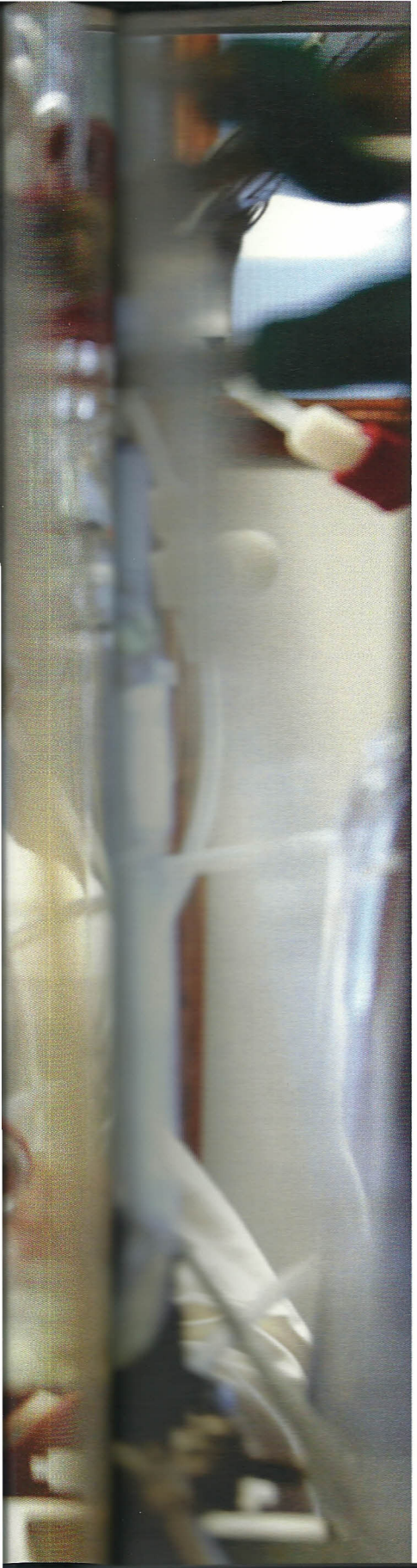
Achievements of FP7

examples that make us proud

EU

2016



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Foreword

An innovative society cannot thrive without the continued development of knowledge. To gain new, state-of-the-art knowledge, researchers and enterprises need to have access to the best knowledge, best facilities and best networks across borders and disciplines. Together, we enable this cross-border cooperation through excellent national and European (Framework) programmes. We strive for impact and success by securing funding, access and collaboration, and by putting in place the right framework conditions for an attractive research and innovation climate in Europe.

Ground breaking research and innovation are exciting and useful for creating jobs and stimulating growth. Compiled in this booklet, your contributions demonstrate the substantial impact of investments in research and innovation through the European Framework Programmes. Moreover, these EU projects show the added value of research and innovation projects for the economy and for national, regional and local communities.

With this booklet we show that investments in research and innovation, including short- and long-term investments, have a significant and real impact on Europe's economy and society. I hope it inspires all readers to vouch for a more innovative and competitive Europe. A Europe that aims to attract investors, innovative enterprises and the best researchers. A Europe that aims to foster sustainable economic growth and to solve the societal challenges we are all faced with.

Also on behalf of the Minister of Economic Affairs, Mr Henk Kamp,

Sander Dekker

State Secretary for Education, Culture and Science
Chair of the informal meeting of Ministers for COMPET (Research)

Greece

Name
Love Food: Love Wave Fully Integrated Lab-on-chip Platform for Food Pathogen Detection.

Year/duration
Start 01/09/2012 (42 months)

Website
love-food-project.eu/doku.php

Results
The project addresses the significant issue of *food safety* by proposing a novel technique for the efficient analysis of foodborne pathogen bacteria. Food-related outbreaks have a serious impact on consumers' health and trust to food-industry. With 48 million people suffering annually from foodborne diseases, several of which are hospitalized or even die, it is a *societal priority to strengthen food-safety management by developing and implementing more efficient methodologies to prevent such events*. Through the synergy of 7 partners and thanks to novel scientific and technological advancements produced within the project, new products have been developed in an integrated or modular format. These products will be brought to the market by the participating 2 industrial partners and 3 newly formed spin-offs, all of which will benefit by strengthening their innovation capacity, increasing their competitiveness and enlarging their portfolio of products and services. The engagement in the project of several young researchers and their continuous multidisciplinary training in a field that merges biology with engineering is bringing added value by mentoring the future scientific/industrial leaders for the benefit of human-targeted research.

Expected socio-economic impact
The project proposes a paradigmatic change in food-analysis based on interdisciplinary and highly innovative research in order to confront the increasing emergence for faster, economical and more efficient food-pathogens detection. With over 270.000 companies, the food industry is the largest European manufacturing sector, providing employments to more than 4 million people and having an annual turnover of 956 billion euro. The proposed work is expected to have substantial impact in strengthening the competitiveness of Europe in the food and analytical sector while alleviating the societal burden related to food poisoning.

Description
The Love-Food project is addressing the problem of food safety by surpassing laborious, lab-based and time consuming methods currently used by providing an innovative integrated, fast and cost-effective system for food analysis. Specifically, we have developed a fully autonomous analysis system for the detection of pathogens in food samples. To achieve this, bio, nano and micro technologies were converged in order to produce a *Lab-on-Chip* (LOC) diagnostic platform for sample pre-treatment, target (DNA)

amplification and analyte detection. The heart of the system is an acoustic wave sensor. A significant advantage associated with the above device lies in an innovative sensing approach, unique to acoustic systems, which is adopted for nucleic acid sensing. Additional incorporated innovations include the sample pretreatment modules, namely, a plastic nano-textured surface used for bacteria capturing and DNA extraction and a foil-based microPCR module for DNA amplification. All modules as well as the acoustic biochips can be fabricated using commercially micro engineering techniques, amenable to large scale production. Our new technology *overcomes the main problems of current* methods, by providing a time-to-response of less than 4hrs, as opposed to the currently required 2-3 days, and a simple, automated and portable system, as opposed to current labor-intensive and lab-based methods.

Cooperation countries

France, Germany, the Czech Republic.

FP7 Evaluation Achievements

1. Encouraged scientific excellence on individual and institutional level.
3. Engaged industry and SMEs strategically.
4. Reinforced a new mode of collaboration and an open innovation framework.
6. Addressed certain societal challenges through research, technology and innovation.
8. Stimulated mobility of researchers across Europe.
10. Reached a critical mass of research across the European landscape and worldwide.

Name

NANOTHERAPY: a novel Nanocontainer drug carrier for targeted treatment of (prostate) cancer

Year/duration

2009-2014 ERC (Starting grant)
2014 (18 momnths) ERC (Proof of Concept)

Website

www.demokritos.gr/Contents.aspx?CatId=367
or:
www.must.risk-technologies.com/home.*aspx?lan=230&tab=461&itm=461&pag=458*

Results

- generated a drug delivery system that targets cancer and leaves the rest of the body untouched, "localized chemotherapy";
- the ERC program supported 15 young scientists and the spinoff company in full development will support more than 100 scientists;
- the ERC PoC led to the development of a business plan, PCT and the establishment of the Nano4Chem (www.nano4chem.com) spinoff company at TEPA Lefkipos;
- we are about to carry out clinical studies Phase I at the University of Antwerp and ZeinCRO;to prove our technology works in humans;
- we collaborate with the GMP companies: DEMOS, Pharma Zag, MJR PharmaJet;
- a company was established under the assistance of SEV-Hellenic Federation of Enterprises;
- the commitment of the companies

supporting this technology and discussions with funds in Holland, Switzerland, Israel and Greece ensure synergy with international funds;
- nano4chem targeted DDS will reduce the public health care cost, will alleviate the side effects of the traditional chemotherapy reducing the pain of the traditional therapies;

Expected socio-economic impact

Cancers are among the leading causes of morbidity and mortality in the world with approx. 14 million new cases and 8.2 million cancer-related deaths in 2012 (Source: World Cancer Report 2014).
The total economic cost of cancer in Europe is EUR 126 billion (Source: Oxford University and King's College London, 2009) or EUR 102 per European with drugs representing 20% of the total. Cancer in Germany, France, Italy, and the UK together accounted for just over two-thirds of the cost.
It also costs us the people we love: 1.75 million died of cancer in Europe in 2012 (Source: Elsevier, European Journal of Cancer, 2013).
Patients who suffer from cancer need something potent to improve: on the one hand the tumour efficacy due to decreasing the unspecific release and on the other hand the drug toxicity. Our proposed drug nanocontainers will help pharma and biotech companies address this market gap, ultimately replacing Doxil® nanotheropy originating from India with a new European alternative, more stable and more effective.

Description

NANOTHERAPY provided the solution to the problem "How can the delivered therapeutic dose to the tumour be increased while at the same time reducing the dose in healthy tissue?"
This accomplishment leads to a huge improvement in the length and quality of life of cancer patients. In this context, NANOTHERAPY developed an innovative and patented therapeutic approach based on novel polymeric nanocarriers (NCs), which enables targeted drug delivery in tumors. Most investigational drugs fail due to unacceptable adverse effects and limited efficacy. Consequently, there is a pressing call for ways to elevate the efficiency of existing and developmental drugs to safely target tumors. The encapsulation of compounds in nanocarriers (NCs) has emerged as one of the most promising approaches to significantly improve local bioavailability. These NCs can protect oncology drugs against degradation and protect healthy tissues against toxic effects. Despite this promise, the number of nanocarrier-based treatments that have reached the market is still disappointing. The main problem in the development of these carriers is the requirement for stability and robustness when passing through the bloodstream, while being capable of unloading the drug when the target tissue has been reached. The NANOTHERAPY NC technology constitutes a significant improvement over the state of the art, since it is the first to integrate four stimuli (pH, temperature, reducing environments and alternating magnetic fields) as well as proprietary targeting capabilities. The "active targeting" aspect of our NCs results from the surface attachment of certain ligands that bind to proteins overexpressed on tumour cells. In mice experiments, our leading drug candidate NANO4-DOX (doxorubicin loaded in our NC platform) has proven

significantly more safe and effective in vivo than the current gold standard Doxil (liposomal doxorubicin), an absolute blockbuster nanomedicine in oncology. Our NCs are tunable products designed to give optimal control over the release kinetics and bioactivity of any anti-cancer compound, thereby improving pharmaco-therapeutic efficacy and reducing side effects, resulting in a "best-in-class" clinical profile. There is strong clinical and industrial interest in nanomedicines – particularly in the field of oncology, as demonstrated by commercial sales of the first two nanomedicines for cancer treatment, liposomal Doxil and albumin-nanoparticle Abraxane (approximately USD $600 million and $649 million in peak worldwide sales respectively). The different needs of the pharmaceutical industry, medical professionals, patients, healthcare insurance companies and policy makers all play a part in driving the market for improved drug delivery of anticancer pharmaceuticals.

Cooperation Countries

Netherlands, Portugal, Scandinavia, Germany, Switzerland, Poland, Italy, Finland, and Belgium.

FP7 Evaluation Achievements

1. Encouraged scientific excellence on individual and institutional level.
2. Promoted ground breaking research through a novel programme FP7 IDEAS (ERC).
3. Engaged industry and SMEs strategically.
4. Reinforced a new mode of collaboration and an open innovation framework.
5. Strengthened the European Research Area by catalysing a culture of cooperation and constructing comprehensive networks fit to address thematic challenges.
6. Addressed certain societal challenges through research, technology and innovation.
7. Encouraged harmonisation of national research and innovation systems and policies.
8. Stimulated mobility of researchers across Europe.
9. Promoted investment in European research infrastructures.
10. Reached a critical mass of research across the European landscape and worldwide.

Hungary

Name

Integrated evolutionary a
and drug interaction netw
(Network evolution)

Year/duration

Start 2008-07-01 End 201

Website

group.szbk.u-szeged.hu/s
lab-index.html
or www.brc.hu/sysbiol

Results

The spread of the multi-d
„super-pathogens" is a se
for health industry. One o
objectives of the research
out the molecular mecha
influence antibiotic resist
research team employs la
evolutionary experiments
new-generation, full gen
and detailed biochemical
decipher the general evol
mechanisms driving this p
systematically measured
other drugs that had bec
some specific compounds
course of laboratory evol
research team observed a
the bacteria that had bec
aminoglycosides, simulta
hypersensitive to several
antibiotics. The research
develop complex drug co
therapies using a wide sp
antibiotics.