But that's changing.

"It's true that the tradition of technology in this country starts practically in the 19th century and begins through an imitation of the French in the world of engineering," says Pedro Solbes Mira, Spain's Minister of Economy and Finance. "During the dictatorship, the country was closed to outside influences. We were using imported technology, we sold everything that we manufactured because the output was low and the demand wasn't great either. It's only once we opened up to other countries and foreign investment



Spain strides towards the future: Santiago Calatrava's City of Arts and Sciences in Valencia

Eva Serrabassa



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At the Center of Biological Research (CIB) we believe that the human body is a work of high precision. Since our creation 50 years ago, we've been at the forefront of Spanish research in the fields of biology and biomedicine, promoting high scientific standards in Spain and abroad. The CIB will carry out ever more ambitious projects, concentrating in Cellular, Development and Plant Biology, Protein Science, Cellular and Molecular Physiopathology, and Molecular Microbiology. By transferring the knowledge we generate to the productive sector, we will contribute to increase scientific awareness in Spanish society.

Center of Biological Research

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Educating entrepreneurs

A decade ago, if you wanted an MBA from a top business school you headed for the U.S., London or Paris. But now Spanish business schools are attracting high-flying students from around the globe, thanks to their emphasis on entrepreneurship. In the annual business-school rankings produced by the Financial Times, Madrid's Instituto de Empresa (IE) was rated the fourth best school in Europe last year; IESE and Esade, both in Barcelona, were ranked fifth and eleventh. In a rival table produced by the Economist Intelligence Unit, IESE was ranked No.1 in the world. At IE, founded by a group of businessmen in 1973, entrepreneurship is a compulsory subject for all students. Its Dean, Santiago Iñiguez de Ozoño, says: "Entrepreneurship is rooted in the school and we have contributed to the increasing entrepreneurial spirit in Spain – 15% of our graduates go on to set up their own businesses."

IE runs an entrepreneurship club to provide students with access to professors, alumni and professionals so that they can work together to develop ideas and new businesses.

At Esade, a new campus and technology park is being developed to include a business incubator where entrepreneurs in high-tech startups will be invited to share ideas and space with MBA students. "Spain now has a reputation for business. It's taking its place at the forefront of Europe and has a reputation for innovation," says Betsey Tufano, Esade's associate director of admissions.

At IESE, students and alumni have access to funding for their innovative ideas. Pedro Neuno, professor of entrepreneurship, runs Finaves, a venture-capital firm specializing in business ideas developed by IESE students. Since it began in 2000, it has invested in over 20 early-stage companies and has generated 650 jobs in growth sectors such as medical technology and IT. ■ BY HELEN JONES

SPAIN **Brains at work**

began to flow into the country that we started becoming interested in other things.”

Technology-based businesses account for just 1.8% of all Spanish companies, according to the Central Firm Directory. “Such companies are capital-intensive and offer high rates of productivity growth – a lack of which is one of the challenges facing the Spanish economy,” says the 2006 European Trend Chart on Innovation published by the European Union.

If Spain is starting from a small base, it is growing rapidly. Its market for information technology and telecommunications grew 5.2% in 2006 – the fastest in Europe, according to the European Information Technology Observatory. EITO predicted Spain would continue to lead the pack in 2007.

Other growth areas for Spain include nanotechnology, photonics, biotechnology and renewable energy. Seville-based Abengoa SA is the biggest bioethanol producer in Europe and the fifth-largest in the U.S. The company has been the driver of Spain’s rise to the top European producer of ethanol, mostly from wheat and barley but also from surplus wine, according to the French Petroleum Institute. Abengoa brought the world’s first commercial solar-electricity plant online in March 2006, powering about 6,000 homes.

In biotechnology, PharmaMar, a subsidiary of Madrid-based biotech company Zeltia, is developing cancer treatments using compounds found in marine micro-organisms. The company has 1,410 patents and five compounds in clinical development. PharmaMar invests about \$56 million a year in research and development, says Luis Nora, Executive General Manager and CFO.

What sets the company apart from others in the biotech sector is its focus on the sea. PharmaMar has a library of 50,000 samples of marine micro-organisms from which to work. “The difficulty in our field is to find new chemical compounds,” Nora says. “Other companies look at other sources in nature. But there are different entities if you go to the sea.”

Yondelis is a treatment for soft-tissue cancers, such as breast, prostate and ovarian cancers. The anti-tumor agent was discovered in the colonial tunicate Ecteinascidia turbinata, a tiny sea creature, and is now produced synthetically. Yondelis, which is awaiting European Commission marketing approval, is the first anti-cancer drug developed and produced by a Spanish company. “The biotech sector is new in Spain. We don’t have a long tradition of this kind of research. There are just a few companies, thought little by little we see more,” Nora says.

According to a report on Spain’s biotech sector by Isidre March Chordà of the University of Valencia, and Ramón Seoane Trigo of IDICHUS, the foundation for research, development and innovation of the University Hospital of Santiago de Compostela, the

“Higher value-added industries and clusters should be promoted in an effort to move to and remain an innovation-driven economy.”

biotech industry is hindered by a lack of risk capital and seed capital. That’s hard on an industry that requires 10 to 15 years and R&D investment of some \$1.12 billion to bring a drug to market. Venture capital has yet to take off, at \$5.9 million in 2004 vs. a high of \$9.5 million in 2002, according to Genoma España, the Spanish genome foundation.

Much of Spain’s biotech industry can be found in the Catalonia region in and around Barcelona, which has used the business-cluster model to foster not just health-related clusters like pharmaceuticals, but also automotive, consumer electronics and chemicals clusters. The Basque country and Valencia also are promoting clusters in the automotive industry as well as in some more traditional sectors such as agriculture.

“Higher value-added industries and clusters should be promoted in an effort to move to and remain an innovation-driven economy,” says Dr. Eduardo Ballarín, Professor of General Management at the IESE Business School of the University of Navarra. “Catalonia is an example with the effort they made to upgrade and transform the consumer-electronics cluster from pure manufacturing activities to more value-added and innovation activities.”

If it is still early days in Spain for high-tech fields such as biotechnology, its traditional companies are already leading the world in the application of technology and innovation.

Clothing retailer Zara, a unit of Galicia-based Inditex SA, changed the fashion industry with its system for gathering customer feedback to pick up on embryonic trends, then deliver the right products to stores quicker than had ever been done before. This innovative approach to supply-chain management catapulted Inditex to the top of Europe’s fashion-retail sector by sales, with stores in 64 countries.

BBVA Group is shaking up the staid world of banking by using technology to offer new services in new ways. “We are looking at what banking is going to be. Our first objective is to provide innovation in financial services for our 40 million customers around the world,” says Manuel Castro, Head of innovation and business development for the Madrid-based banking group. “We are not a tech company, but banking is about data and risk – perfect for technological applications. So BBVA is going to invest \$7.86 billion in technology over the next three years,” he adds.



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The statue of Don Quixote in Madrid's Plaza de España

BBVA is examining the kinds of customer data it collects so that it can offer more services under one roof. When a customer goes to a bank to ask for a mortgage, for example, BBVA would be able to connect them with moving services, a notary and other services related to buying a new house.

Tax preparation could be another area of growth — after all, the bank has the records of the customer's financial flows. "It would be a great service for small businesses and individuals," Castro says.

In its expansion into Latin America, BBVA is researching ways to put useful banking services onto a small smartcard, like a credit card, rather than create expensive bank branches. "We are looking at how to use the information we have about customers and to automate many functions," Castro says.

The private sector in Spain, rather than the government, is at the forefront of innovation, and that is as it should be, says Fernando Fernandez, Provost of Antonio Nebrija University in Madrid. "I don't think the government can lead the way," he says. "I don't think any government can pick the winning sectors."

■ BY CATHERINE BOLGAR

The turnkey approach

Duro Felguera has transformed itself into a major global player in the market for turnkey projects and used an innovative approach to occupational training to support its expansion.

As Spanish companies adapt to the demands of the global economy by investing in technology and promoting innovation, and by expanding into new markets, some of the country's longest-standing businesses are changing almost beyond recognition. When engineering firm Duro Felguera celebrates 150 years in business in 2008, it will acknowledge a transformation that in the past 10 years has seen it emerge as a leading player in the global market for turnkey projects in the energy and industrial sectors.

That transformation has been supported by an innovative approach to occupational training, which has seen the company sidestep a skills shortage in this area of Spain.

Duro Felguera, which is listed on the Madrid stock exchange, was founded in 1858 and is based in the northern Spanish region of Asturias. In the last decade, the company has moved away from its traditional business of manufacturing capital goods, such as equipment for refineries and electricity-generating plants, and toward a new focus on the high-margin business of executing turnkey projects, mainly in power-plant construction, and toward maintaining and operating industrial facilities.

"We have changed our business area and moved into more profitable sectors such as services and project development," explains Juan Carlos Torres Inclán, Duro Felguera's Chairman. "Some 80% of our business now is in services, and 20% in manufacturing — and we want that 20% to fall. We are trying to get more and more into services."

Although Duro Felguera will continue to manufacture capital goods — the equipment it makes gives it a competitive advantage in turnkey projects — it is construction management and the operation and maintenance of industrial facilities that is now the company's core business.

A focus on project management is providing Duro Felguera with more reliable and recurrent revenues than capital-goods manufacture, and the global spread of this business is reducing the company's dependence on Spain. It is this internationalization that is driving the company's transformation. "For a company that wants to grow, the priority is to be international, [especially] if it is from a country the size of Spain," Torres Inclán says.

But the company's continued rapid growth is dependent on having access to a pool of highly qualified personnel. "We are at a demand peak," Torres Inclán says. "And it is difficult to find qualified personnel to meet demand from the industrial and energy sectors. Our growth is based on the growth of specialist personnel."

In response, in 2003, Duro Felguera set up its pioneering Center for Specialization in Advanced Techniques, offering a masters in integrated management of industrial projects to its new university recruits. The program is co-financed by the Spanish Employment Institute and the European Union Social Fund. "This is our contribution to the training of graduates. And for the time being it's solving the problem of the shortage of engineers and specialists," Torres Inclán says.

These human resources are the basis for the international growth of the company. Like many Spanish firms, Duro Felguera has been able to build up a strong presence in Latin America, where it is now one of the leading players in the construction and management of large-scale energy projects and industrial plants. "We are convinced that Latin America is stirring again and that the next decade will be the decade of Latin America," Torres Inclán says. "As we have a major presence there, we have an almost assured market in the energy and ports sectors, and in minerals."

In international markets, Torres Inclán says that Spanish flexibility and customer service are being complemented by what Duro Felguera has learnt from its technological partners, such as Siemens and General Electric. "Our skill is in trying to offer clients Spanish flexibility with Anglo-Saxon professionalism," he says.

The shift in Duro Felguera's activity toward new business lines and new markets is having a major impact on its bottom line: In the first half of 2007, international sales rose 12% from the same period a year earlier, representing 30% of the company's total sales; and in 2006, net profit rose 44% to \$50.2 million. And total revenues are rising. From a revenue of \$786 million in 2006, Duro Felguera expects to book \$982 million in 2007, \$1.19 billion in 2008, and to reach the \$1.4 billion mark in 2010, crowning the transformation of the company into a major competitor in the global market for turnkey projects.

Smart implants

A COMBINATION OF GROWTH FACTORS AND BIOMATERIALS ARE THE INGREDIENTS FOR A DENTAL IMPLANT SYSTEM BY BTI BIOTECHNOLOGY. SINCE 2002, THE BASQUE COMPANY HAS FILED 15 PATENTS.

Petri dishes may be small, but they are often the staging ground for great ideas. Dr. Eduardo Anitua had an idea 18 years ago to patent new bio-active surfaces. He started his firm at a science park 12 years later initially focusing on dental implants and regenerative medicine. Although he can often be found staring down a microscope, he has never lost sight of the big picture. When his company was awarded Spain's Principe Felipe prize for technological innovation in 2007, the BTI Biotechnology Institute gained instant recognition. Today, BTI is a world leader in dental implants and a pioneer in the use of bioactive surfaces for oral implants. But what keeps the Basque firm working at night is the search for improved therapeutic applications for preparation rich in growth factors (PRGF).

Anitua, a stomatologist, received his postgraduate degree in Florida and practiced medicine for 27 years. Today, his team of 30 to 40 research scientists is based outside the town of Vitoria-Gasteiz in the Basque Country. From the Miñano technology park, BTI exports its ideas to the rest of the world, something economists like to refer to as 'RoW'. In the case of BTI, RoW includes Russia, India and Taiwan. The scientific team carries out clinical studies in cooperation with hundreds of dental surgeons. "As you can imagine, in this field you need to work with a broad range of practitioners," Anitua says. BTI has partner labs and affiliates in the U.S., Mexico, Germany, Italy and Portugal. The company also holds quality certifications for ISO 9001:2000 and ISO 13485:2003.

"We're a biotech firm that goes back 18 years, even though the BTI Biotechnology Institute was officially created from a matrix we developed six years ago. The idea is for the company to create synergies at different product levels," says Anitua. The firm plans to invest 120% of its profits into R&D over the next 10 years. Anitua says there have been buyout attempts along the way, as well as hefty offers by venture-capital funds. But despite the temptations of an easy life, no one has diverted BTI from its biomedical quest – not even state money for R&D. "You need to be extremely well placed in our field because our closest competitors are large multinationals," says Anitua.

BTI is scientifically versatile when it comes to implant tech-



Dr. Eduardo Anitua and his young team of researchers at BTI Biotechnology Institute

nology. The big picture includes diagnostics software to examine a patient's bone condition, as well as surgical instruments needed. His team looks at the shape and quality of a patient's maxillary bone to determine optimal solutions. BTI then develops bioactive surfaces by humidifying dental implants with PRGF. These new biologically active surfaces improve implant osseointegration. "We've published animal studies showing that a 100% apposition rate has taken place in less than two months. The 100% rate means you can duplicate a bone's position in relation to the implant in only eight weeks," says Anitua.

"We've created the most versatile implants on the market and our product range is very broad. The focus now is to make things easy for the surgeon. The success rate for our dental implants is 99.5%," says Anitua. The PRGF technology pioneered by BTI is also penetrating related fields such as sports medicine, orthopedic surgery, dermatology, eye surgery and the treatment of degenerative arthritis. The result of these efforts has been the creation of the Institute of Implantology and Regenerative Therapy Eduardo Anitua, which relies on the most advanced technology available and has become a world-renowned center in its field.

For Anitua, the challenge for biotech companies in Spain is finding a niche in the overall economy. The future of regenerative medicine, says Anitua, will depend on increased budgets for R&D across the board. "We've tried to be self-sustaining from a financial standpoint. This gives us leeway in developing our own focus. But it also means that the government will back our initiative in the long term, as we invest more in research," says Anitua.



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Winning the battle against hemophilia

THROMBOTARGETS HAS DEVELOPED A BLOOD-COAGULATION AGENT WHICH COULD CHANGE THE LIVES OF HEMOPHILIA SUFFERERS. WITH FDA "ORPHAN DRUG" STATUS AWARDED, THE PRODUCT IS AIMING AT A MARKET VALUED AT \$42 BILLION.

The Spanish government's commitment to ramping up R&D is stimulating the emergence of companies in an industry where until now Spain has had a limited presence – biotechnology. Thrombotargets, which was established in 2005 and which is developing products to assist blood coagulation in hemophiliac patients, has received \$3.7 million of Spanish public funding, in addition to \$4.8 million of private capital. Thrombotargets has become the first Spanish biotechnology company to have a product awarded "orphan drug" status by the U.S. Food and Drug Administration (FDA).

The FDA grants orphan drug status to those products which address a serious disease and which treat it better than any solution currently available. Orphan drug designation (ODD) means a compound will enjoy a seven-year monopoly in the U.S. market. And there seems to be little doubt that the Thrombotargets product marks a revolutionary breakthrough in treating blood-clotting disorders, promising to change the life of hemophiliacs in much the same way that insulin did for patients with diabetes. The product is aimed at a potential market of \$42 billion, and could lead to annual sales of over \$2.1 billion for Thrombotargets. All based on the genetic observation of an unlikely pairing – the blood of human placentas and sewer rats.

Dr. Javier Pedreño, President and CEO of the company and of U.S. subsidiary Thrombotargets Corp., explains that there has been little scientific innovation in the area of blood coagulation in the past 40 years. Pedreño says that in the 1990s he and Dr. Luis Caveda (who between them hold over 20 patents) joined forces with Dr. Lina Badimon, a close colleague of one of the world's leading heart surgeons, Dr. Valentin Fuster, to work together in this neglected area and attract investment to the new venture. "The idea was clear," Pedreño says, "there is no medicine for treating hemorrhages. Soldiers in wars bleed to death and it is very difficult to stop bleeding in accidents, and the problem is even worse for hemophiliacs, with some hemophiliac children not even able to go to the dentist or camping with friends."

The Thrombotargets team noticed that there were high levels of

the protein that is used for blood coagulation in placentas, as mothers need to staunch bleeding rapidly after giving birth, and in sewer rats, which often lose tails and feet but which rarely bleed to death. By cloning and then genetically modifying and optimizing the DNA of this protein, Thrombotargets has developed a gel, TT103-MH, which when applied to a hemorrhage stops the bleeding in 90% less time, without the need for a tourniquet or for intravenous treatments.

Thrombotargets demonstrated their product to the FDA by cutting the tail off a hemophiliac mouse and then applying the gel: the hemorrhage stopped in under a minute. ODD followed rapidly. Pedreño says that there are no similar products anywhere, and that orphan drug status means the FDA could cut the product's time to market from 10 years to just three. Phase 1 clinical trials of TT103-MH will begin in early 2008, and Thrombotargets is currently looking to license the drug candidate to a pharmaceutical company for marketing.

"It means that a hemophiliac child can go and play in the park, and if he falls down the hemorrhage can be stopped without having to go to the hospital for a transfusion," Pedreño explains.

"The market for this product is not just for hemophiliac patients, but for any type of hemorrhage."

Thrombotargets is also working on gene therapies to treat coagulation disorders such as hemophilia and Von Willebrand's disease. Pedreño says that first indications are positive. He aims to produce pills which reverse genetic illnesses like hemophilia by making the body produce what it is lacking. "I have never understood why Spain has not had a strong pharmaceutical industry like that of France, the U.K., or Germany," Pedreño says. "We had a small industry which never became competitive because historically the country did not invest in R&D. But I think if we invest time and money in R&D the country will be competitive."

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