Health2CARE

Directory of innovative projects in personalised medicine

HEALTH 2CARE

Cross-sector alliance for personalised medicine

DIRECTORY OF INNOVATIVE PROJECTS IN PERSONALISED MEDICINE

The Health2CARE project is a 2-years initiative (February 2014 – March 2016), co-funded by the European Union and coordinated by the Rhône-Alpes Region. The main objective, thanks to collaboration between clusters – **i-care Cluster, Lyonbiopole, Minalogic, Plastipolis – is to enhance the cross-sectoral cooperation in the field of personalised medicine**.

Health2CARE aims to gather different technological and applied **sectors in Rhône-Alpes** such as biotechnologies, medical devices, plastics, nanotechnologies, software, **to investigate new value chains by an open innovative approach**. Personalised medicine mobilizes various techniques and skills, going often beyond the perimeter of existing partnership between actors. Clusters involved in the initiative have a key role to enhance this interdisciplinarity and in-fine to reinforce the competitiveness of companies, more specifically SMEs, on this innovative and emerging sector.

To foster the emergence and the growth of innovative solutions, 2 calls for Expression of interest have been launched between 2014 and 2015 in the frame of Health2CARE towards multidisciplinary SMEs, start-ups or academic research labs addressing personalised medicine issues. This book collects the 20 innovative projects of the Rhône-Alpes region, submitted within the 2 calls for expression of interest. All these projects are solutions addressing the personalised medicine challenge and while integrating multiple technologies applied to healthcare products.

The most promising projects have been selected by a jury of experts, and awarded for an external expertise. This support is provided by the implementation of financial envelopes, called "**Innovation vouchers**" dedicated to facilitate the innovative projects structuration and their transformation into product(s) or business service(s).

Thus, 10* of the projects presented in the book have been selected to receive external services financed with the "innovation vouchers" representing between 7.000 and 15.000 euros co-financed by the company.
The services provided as "innovation vouchers" correspond to the project holders needs among:

- Business development (market feasibility, funding strategy, commercial action plan, etc.)
- Support for private investment (identification of funding partners, funding engineering, etc.)
- International Business development
- Regulatory affairs (regulation, European rules, etc.)

The objective of this book is to present the innovative project to regional and European companies, research labs, public health stakeholders for future potential collaboration. Discover the project ideas in the next following pages.

** One of these 10 selected projects is not included in this directory for non-disclosure commitment.*

SOMMAIRE

ALTRABIO

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> DESCRIPTION OF THE PROJECT

AltraBio (established in 2006) is a biotechnology company that provides comprehensive solutions in exploration, mining and integrative analysis of life science data. In order to accelerate its growth and enlarge the portfolio of its services, AltraBio is developing a new services offer of analysis, visualisation and interpretation of MASS CYTOMETRY data. This new technology, combining the aspects of flow cytometry and mass spectroscopy, has a high potential to radically improve the capabilities to characterize cellular sub-populations. This technique is increasingly important in life science basic research in the areas of cancer, immunology, autoimmune disease etc. In the near future, it will also be increasingly applied to immunomonitoring for individualized medicine. It is estimated that within 3-5 years, the analysis of the immune status (complex phenotype) in research as well as clinical (diagnostics) settings will be performed by means of mass cytometry. An increasing number of scientific teams as well as clinical establishments will need access not only to mass cytometry platforms but also to advanced software and tools to analyze and interpret their data. We plan to address this need by creating a bioinformatics platform for visualization and analysis of mass cytometry data.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

AltraBio will design, test and evaluate novel ways of mass cytometry data processing, treatment and reporting, in particular automatic gating. This addresses the major bottleneck in current use of the technology that relies on manual preprocessing of cytometry data.

> PARTNER SEARCH

Within the existing collaboration with academic partners, AltraBio has established contacts with major users of mass cytometry technology in Lyon. The development of software and data interpretation tools is currently ongoing. We seek assistance in deploying the offer of services at the national and international level.

SELECTED FOR VOUCHERS

AVALUN

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> DESCRIPTION OF THE PROJECT

Created in 2013, the company Avalun currently develops the LabPad®, a next-generation mobile point-of-care (POC) device. As rapid In Vitro Diagnostic (IVD) is a fast-growing market, LapPad® technology responds to a demand for a tool designed to carry out multiple tests. LapPad® allows for patients to be monitored at home or during an emergency and more generally, assists healthcare professionals (doctors, pharmacists, nurses), whom practice would be clearly incompatible with a plethora of different instruments. Using the same imaging components as a smartphone to create a fully integrated miniature microscope, LabPad® is a portable minilab that can perform many tests on the same device, such as blood coagulation, glucose or cholesterol. A patient or a healthcare professional just needs to insert the appropriate micro-cuvette in the device, draw a droplet of blood from the patient's finger and deposit it on the micro-cuvette.

The innovative LabPad® patented technology allows for a number of medical tests to be taken by one single instrument. The development of this technology is the result of over 10 years of research at CEA-Léti, a top French research institute, based in Grenoble.

The first blood parameters to be CE marked will be INR, or blood coagulation time, to allow monitoring patients on VKA anticoagulation therapies, such as Warfarin, who needs periodic blood tests to avoid haemorrhages. To date, haemorrhages induced by VKA lead to more than 200 000 hospitalisations and 50 000 death worldwide. Designed for e-health applications, LabPad® also is a communication device that strengthens the link between patients and healthcare professionals. This could radically change the way people on Warfarin are monitored and educated so to decrease significantly the number of adverse events. Our project implies studying different integration for the LabPad in different European healthcare systems and the related connection issues.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

The LabPad has the ability to:

- **realise multiple measurements** on the same device
- **realise a test** on a small drop of blood
- **connect** to healthcare professionals.

These innovations allow innovative business models that will shape tomorrow's medicine.
The key technologies already included are electronics, microfluidics, plastics, surface chemistry, biochemistry and IT.

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> DESCRIPTION OF THE PROJECT

AXO Science brings its patented HIFI technology (FR 2970568 / WO 2012095614) an economically viable solution to the various stakeholders in public health. With HIFI Blood 96 ™ solution of automated blood genotyping that has been developed by project ANR «HIFI-Assays» is now being deployed. The company aims to position itself as leader in the field. To do this, and to prepare a new generation of tests HIFI for 2019, AXO Science has decided to develop a new test format in microcapsule for both amplification and identification of genes of interest within one single step, in a fully automated and used in broadband format.
This highly innovative approach, called MOST, will save time, reduce costs and human interventions and therefore a significant reduction of risk of contamination. The aim is thus to deploy the new solution HIFI Blood 96 NextGen on the international market and allow blood banks to generalize blood genotyping.
MOST technology will also be used for the diagnosis of other solutions based on DNA chips already in development by AXO Science. We can mention particular research pathogens responsible for respiratory infections and gastro-enteritis.
AXO Science has, in addition, many essential to the successful completion of the MOST project expertise:

- **Design and production tests**
- **Robotic Environment** and associated software control for high-speed analysis results
- **Playback of high definition** imaging results
- **Placing on the market** and commercialization of diagnostic solutions
- **network of expertise** and academic and industrial partners Team Management, Project Management Research,
- **Quality (ISO: 13485, ISO: 9001)** and standards, including CE-IVD

AXOScience

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

MOST: A REVOLUTION FOR ALL MOLECULAR BIOLOGY TESTS

AXO Science engages in the development of a format that will revolutionize molecular biology tests. Called MOST, this new assay format will perform all the steps necessary to achieve a multiplex test capable of characterizing samples in less than 4 hours with 50 parameters per sample within a fully automated single step .Time savings, reduced risk of errors and cost reduction are the most visible benefits of this innovation, it is important to note that the ease and speed of performing a test based on the technology MOST innovative will certainly expand the scope, the panel of users and the conditions under which these tests are performed diagnostic.
No equivalent on the market, should win MOST membership and cause migration of standard tests to the new format. This technological breakthrough will create less complex IVD products with a strong competitive advantage for a variety of applications, and a reasonable price level given its simplicity.
The project is the crossroad between transfusion medicine, latest microarray technologies, PCR multiplexing, genotyping and nanotechnologies.
This is only by gathering this expertise that we will succeed. Most of these skills areas are covered by AXO Science. However the French Blood Bank will be involved for the transfusion medicine clinical area. The ICBMS is crucial when it comes the surface chemistry and will not be able to make it without Nano-h who will bring its nanoparticules knowledge.

CARTIMAGE MEDICAL

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> DESCRIPTION OF THE PROJECT

Our flagship product ChondroSight is the only intra-operative imaging device able to provide the surgeon with depth exploration and biomechanical assessment of cartilage and bone, during arthroscopy. ChondroSight will allow surgeons to choose the optimal therapy for each kind of articular damage, and customize it to the patient's specific needs. The combination of intra-articular ultrasound and navigation is unique and allows to construct 3D maps of the joint while conducting a thorough exploration of all tissues. Data fusion with pre-op MRI and arthroscopic video enables to measure biomechanical properties more precisely than ever. With automated calibration and a simple, user-friendly interface, it integrates smoothly with existing arthroscopic setups to provide «augmented reality» and enhanced cartilage analysis, without the need for a radiologists' expertise. A surgeon is therefore autonomous with this device, which will also automatically generate post-operative reports, both for keeping tracks of interventions and to help inform the patient. Digital reports and clinical data can be used to keep track of the patient's evolution and to personalize therapies.

SELECTED FOR VOUCHERS

FLUOPTICS

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> DESCRIPTION OF THE PROJECT

Created in 2009, Fluoptics develops and commercializes fluorescence imaging solutions that assist and guide surgeons in real time during operations. Fluoptics responds to a gap in the medical field, expressed by numerous surgeons, improving the quality of surgery and so contributing to greater therapeutic effectiveness.

Fluoptics's solution uses a fluorescent probe and an imaging instrument. The solution allows surgeons to visualize, in real time, biological phenomena invisible to the naked eye in the zone of interest as they operate, guiding their gestures and making them safer, and in particular improving the efficiency of operations. This technology has many applications, among others in surgical oncology, for the resection of tumors and metastasis, for sentinel lymph nodes detection, but also in cardiovascular surgery, reconstructive surgery and liver surgery.

At the moment Fluoptics obtained CE MED and FDA approval for the main product Fluobeam®. The main issue for Fluoptics is the international sales development. We are looking for new resources and new skills to help us for this new challenge.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Fluorescence imaging in a new technology for surgery. The company is an innovative company launched for developing innovative solution in fluorescence imaging. This solution doesn't exist yet in surgical room. We are in an emergent market.

We work on the two part of the solution, device and molecular probe. On the device part on the field of imaging for surgery, the key technologies are in the optics field, in mechanism, electronic, software and image analysis On the molecular probe part, the key technologies are in the field of chemistry, biology, and pharmaceutical. Our partners are technological partner like CEA, biological partner like University Joseph Fourier and surgical partners like CLB (Lyon) and CHU de Grenoble for regional partners.

HARDIS GROUP

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LIGHT UP
YOUR FUTURE_
HARDIS
GROUP

> DESCRIPTION OF THE PROJECT

In cooperation **with our partner, Group Harmonie, a French "Mutuelle"; which is a major Health Insurance Company** (4,5 million persons covered) as well as an important Health & Care Operator, propose some high added value Digital Services to their "customers" who are willing to subscribe. These Digital Services are related to Health & Care Data collection and analysis:

1) "Carnet de Santé Digital": personal secured digital Safe for H2C information. NOSQL database filled in from various sources: existing digital archives (ie health trials records from insurance), free declarative information from subscribers, connected objects feed-backs, medical & biological exams results. Value for subscriber: information available for him and his family at any time and any place

2) • Sharing the "Carnet de Santé Digital" with the medical staff (program members)
   • Value for medical staff: better knowledge of patient (emergency, anesthesia, geriatrics)
   • Value for subscriber: better quality of medical care

3) • Sharing anonymously the "Carnet de Santé"; for global predictive analysis
   • Value for subscriber: participate to enhancing the public health system
   • Value for the public health system: better knowledge for global preventive campaigns

4) • Sharing "Carnet de Santé" with the medical staff for personal monitoring services
   • Value for subscriber: be informed and advised in case of medical possible risk
   • Value for medical staff: high added value advises and interventions
   • Value for the public health system: decrease of health accidents among risky populations

5) • Participating to a personal coaching and monitoring program with the medical H2C staff with acceptance to wear connected objects and to regularly make reporting
   • Value for subscriber: increase his life expectancy and his life comfort
   • Value for the public health system: increase of % of healthy population

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> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

1) **Connected objects in the bio monitoring field are there**. Our purpose is to take opportunity of this wave to collect the available data from these devices thanks to software system able to safely concentrate the digital data flows.
2) **Make it more simple:** new paradigm which consists in filling as quickly as possible the H2C database with available information without any data model (NOSQL database).
3) **Predictive analysis** is a new technology which allows to get answers to some valuable questions with a just necessary set of Data. A first level of valuable predictions could be brought to insured parties and health professionals through analysis of already available data (ie health trials records from insurance)
4) **New Business model to reconfigure for this emerging value chain.** All players should be winners, it should be possible to define a new Business model for Insured parties, Insurance, Health Professionals, health industrials...
5) **Based on a volunteer subscription of insured parties**, and thanks to the integrated health care network of our Insurance partner, we will be able to quickly launch some Proof of Concept in an innovative "lean start up" perspective (Agile method).

MULTIDISCIPLINARY ASPECTS OF THE PROJECT:

Micro-nanotechnologies
- connected bio-sensors (biological data) Bioinformatics :
- Health Database hosting / security aspects
- Predictive analysis / mathematical methods applied to health prevention

Software
- Network and communication for mobile
- Big Data storage / NoSQL DB + security

Medicine :
- Quality & efficiency of diagnosis
- Posologie monitoring and optimisation

Economy :
- new business model definition

Legal framework :
- Data confidentiality, Code of ethics

Sociology :
- usage adoption

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SELECTED FOR VOUCHERS

HISTORAM

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historam
Raman Imaging for Histopathology

> DESCRIPTION OF THE PROJECT

In the realm of oncology, one of the challenges today is to improve the diagnostic flow which then determines the therapeutic approach. Currently, the surgical histological examination of tissues or cells within the biopsy via the microscopy is the reference analysis. The overall process nevertheless presents a number of limitations, such as the subjective interpretation given by the pathologist just based on the structural qualitative morphological observation. To overcome these limitations new analysis techniques emerge but if they bring the sensitivity and the specificity they ask in return considerable analysis time, expensive instrumentations and complex procedures. To get out of this context we developed a user friendly and low cost Raman Spectroscopy (RS) device (TRL5) to provide to the pathologists a complementary and rapid analysis (20 min). The tool is based on the Raman Image Mapping (RIM), which quantifies a panel of specific biochemical metabolites (SBM) issued from Raman spectral signatures. The proposed approach will give the possibility for the pathologist to confirm or corroborate his diagnosis integrating a new kind of information around the cancer disease in order to improve the therapeutic strategy.

The device is actually proposed in a compact and automated V0 prototype. It has been installed at the Optic Clinic laboratory of CHU Grenoble to start the preclinical and clinical essay phases. The short term objective (beginning 2016) is to validate the medical proof-of-concept consolidating the preliminary results. We have to strengthen the proposed approach in comparing to the reference technique in order to obtain the support of KOL's. In this context, this project is finalized to create a start-up (middle 2016) that will commercialize this tool. Therefore, we are focusing our interest to better understand the markets we can penetrate immediately.

The long term objective is then to propose this tool as reliable instrument on the workflow of the pathologists and to introduce progressively a new robust reference methodology on the cancer diagnostic in real-time in the hospitals and private analysis laboratories.

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historam
Raman Imaging for Histopathology

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

INNOVATIVE ASPECTS OF THE PROJECT

Our platform combines a double imaging system with a RS helping in the cancer diagnostic. It gives the possibility to add a real-time quantification of the SBM via a RIM over a selected ROI in addition to the image obtained with the wide FOV in 20 min. This contribution is a plus for the pathologist especially in the ex-tempore procedure in which the results are expected in max 30 min by the surgeon while the patient is under anesthesia determining the surgical and therapeutic online protocol. Actually the gold reference is the microscope observation. This is a qualitative analysis that impacts the sensibility and the specificity.

Innovations:

- Our tool gives the possibility to introduce RS in the clinical workflow as a complementary and reliable analysis helping the pathologist;
- The SBM analysis led the pathologist to be an expert for this innovative approach strengthen his role in the decisional panel;
- Historam offers an online quantitative analysis in parallel to the morphological examination establishing more rapidly the first diagnostic and the appropriate treatment;
- The advantages in to have a compact, user-friendly and low-cost automated RS.

Benefits:

- Decrease the pathological misunderstanding and make the diagnosis faster;
- Give access to the powerful technique of RS with a performing device;
- Reduce the instrument cost and cost-for-analysis for a quantitative screening.

MULTIDISCIPLINARY ASPECT:

RS provides a chemical-structural characterization. It's a rapid, marker-free and non-contact characterization tool that do not requires a sample preparation. Chemical Imaging is interesting: the vibrational spectra generate images showing the location and the amount of the different biochemical components. In the tissue, the image shows the SBM distribution such the proteins, the nucleic acids and the fatty acids.

Because the diseases anomalies lead to the chemical changes, RS is used as sensitive tool. RS is performed in-vitro, ex-vivo, in-vivo to detect the alterations in the biochemical composition producing a diagnostic fingerprint of the tissues.

> PARTNER SEARCH

The main objective is to give visibility of the project targeting future partnerships and raising more funding for the incoming development. This will give the possibility to complete the last phase in term of technological optimization, to strength the medical validation, to consolidate the business and marketing approach and to build the team of the incoming start-up. Finally we are looking into a partner with a business-oriented profile and with a strong knowledge in the medical device field as preference. Ideally, he will be in charge to drive with his experience in the marketing and in the raise funding the general direction of the start-up.

Moreover we are looking for future clinical-medical collaboration to validate the approach and to drive the future development with a market-pull approach in order to address the solution proposed in the need solving. This means have the possibility to collaborate with hospitals or private research centers. We would work directly with the pathologists, the surgeons and the oncologists in order to have a direct feedback about the possibilities and the limitations of our approach.

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SELECTED FOR VOUCHERS

HORUSCARE

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> DESCRIPTION OF THE PROJECT

Horuscare will be developing and marketing beginning 2015 a «Barrier» medical device dedicated to the severe obese population (1.9 million in France). It is placed in the small intestine by endoscopic route and is aimed at reducing food intake by approximately 70%.This is reversible and innovative non-surgical (outpatient) treatment concept (registered patent).
One person out of 10 is therefore obese in the world according to the WHO and, according to its predictions, more than half of the adult population will become obese or overweight by 2030 across the world.

Overweight also affects children, with almost 44 million children who are overweight in 2014, and WHO predicts that by 2025 there will be 75 million overweight children.

In Europe, close to 320,000 deaths per year are related to obesity, i.e. the second cause of mortality after smoking.
• **Findings > over 90%** of cases of severe obesity are not treated
The significant insufficient number of obese people receiving a surgical operation is essentially due to the complexity of the surgical act as it excludes the stomach and part of the small intestine. This population is currently seeking an efficient, reversible solution while avoiding the aforementioned post-surgical complications in order to protect their physical integrity.

There are currently three main techniques in surgical procedures (gastric banding, gastric sleeve and gastric bypass), the scientific literature shows that only gastric bypass provides a long-term satisfactory outcome with 80% success. However this solution is performed laparoscopically and has, besides the restriction of the gastrointestinal tract, the sometimes serious complications (bleeding ...) which, in any event, require a lifetime followed by a medical team trained in this technique.

Ultimately, the solution developed by Horuscare gives similar results in terms of weight loss by minimizing the mechanism «harmful» Bypass (malabsorption and restriction) while eliminating serious complications and preserving the reversibility of the treatment and maintaining quality of life of patients who continue to eat normally.
• **The response > treatment of obesity** by an endoscopic operation backed by a range of food supplements

The adverse effects and major complications induced by the surgical approach to the treatment of obesity can now be avoided thanks to the solution developed and patented by Horuscare.

horus care

This entails positioning by endoscopic route, a «Barrier» medical device in the intestine in order to reduce food intake (in particular fat and sugar) which are sources of obesity. This non-surgical, reversible therapeutic concept generates a sustainable loss of weight and leads to food deficiencies (as with all bariatric operations) which will be treated by a range of sublingual food supplements providing the vitamins and mineral salts required for the patients.
This range of food supplements is covered by a patent application relating to the specific dosage.

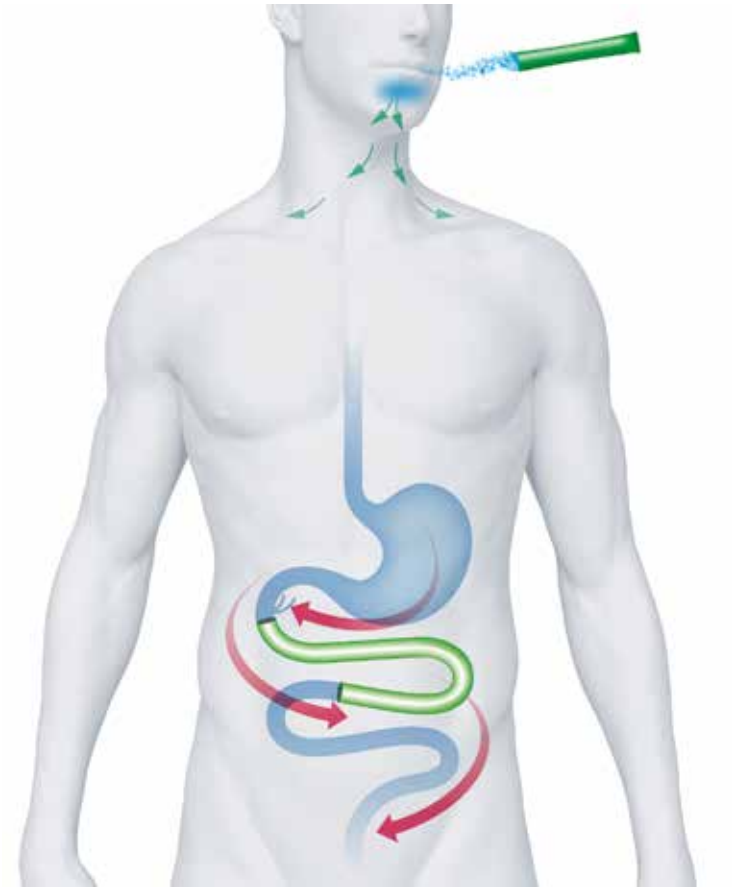
In addition to the totally innovative aspect of the Horuscare therapeutic solution and the all-round response expressed by obese sufferers, this endoscopic approach under an outpatient protocol gives rise to highly significant financial savings by reviewing the surgical and hospitalisation times of patients which represent major financial stakes to social organisations and the world health authorities.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Installed by endoscopy in the small intestine, our «Barrier» device is a flexible tube that acts as a «nutrient filter» to slow the absorption by the permeable wall of the small intestine, a major body of absorption of food brewed by the stomach. It is folded into an introduction system. Her holding system is located below the duodenal papilla of Vater.

It requires no hooks trauma can damage the mucosa of the stomach. It is made so that it must follow the movement of the small intestine during the passage of digested food.

To date, we finalized the technology and the geometry of our barrier device (tube armature holding system). But to implement our device into the small intestine, we need a delivery system that passes through the working channel of the endoscope. We are currently in the development phase of the system (technology and design). In vivo testing will enable us to finalize this device.



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KOWOK THERANOSTIC

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> DESCRIPTION OF THE PROJECT

Our project goal is to treat more efficiently patients that suffer from chronic form of arthritis caused by 2 autoimmune diseases named rheumatoid arthritis (RA) and ankylosing spondylitis (AS). Rheumatoid arthritis (RA) is characterized by chronic and progressive joint inflammation that typically results in permanent, debilitating tissue damage, which is further compounded by joint deformation. Ankylosing spondylitis (AS) is a type of chronic arthritis that affects parts of the spine, including bones, muscles and ligaments. Arthritis is a common condition that causes pain and inflammation of the joints and tissues around them. The condition for those patients is associated with lower quality of life, premature death, disability, and unemployment.

In EU, more than 3.5 million of people are concerned with RA. More than 50% of all cases occur in people aged 65 years or older. Due to ageing, number of people with RA should raised by more than 10 %. We estimate that people with AS in EU are more than one million. AS can develop at any time from teenage years onwards, although it usually occurs between 15 and 35 years of age and rarely starts in old age.

In 2012, the majority of patients were treated with disease-modifying antirheumatic drugs (DMARDs). In 2012, DMARDs market share of RA drug was dominated by the tumor necrosis factor alpha inhibitors (TNF-alpha), which together held a total market share of 73%. The ability of TNF-alpha therapies to effect multiple outcomes, including reducing signs and symptoms, improving physical function, and slowing or inhibiting the progression of bone erosion has been demonstrated in numerous clinical trials. Nevertheless, good response (e.g ACR-70 and ASAS-70 criteria) rate is only 40% after one year of treatment. It means that, each year, for approximatively 5 billion $ of treatment expenditure in EU, 3 billions $ are expended for a result that is not good.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Innovative aspects of the project are 3 of differents kinds. First aspect is medical. People that suffer from rheumatoid arthritis or ankylosing spondylitis will grant a personalized medical decision for the choice of TNF-alpha biologics. That personalized decision maximizes their chance to enter into remission. Indeed, whatever the TNF-alpha, some authors have demonstrated that patients receiving as first line of therapy efficient TNF-alpha biologics have greater chance to enter into remission. Today there is no technology that allows predicting efficiency of TNF-alpha therapy or another therapy indicated in rheumatogy. There is some technologies that monitors TNF-alpha efficiency which are additional to our predicting technology. Second aspect is industrial. It validates our innovative approach that is based on unique in silicon technology built for theragnostics medtech innovations. It is reducing to 80 % cost and time for such medtech R&D. Last aspect is economic. Today, health insurances reimburse TNF alpha despite their weak response rate for a good efficiency. In France, national health insurance pays almost 300M¤ for inefficient or weakly efficient treatment.

Our project combines in-vitro diagnostic (IVD) technologies for biomarkers measurement, medical and clinical expertise in rheumatology, innovative bioinformatics technologies and medical software expertise to build our predictive system. Biological measurement kits and biological know-how are as much important as clinical expertise in rheumatology for our projects. Both aspects are committing for datasets qualities, and so on, algorithm engineering and predictive performance of our system.

LABORATOIRE DE BIOLOGIE INTÉGRATIVE DU TISSU OSSEUX (INSERM U1059, UJM, ST-ETIENNE)

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> DESCRIPTION OF THE PROJECT

The reconstruction of large bone defects is still a challenge for orthopaedic surgeons. In order to resolve this clinical problem, the aim would be to promote the regeneration of the bone tissue within the bone defect. This new approach, called tissue engineering, could be achieved with living cells, which are capable of division and differentiation when seeded on 3D porous biomaterial that acts as scaffolds. Ideally, a scaffold should produce correct signals to induce appropriate in situ stem cells differentiation to facilitate osseointegration of the implant. Osseointegration is of critical importance for optimal function of the implants and is, in part, related to the design of the scaffold. Recent advances in understanding the effect of 3D architectures and also surface texture on stem cell behavior has brought the community to consider that manipulating biomaterial surface and 3D structure design may bring innovative tools for improving the implant clinical outcome. However, the functional relationships between cells behavior and the various changes in substrate 3D geometry and surface nanotopography remain to be further elucidated. Recent developments in selective laser melting have enabled production of complex porous titanium scaffolds with precisely-controlled 3D architecture. Moreover, the laser femtosecond can "print" specific and predefined nanotopography on the surface of the biomaterial. Thus, the combination of these two laser techniques will be useful to design bioactive 3D scaffolds promoting osseointegration. The objectives of this study are threefold: (i) to fabricate titanium scaffolds with 3D architectures and controlled surfaces texturation (ii) to characterize the morphological and surface properties of the scaffolds (iii) to investigate in vitro cell behavior of clinically relevant mesenchymal-stem-cell-like osteoprogenitors over 14 days of culture in a bioreactor.

LBTO Laboratoire de Biologie du Tissu Osseux Inserm U1059

ENISE

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Titanium alloys with various porous structures can be fabricated by selective laser melting, which are attractive for use as scaffolds for bone defect repair. However, surface of the 3D objects often requires time-consuming finishing stages. The minimum roughness (Ra) is about 10µm which limits the industrial applications of the process. For biomedical applications, it is important to control the scaffold geometry but also surfaces, particularly inner surfaces which are critical to improve osseointegration. To reach this goal, the first innovative aspect of the project will be the combination of 2 lasers technologies: the selective laser melting to control 3D scaffold architecture and the femtosecond laser to control the surface roughness. The second innovative aspect is to validate the designed scaffolds using a new 3D dynamic culture model: BioDynamic® Bioreactor BOSE (EquipEx IVTV). In this top level bioreactor, cells are grown and organized in a three dimensions environment. The system allows perfusing the scaffold and applying controlled mechanical strain: this dynamic environment is closer to in vivo situation and enables to obtain bone tissue engineered substitutes.

The laboratories are partners of the 2 Equipex: IVTV and/or MANUTECH-Ultrafast Surface Design. This multidisciplinary approach provides new insights on the potential use of laser technologies for engineering scaffolds for regenerative medicine. It is worthy of note that the association of the 3 expertises (biology, mechanics and laser physics) together with these advanced technological platforms is a unique opportunity for improving knowledge and to draw full benefit for our research.

SELECTED FOR VOUCHERS

LX REPAIR

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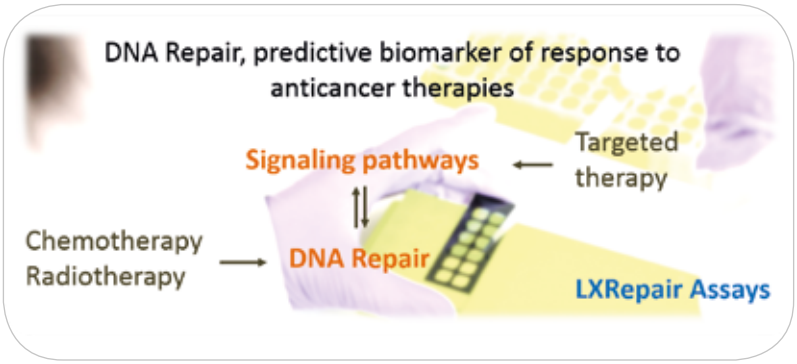
> DESCRIPTION OF THE PROJECT

LXRepair is a life science company, spin-off from CEA, created in September 2013 by Dr Sylvie Sauvaigo that develops multiplexed high value functional tests to characterize major cellular DNA Repair mechanism. LXRepair designs diagnostic tests with original biomarkers to help clinicians to personalize cancer therapies. Two clinical studies have been launched to identify predictive biomarkers of radiotoxicity and chemo- and radio-resistance in head and neck cancer, and patients that do not respond to targeted therapies in metastatic melanoma.
LXRepair also proposes research kits for academic laboratories and industrials in Pharma Drug Development, Cosmetic-Aging Sciences and Environmental and Industrial Toxicology, to identify biomarkers of exposure and biomarkers of risk, in individuals and populations.
LXRepair has a R&D service lab, several customers from pharmaceutical industry and academic laboratories.
The first kit, Glyco-SPOT, developed and commercialized in partnership with Bertin pharma, is available since June 2015. Two other kits are under development. The aim is to cover the whole DNA Repair pathways.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT (1/2)

DNA Repair mechanisms are responsible for chemo- and radio-resistance in cancer, they are also responsible for dramatic radiotoxicity reactions. In addition, they are the downstream effectors of signaling pathways that are targets for newly developed targeted therapies.

LXRepair proposes a new paradigm for DNA Repair and related pathways characterization through the use of multiplexed functional DNA Repair assays.



HEALTH 2CARE

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT (2/2)

Hence LXRepair technologies are the first ones that take into account the complexity of DNA Repair mechanisms rendering DNA Repair investigation unequally relevant. As they measure the activity of the enzymes, in a single endpoint determination, they integrate and render measurable all the possible impacts of mutations, RNA regulation, post-translational modifications that occur in cells. From cell or tissue extracts, these assays enable the establishment of a DNA Repair Enzyme Signature through a comparative quantification of different DNA Repair pathways.
Compared to existing assays that are monoparametric, LXRepair assays offer the advantages of being standardized, user-friendly, automatable, quantitative and above all, because of the multiplexed functional approach, much more relevant to identify high value biomarkers.

LXRepair activities require expertise in different domains of life sciences, bioinformatics and material sciences. LXRepair develops its assays on customized biochips, coated by layers of different specific materials. The assays themselves use specific know-how in cell biology, enzymology and sensitive DNA labeling methods. We also develop specific software for biochip data normalization and analysis.
We are thus a multidisciplinary company.

MAGIA

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MagIA
Save time, save lives

> DESCRIPTION OF THE PROJECT

The future startup MAGIA (project in "maturation" with Grenoble SATT-Gift) aims at developing magnetic devices to accelerate and increase performances of immunoassays widely used in biopharmaceutical and diagnostic laboratories. Our vision is to develop and commercialize our magnetic microtiter plate MAG-PLATE by 2018. Our MAG-PLATE will be first dedicated to enhance and accelerate biopharma immunoassay development during drug development. In a second time immunoassays will be commercialized to emerging countries diagnostic laboratories to facilitate and accelerate their manual immunodiagnostic analysis. Our technology will be then integrated to a Point of Care device called MAG-Chip.

A magnetic microtiter plate MAG-Plate aims at reducing immunoassay time and cost of biopharmaceutical laboratories. Analytical methods used to validate step-by-step drug development represent about 15-20% of its whole budget (1.2 Billions of dollars per drug). ELISA, one of the major analytic methods used in drug development takes today 4 to 6 hours per plate. MAG-Plate will significantly impact drug development, reducing ELISA time and cost by 10 while enhancing their performances and requiring no investment. Diagnostic magnetic immunoassays will be then commercialized to facilitate and accelerate healthcare diagnostic laboratories who still operate manually and cannot afford investing in expensive automate platforms.

MAG-CHIP is designed to offer 10min portable diagnostic immunoassay. Fast and sensitive diagnostic is especially important for acute disease, which needs to be treated within the next hours (e.g. acute coronary syndrome diagnostic takes at least 3 hours in emergency center, whereas intervention needs to be done within the first 12 hours after the first chest pain symptoms). Today most of diagnostic companies want to offer their own Point of Care device and yet, as far as we know, very few portable POC immunoassay devices allowing sensitive detection are validated as a diagnostic in-vitro medical device today. POC devices performance, time and cost remain the major challenge that MAGIA will take up.

HEALTH 2CARE

MagIA
Save time, save lives

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Clients usually ask for improved sensitivity and reproducibility, cost and reagents reduction as well as faster test. It is also reported that new equipment investment is one of the major obstacles to technology change.
To those extents, MAGIA performs one step ELISA with one or without washing step in less than 20 min, in devices compatible with existing technology.

All of those advantages are based on our plastic embedded micro magnetic structures. While standard ELISA, have multi-steps reactions performed at the bottom of the well, our immunoreaction is performed on highly diffusive suspended magnetic nanoparticles which makes the reaction **10 time faster and soon more precise and twice more sensitive**.

Whereas commercialized magnetic immunoassay (Roche, Bioscale), use centimeter scale magnets to attract MICRO-particles we downscale the process using MICRO-magnets to locally attract NANO-Particles. It results in 3 direct advantages:

1) Time is decreased 3-5 fold compared to magnetic ELISA.
2) Surface reaction is increased 100 times thereby increasing **sensitivity**.
3) Local magnetic capture of immune-complexes allows no-wash differential detection increasing **reproducibility**.

MAGIA technology is fundamentally multidisciplinary. Our device fabrication embed magnetic material and electronic in plastic. The immunoassay application requires knowledge in molecular biology, chemistry and biotechnology. Microelectronic, informatics and mechanical skills will be required to develop our first POC prototype. Plastic based micromagnets industrialization will require strong partnership between our startup and plastic manufacturer.

MEDIMPRINT

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> DESCRIPTION OF THE PROJECT

Glioblastoma (GB) is the most frequent and aggressive type of primary brain tumor in the central nervous system. Despite surgical resection followed by radio- and chemotherapy, the prognosis remains poor and recurrence happens mostly at the margin of the resection cavity in the peritumoral brain zone (PBZ). A better understanding of the PBZ is a major issue to unravel the mechanisms associated to the recurrence and to develop new therapies in GB. Nevertheless lesion effects of biopsies are incompatible with tissue collection in highly functional PBZ. We introduced a new concept: the cerebral imprint and developed a cerebral imprint device based on a smart silicon chip that reduces lesion effects and opens the way to the exploration of PBZ. This tool is currently assessed in a clinical trial and 15 GB-patients have already been operated. The tool will be supplied to 4 hospitals for a clinical trial on 200 patients with GB in September 2015. Based on this success, we are currently designing new prototypes to obtain cerebral imprints from deep brain nuclei in neurological diseases for which electrode implantation for deep brain stimulation (DBS) is performed. This approach concerns Parkinson's (PD) and Alzheimer's disease (AD), dystonia, essential tremor, obsessive compulsive disorders and many others. 12 patients with PD or dystonia have already been included in a clinical trial in Geneva Hospital. These new tools open a new market based on the cerebral imprint concept. The clinical context is those of the GB resection surgery and of the DBS approach, which represent in the world 100,000 and 15,000 cases per year, respectively. The main objective is to identify in PBZ therapeutic targets that may influence the treatment selection. For DBS-associated diseases, we offer unique solution to obtain during the surgery, fresh tissue from pathological nuclei with the aim to better understand neurodegenerative mechanisms in PD and AD.

MEDIMPRINT

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Our medical device opens a window on inaccessible brain tissue such as deep brain nuclei or PBZ. Today there is no competing product allowing an access to these regions. But our product may compete with biopsy tools in brain biopsy. The tool consists in a guiding tube with a lateral window and a stylet with a sticked silicon chip. The innovative feature of our medical device consists in the integration of a silicon chip as imprint surface that allows overcoming the limits of classic brain biopsy. In fact the tissue imprinting process relies on the apposition of tissue on the chip, and appears clearly less lesion than tissue cutting occurring in biopsy. Moreover the capacity to expose or hide the chip by simple rotation of the stylet into the guiding tube allows the specific capture of the targeted regions and prevents the silicon chip from contamination during the trajectory until the region of interest. In DBS-associated context, new medical device may open the way to the analysis of fresh tissue in different neurological diseases, overcoming the limits of post-mortem tissue. Here also there is no concurrence in tissue imprint in neurodegenerative diseases.

Today the device includes the silicon technology, which is perfectly mastered in Grenoble. Moreover we also included micro and nanotechnologies to the silicon chip with micro or nanostructuration. We currently focus our effort on the integration of optical technology in order to have a video picture during trajectory and tissue collection.

SELECTED FOR VOUCHERS

NEOLYS DIAGNOSTICS

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> DESCRIPTION OF THE PROJECT

Neolys Diagnostics is a Lyon based service-company proposing a personalised decision making tool to radio oncologists. Our biological analysis offers a clear risk/benefit status to each individual patient undergoing radiotherapy. In Europe and the USA, 2.5 million patients with cancer are receiving radiotherapy per year. Among them, 0.5 million have debilitating secondary effects and another half million have a questionable risks/benefit ratio.

From healthy skin and tumour biopsies Neolys Diagnostics propose to radio-oncologists the first test able to precisely individualise the radiotherapy treatment for their patients.

Our innovative technology, coming from the radiobiology INSERM group led by Dr. Nicolas Foray, is a disruptive technology protected by patents, a proprietary database and know-how.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

Our innovative technology consists of the first ever tests really able to measure the DNA double break (DDB) and its clinical impacts. Our core technology relies on the precise and unique knowledge of the DDB effect on cells from signalisation to clinical outcome.

Our unique technology allows us to provide the dose/effect biological respond to radiation on healthy tissue and tumour cells independently from the patient's history. Our tests allow the radio oncologists to treat the good respondents with the standard radiotherapy and personalised the treatment for the others.

NOUVEAL

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> DESCRIPTION OF THE PROJECT

To this day, there is no working solution on the market that tackles follow-up for outpatient surgery. The outpatient market in France stands for 500,000 operations a year. Handling of such operations and patients has to be addressed in a completely dedicated way, especially when patients cannot receive quick care after they leave the medical premises. Outpatient surgery is a surgical treatment that allows patients to check out on the same day they entered the medical facilities. It comprehends all the surgical acts and investigations, programmed and performed with the same levels of security that are in place in an operating room. While originally reserved for light surgery, outpatient care is now tackling much heavier operations such as full prosthetic knees, still allowing patients to leave in the evening thanks to the use of quick recovery techniques. To offer a post-surgery follow-up at home, we are developing a service that allows doctors and patients to communicate with ease on the details of the convalescence. This service works around a mobile app that retrieves the patient and operation's data from the hospital's information system. Once home, patients will be able to enter in the app how they feel and answer prompts about their health condition on a daily basis (e.g. pain level, vital signs, scar picture, drugs intake or anesthetic feedbacks). Working together with a secured cloud-based back-office for sharing data between doctors and patients, the app features rich media recording: text or voice memos, pictures and videos. In addition, the use of decision trees will allow the app to make medical diagnosis. The targeted audience consists of around 2,500 establishments: - clinic or consortium of clinics - hospitals - specialized medical services - general practitioners - consultant specialists - medical community Medium-term plan to deploy the service in Europe.

nouveal
SOLUTIONS DIGITALES MOBILES
DÉDIÉES AUX ENTREPRISES

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

The technical innovation lies in the mixed usage of mobile technologies with the private Cloud to bring a sense of proximity between the two parties. With this in mind, it allows conviviality and sharing. The use of technologies combined let us exploit mobile devices to their fullest (with sound and video recording, picture taking and textual input). Today there are no apps that delivers both medical diagnosis and rich media to a medical follow-up usage. Regarding the supported platforms, we are aiming at the three most used mobile operating systems, namely iOS, Android and Windows Phone so as not to restrain the access to the service to a partial group of users. This service will participate in reassuring patients and work toward a globalization of outpatient surgery to other medical branches, participating therefore in a reduction of health care costs for the government. The company behind this project is also original in many ways: By presenting to our team innovative projects to work and allowing personal projects to have their place as well.

Multidisciplinary aspect:

- **assuring a streamlined usage** on any targeted mobile device entails narrow collaboration between developers and user experience (UX) and interface (UI) experts -assuring network transfers security as well as smooth connectivity and errors handling
- **analytics and failures reports** with simple backend architecture in mind
- **multiplatform** means that specialized developer works together on different code bases. Collaboration techniques need to be perfected to build upon the same abstraction layer.

SELECTED FOR VOUCHERS

RHEONOVA

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> DESCRIPTION OF THE PROJECT

Rheonova develops a medical device called 'Rheomuco' dedicated to the pulmonary diseases market. Our technology measures complex mechanical properties of the pulmonary secretions, i.e. the viscoelasticity of sputum. The instrumentation is easy to use and all automated: from the set-up of the sample to the data treatment. The output is a simple parameter which assesses quantitatively the state of a disease. Our first customers are Biotech & Pharma companies. Rheomuco allows them to validate the effectiveness of their drug candidates obtaining pharmacodynamics data throughout in vitro studies and clinical trials.

The second target is the healthcare professionals who follow patients affected by a cystic fibrosis (80000 patients worldwide), and will use the test as a surrogate endpoint. Rheomuco makes the prognostic of the evolution of the disease possible, and discriminates the bacterial type associated with the pathology. Results will be used to adapt and anticipate treatments (including the antibiotics).

The third target is the pulmonologists. Rheomuco is a simple test to better diagnose and monitor the COPD (chronic obstructive pulmonary disease), an under-diagnosed disease that affects 210 million people worldwide and kills more than 3 million annually.

For both diseases, the main benefit for patients is a personalized follow-up of their health status, particularly with a prognostic of the exacerbation phases to avoid hospitalization and heavy emergency treatment.

Our next medium-term goal is to provide a miniaturized self-care medical device. Moreover, Rheonova can offer a wide range of devices to characterize other biological fluids linked to specific diseases. Knowing and understanding the properties of fluids can diagnose pathologies, prove quantitatively the efficiency of a treatment from a mechanical point of view, and play the role of a companion test.

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

The results will be understood and interpreted directly by the user (without further analysis). Rheomuco substitute the indicators of the 19th century (respiratory function, patient testimony) to help professionals in their analysis and increase quality of life of patients.

We exploit knowledge in mechanics (sensor, sensor architecture), electronics (engine drive), mechatronics (integrated micro pump), polymer science (design of the physical interface with the fluid) and informatics (correlation algorithm).

HEALTH 2CARE

SHAZINO

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> DESCRIPTION OF THE PROJECT

Clinical studies based on the Apple ResearchKit framework.

"*GlaxoSmithKline, one of the world's largest drug developers*", told BuzzFeed News it is"*currently working on integrating (ResearchKit) into clinical trials and planning to start in coming months.*"
http://9to5mac.com/2015/07/13/researchkit-big-pharma/

Clinical trials are research studies designed to assess safety and efficacy of new drugs or medical devices. They are central in both developing new medicine products that would satisfy unmet medical needs and monitoring products that are already on the market.
Most of these clinical data are collected by clinicians during interview or at hospital while performing costly exams.
This strategy is often efficient to determine the action of a drug when the effects are drastic, but it can also fail when the results are not so clear. Other problems also arise when drawback effects related to drugs already on the market are not quickly shared with health authorities.

This project is dedicated to the development of a new platform that will significantly improve the efficiency of research studies. Based on our expertise, we will develop a new bioinformatics platform that will provide new analytics for patient, clinician, biopharmaceutical companies and health authorities. By having access to these data in real-time (through the new ResearchKit service provided on Apple devices), we will be able to gather heterogeneous information related to patient's activities, nutrition, and daily analysis.
We believe that these data will permit to identify more quickly, more easily and more efficiently the best new drugs or medical devices, while also being able to identify earlier side effects. This will lead to huge benefits for the patient (better treatment, avoided risks), clinician (better analysis and understanding of why a treatment works or not during a trial), biopharmaceutical company (better confidence in their results, cost decrease of clinical trials) and health authorities (better survey to assess safety and efficacy of the medicine product).

shazino

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

ResearchKit (**http://www.apple.com/researchkit/**) is a new platform provided by Apple for its mobile devices: iPhone and iPad. ResearchKit is connected to a plethora of third party applications able to collect daily, in real-time, health information coming from the user. This currently include food taking, activities (fitness exercices) and a lot of physical analysis from products like scales (weight and fat mass), step tracker (move), sleep trackers (rest) and blood pressure monitors (heart).

Compared to traditional analysis during clinical trials, that are costly and incomplete, our platform will provide crucial information to finally understand why some patients react well to a treatment, while others show side effects.
This information will be invaluable for a lot of stakeholders in the health sector.
For instance, biopharmaceutical companies will be able to understand that a patient in a study suffering from diabetes does not respond to a new drug while consuming a particular kind of food, or when she does not do enough fitness, or health authorities and clinicians will see that a medicine on the market increase blood pressure or heart rate of most of the patients, etc.

We've already developed the first application dedicated to study Multiple Sclerosis using the ResearchKit framework. We'll launch the clinical trial with an academic partner in October 2015.

> PARTNER SEARCH

Shazino is a young innovative startup (JEI/CIR status) based in Lyon, France. For this project, we will look for a biopharmaceutical company willing to improve its clinical trial processes based on the new ResearchKit framework.

HEALTH 2CARE

TMM SOFTWARE

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> DESCRIPTION OF THE PROJECT

Ap'Telecare is a multi-pathology software plateform that monitors patient chronic disease. Our objective is to offer hospitals and healthcare facilities a complete, safe and reliable software application able to manage the patients and its chronic disease and adapt multi-medical protocols.
TMM Software has firstly intended to focus its development on peritoneal dialysis treatment as from a technical solutions, it has some specificities that will tchnically embrace some other pathologies. Dialysis market currently represents in Europe : ~200,000 kidney transplanted patients, 180,000 patients under haemodialysis, and ~20,000 patients undergoing peritoneal dialysis.
Consequently, in reply to these issues, TMM Software targets to propose a dedicated software application called Ap'Telecare for healthcare facilities and professionals to offer patients some telehealth chronic disease self-management programs. Ap'Telecare gets 3 main lines to be focused on health maintenance, disease prevention and education.

> For patients
- A multi-hardware support : PC, tablets, smartphones
- Videoconferencing and instant messaging with health professionals ; Remote monitoring ; Disease prevention and education ; Follow-up
- Medical material connection (blood pressure, precision scale...)

> For health professionals
- Creation and implementation of medical protocols Customisation per patients. Follow-up management. Statistics Alarms management; Data security and storage
- The application is curently running on around 150 patients. Our objective is to benefit from « Innovation Vouchers 2014 » to improve work on the reglementary side on a European Level.

Tmm groupe

> DESCRIPTION OF THE INNOVATIVE ASPECTS OF THE PROJECT

Ap'Telecare is a universal software as it allows; to manage different kind of chronic disease and care and to follow the patient health conditions; to be implemented on anyhardware support (tablet, smartphone, PC) taking into account parameters such as : screen size, operating system, manufacturer; to interconnect with existing Hospital information System by developing some specific connectors : in this case a « gateway » for data exchange has been developed. This « gateway » forwards information such as protocols and patient information from the Patient Medical Record to the tablets and uploads all the data registered by the patients. This interoperability is ensured thanks to a healthcare protocol computer modelling. Every protocol received from the patient medical record is broken down into a set of components and instructions. These components are then reinterpreted by the application. By analogy, the « gateway » receives a «sentence» which it decomposes into «words». The «sentence» is then reconstructed by the terminal of the patient

Technologies used:

Datas between patients and professionals are encrypted and impersonalized. We use a unique patient identifier called INS-C. This identifier is calculated by the patient terminal and checked via the « gateway » thanks to patient card reading. To secure the communication between equipment and to avoid any spoofing, some encrypted certificates (PKCS#12) are exchanged between each open session. The application integrates an expert system algorithm (alarms, monitoring,...)

HEALTH 2CARE

SELECTED FOR VOUCHERS

VOICE

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> DESCRIPTION OF THE PROJECT

VoicePatch offers a personalized follow-up of patients having suffered orthopedic surgery, in particular those who have had a joint replaced. More specifically, VoicePatch gives a complete and precise evaluation of the human body joints movements. Thanks to the battery autonomy, these measurements can be carried out over time periods of more than one week.

The VoicePatch electronic platforms rely on inertial and magnetic sensors able to grasp the complete set of 3D human movements. The system is shaped as light, compact and waterproof, patches get sticked onto the skin like an adhesive plaster. Being completely biocompatible, they can be safely and nicely dressed for several days.

The set of complex algorithms associated to VoicePatch implement a thorough biomechanical analysis. The device can thus offer an important number of indicators of the patients physical condition by measuring their movement, activity and gait over several days when they are back home.
Data processing generates personalized reports, offering to practitioners the possibility to make individual remote follow-ups. A robust sticker like attaching system guarantees that the patches can be comfortably worn for several days in a row.

The system complements and objectifies the knowledge of recovery improvements.
Report is pragmatic and through colorized results takes only a few seconds to understand. VoicePatch gets closer to the essential and currently unavailable information needed by patient and practitioners

It represents a complement to personalized coaching of the patient, a check of his progresses being made over aspects such as:
- Flexion extension values
- Particular positions generating pain;
- Shocks magnitude measured on joint;
- Recording of the patient's mobility; evolution and comparisons, before and after surgery

The target is a reduction of the time necessary to reach a full recovery, thanks to a higher patient motivation, a better global understanding of patient biomechanical status and a more complete teamwork between practitioners.

HEALTH 2CARE

> DESCRIPTION OF THE INNOVATIVE AND MULTIDISCIPLINARY ASPECTS OF THE PROJECT

VP easily and safely sticked on the skin by medical team; sends automatically created records of patient health situation to Surgeon and Physiotherapist. They have a place on the report, to exchange comments. Colored results, give an objective view of situation, report needs a few seconds to be understood. Patient feels permanently monitored by medical team in day life conditions; he can act alone on his recovery, and see improvements. Quality of health care is proved by records with zero added cost.

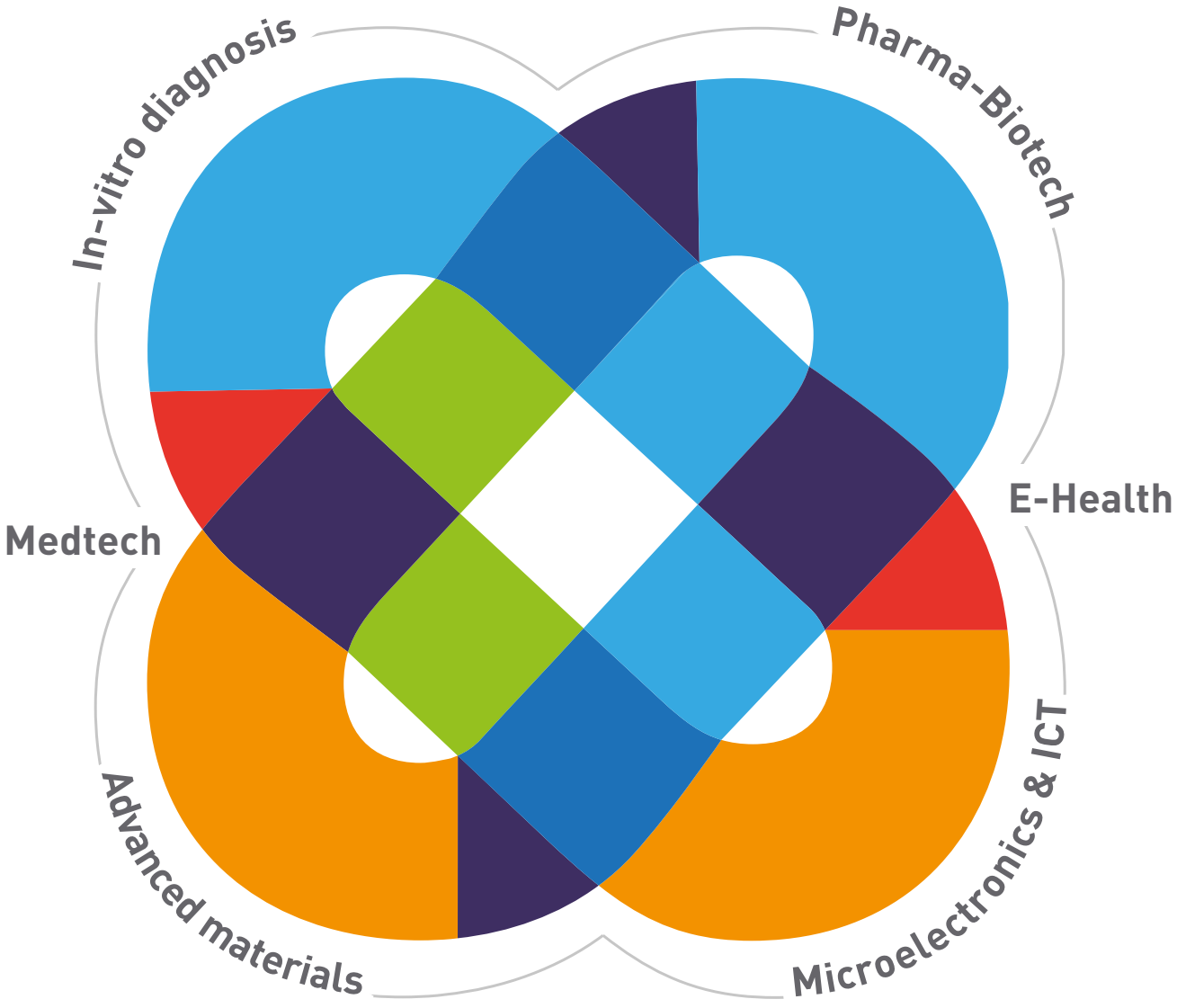
The VoicePatch system is thus developed by integrating the following technologies:

- **biomechanics:** human motion analysis
- **electronics:** design of miniaturized systems, energetically autonomous for over one week
- **computer science:** development of complex computer algorithms for sensor data processing - mechanics: design of a waterproof device and a biocompatible system allowing to fix the VoicePatches comfortably and safely onto the skin.

> PARTNER SEARCH

Voice is looking for two main types of partnership:

- **Distributors**, in the field of medical devices especially in Germany, Belgium and Spain;
- **Investors:** Entrepreneurial type with background in similar activities.


In-vitro diagnosis
Pharma-Biotech
Medtech
E-Health
Advanced materials
Microelectronics & ICT

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