Interregional Portfolio

Translation, Innovation and Technology Transfer in Ageing Network

July, 2018

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Executive Summary

Rationale:

The main goal of this document is to establish a common Interregional Portfolio of research results within the TITTAN project, to be promoted at international level.

Expected Outcome:

The result of this activity will be one Interregional Portfolio per partner, which will be shared with the rest of the partners and the local stakeholders involved in each region.

Galician Health Knowledge Agency (ACIS)

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Patent 1: Use of bacteria of the genus Tenacibaculum for quorum quenching (ES2342807B2; EP2356991B1; US8586343B2; CN102149395B). Patent 2: Peptide with quorum-sensing inhibitory activity, polynucleotide that encodes said peptide, and the uses thereof. (ES2528673B1; EP3020814A1; US14/904,278). Priority Date: 2008/08/01 (ES2342807B2) and 2013/07/11 (ES2528673B1) Owner: University of Santiago de Compostela (USC) Inventors: Ana María Otero Casal, Manuel Romero Bernárdez, Arturo Roca Rivada (ES2342807B2); Ana María Otero Casal, Manuel Romero Bernárdez and Celia Mayer Mayer (ES2528673B1).

BACKGROUND:
The expression of virulence factors and biofilm formation in numerous animal and plant pathogenic bacteria, depends on a bacterial communication system known as “quorum sensing” (QS), based on the production of small signal molecules, the most studied being N-acylhomoserine lactones (AHLs). This invention proposes the use of an enzyme or cell extract obtained from a marine bacteria within the genus Tenacibaculum (Tenacibaculum sp. strain 20J) that interferes with these QS signals (known as “quorum quenching” (QQ)) through enzymatic degradation of the AHL molecules, for inhibiting biofilm formation and for controlling bacterial infections.

ACHIEVEMENTS AND RESULTS:
🎬 Aii20J, a Quorum Quenching enzyme from the marine bacterium Tenacibaculum sp. strain 20J has been identified, cloned and overexpressed in E. coli in soluble form, being available in large quantities. This enzyme has a higher specific activity and wider range of AHL substrates than any of the enzymes described previously. The enzyme is specially active against short-shin AHLs in comparison with other enzymes already described, such as AiiA from Bacillus (Figure 1), 🎬 Aii20J maintains its activity after incubation at 100ºC for 10 minutes, is resistant to protease K and α-chymotrypsin, does not interfere with β-lactam antibiotics and is unaffected by wide ranges of pH. 🎬 The activity of the enzyme to inhibit biofilm formation has been demonstrated in vitro in Pseudomonas aeruginosa biofilms as well as in other mixed bacterial biofilms of relevance in human health (Figure 2, data available after CDA signature). The activity of the enzyme is higher

than some commercial compounds used for the inhibition of biofilm formation in human health. The enzyme has also been able to quench AHL-mediated glutamate dependent acid resistance in E. coli (Figure 3).

🎬 Tests carried out with live cells and cell extracts of Tenacibaculum sp. strain 20J have demonstrated that it can also be used as “probiotic” or feed ingredient for the control of bacterial infections in aquaculture.

IDENTIFIED PURPOSES AND ADVANTAGES

🎬 Use of this strain and the derived enzyme to block the processes controlled by AHLmediated quorum sensing, specifically biofilm formation.

🎬 Cheaper and more sustainable alternative than the use of antibiotics in animals, reducing the costs and occurrence of antibiotic residues in aquaculture products, and lowering the probability of antibiotic-resistant bacteria.

COLLABORATION OFFER:

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Contact:
Innovation and Technology Transfer Office
Phone +34 881 815541
E-mail: montserrat.camina@usc.es
Edifício EMPRENDIA - Campus Sur S/N – 15782 - Santiago de Compostela (Spain)

Some results:

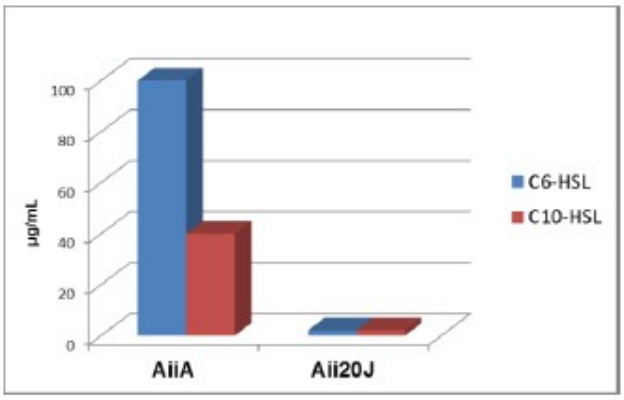

Figure 1.Minimum active concentration of enzyme required to fully eliminate the activity of AHL (10 µM) in 3 hours.

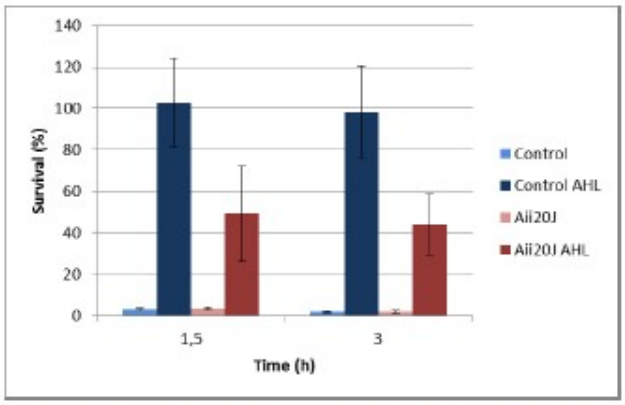

Figure 3.Effect of Aii20J on the AHL-triggered survival of E. coli in acid environment.

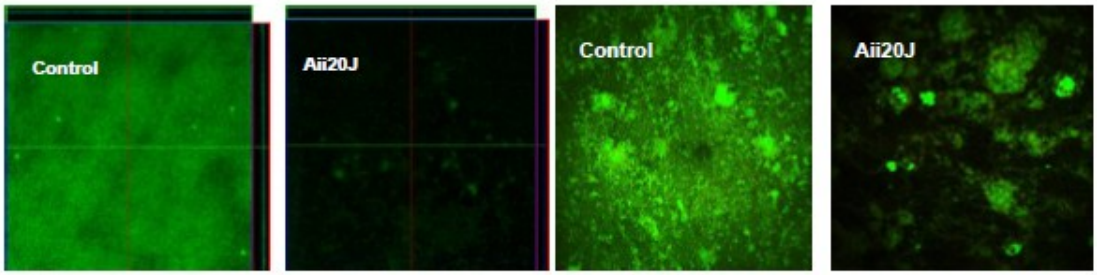

Figure 2. Effect of Aii20J (20 µg/mL) on biofilm formation by *P. aeruginosa* (left) and a mixed bacterial biofilm of relevance for human health (right)

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Registration Entry: 03/2016/1345. **Inventors**: Tomás Teijeiro Campo, Paulo Manuel Félix Lamas, José Ángel Piñeiro Souto. Entidad titular de los derechos de explotación **Owner**: Universidade de Santiago de Compostela. **Web**: https://tec.citius.usc.es/calendula/

BACKGROUND:
We know that taking your medication properly can be hard, but we also know it's important. If you have questions about your medication or about why you're taking it, talk to your doctor or pharmacist and learn about the importance of properly taking all your meds. If we want this to work, you need to understand the impact of treatment on your health and you need to be aware that it's something helpful for you. If you are clear about this, Calendula will simplify the rest. It will help with adjusting your medication to your daily routine, will allow you to easily access information about your medications, and will alert you about your intakes, so you can spend your time thinking about what really matters.

ACHIEVEMENTS AND RESULTS:
Calendula is **an assistant for personal medication management**, aimed at those who have trouble following their medication regimen, forget to take their drugs, or have complex schedules that are difficult to remember. If **you're responsible for other people's medication** (children, parents, grandparents, etc.), this is also your tool. Calendula will help you to fulfill your prescriptions, and **you'll never forget again!.**

IDENTIFIED PURPOSES AND ADVANTAGES
Calendula gives you: 🎬 Medication reminders 🎬 Medication Kit 🎬 Flexible scheduling 🎬 Fit to your own routines 🎬 Multi-patient support 🎬 Material design

COLLABORATION OFFER:

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Contact:
Innovation and Technology Transfer Office
Phone +34 881 815526
E-mail: fernando.pardo@usc.es
Edifício EMPRENDIA - Campus Sur S/N – 15782 - Santiago de Compostela (Spain)

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Copyright protection

BACKGROUND:
BEATLAB is a tool designed to visualize and analyze ECG signals. It can be used to support clinical assistance and medical research. It is an easy-to-use and intuitive tool with a low learning curve. Its advantages area: 🎬 Multichannel ECG visualization 🎬 Edit physiological parameters in MIT-BIH format 🎬 Characterization of heart beats (height and width) 🎬 Easy modification of heart beat parameters 🎬 Addition of new plugins: classification, validation, clustering, heart rate variability

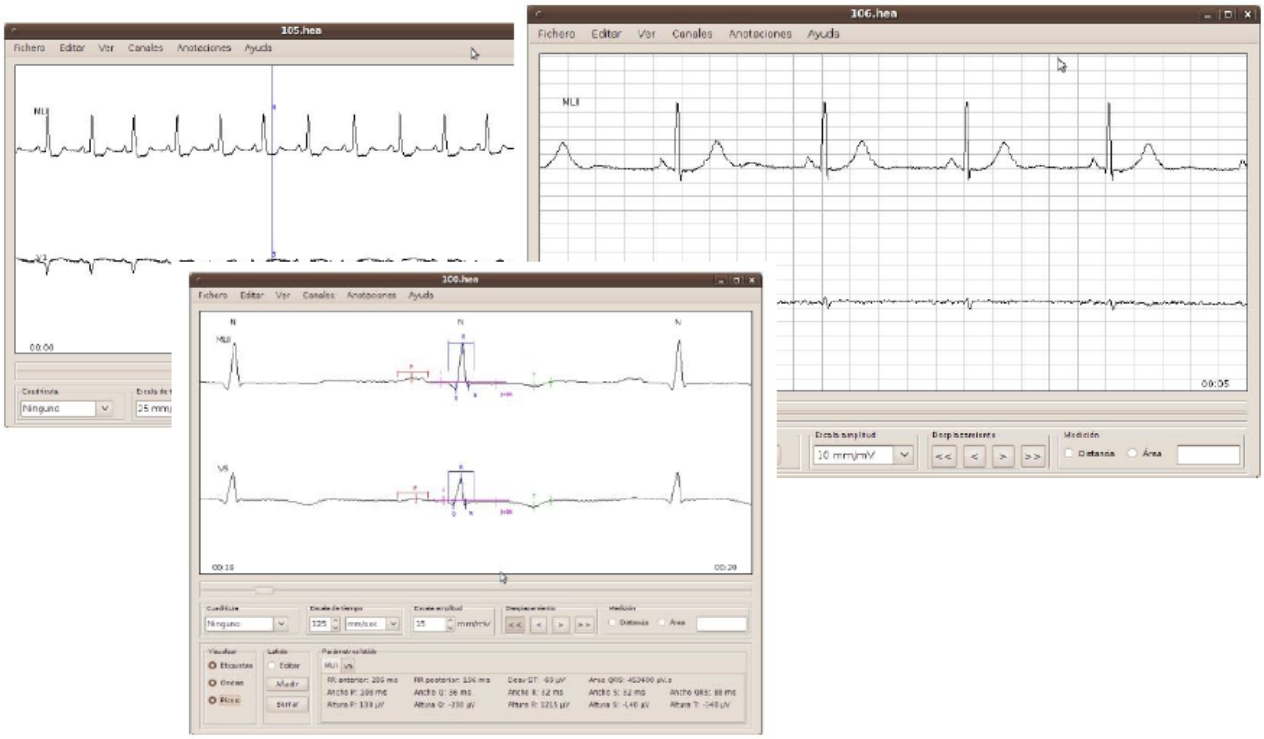
ACHIEVEMENTS AND RESULTS:
Applications 🎬 Clinical assistance 🎬 Medical research 🎬 Physicians education and training **Advantages** 🎬 Easy-to-use interface 🎬 MIT-BIH format 🎬 Quick characterization of the heart beat 🎬 Multiplatform software

IDENTIFIED PURPOSES AND ADVANTAGES
N/A

COLLABORATION OFFER:

TYPE OF COLLABORATION

- License agreement
- Technical cooperation



Contact:
Fernando Pardo Seco, PhdD
e-mail: fernando.pardo@usc.es
Phone: +34881815526
Univ. of Santiago de Compostela- Edificio Emprendia-Campus Vida- 15782-Santiago de Compostela (Spain)

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Protected by copyright

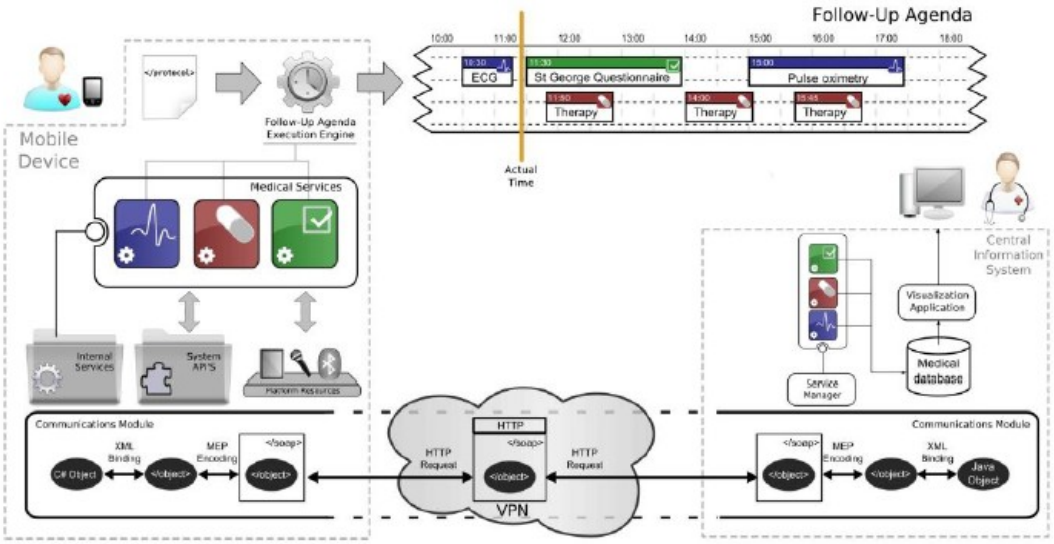
BACKGROUND:
Servando platform consists of a distributed architecture that addresses a set of recurring problems in the current telemedicine systems: 1. The planning of the different medical actions that must be performed at home, organized in a personalized monitoring generated from a monitoring protocol. 2. The encapsulation and reuse of functionality into a set of services. 3. The communication between the patient's home and hospital, through a flexible mechanism for transmission of messages based on Web services technologies. 4. The interaction between patients and the system.

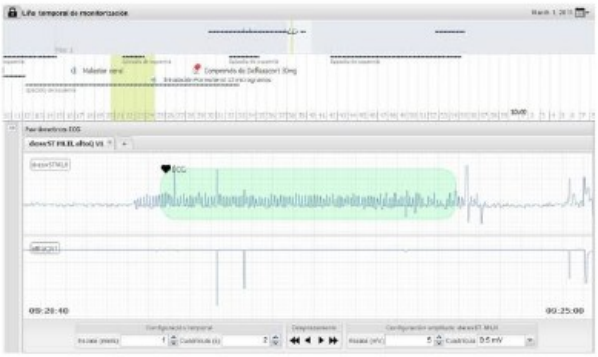
ACHIEVEMENTS AND RESULTS:
Applications 🎬 Patient telemonitorization **Advantages** 🎬 Integrates several services 🎬 Low cost system 🎬 Integrates signal processing

IDENTIFIED PURPOSES AND ADVANTAGES
N/A

COLLABORATION OFFER:
License Agreement

Contact:
Fernando Pardo Seco, PhdD
e-mail: fernando.pardo@usc.es
Phone: +34881815526
Univ. of Santiago de Compostela- Edificio Emprendia-Campus Vida- 15782-Santiago de Compostela (Spain)





TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
P201730994 **Priority Date:** 31/07/2017 **Owner:** University of Santiago de Compostela **Inventors:** Inmaculada Tomás Carmona; José Carlos Balsa Castro

BACKGROUND:
Traditional clinical criteria for diagnosis/prognosis of chronic periodontitis are often inadequate for: 1) determining sites of active disease; 2) measuring the degree of susceptibility to future progression; or 3) monitoring quantitatively the response to therapy. As a result, one of the major challenges in the field of Periodontology is to determine biomarkers for screening and predicting the early onset of periodontitis or evaluating the disease activity as well as the efficacy of therapy (diagnostic or prognostic tests).

ACHIEVEMENTS AND RESULTS:
Our research results revealed an outstanding predictive accuracy of chronic periodontitis based on multivariate predictive models generated from the levels in oral fluids of different combinations of pro-inflammatory cytokines (IL1alpha, IL1beta and IL17A) and anti-inflammatory cytokines (IFNgamma, IL2, IL12p70, IL3, IL4, IL5, IL10 and IL3). In one particular example, these combinations of cytokines showed an excellent ability to discriminate (≥ 93%) the presence of chronic periodontitis with respect to a gingival/periodontal health situation, and a sensitivity and specificity ≥ 90% in most combinations. These models are supported by the well-known biological role of the cytokines involved in the pathogenesis of chronic periodontitis and demonstrates that cytokines could be very good biomarkers when it comes to distinguishing patients with chronic periodontitis from periodontally healthy individuals.

IDENTIFIED PURPOSES AND ADVANTAGES
According to our scientific findings, we propose the development of a diagnostic/prognostic procedure based on oral fluid levels of different combinations of pro-inflammatory and anti-inflammatory cytokines for the diagnosis of periodontal diseases, their progression and their response to different interventions therapeutics. Among the advantages of this technological

development, we emphasize: 1) to have innovative diagnostic tests based on cytokine levels, objectively quantifiable in oral fluids, focused on the early recognition of the microbial challenge to the host, detecting real-time changes in the periodontium; 2) to have innovative diagnostic tests based on cytokine levels, which initially fulfills the two main characteristics of an ideal test. These characteristics are: outstanding predictive capacity of the clinical condition to identify with values approaching 100%, and possibility to achieve this high prediction with only one or two cytokines, which facilitates substantially its process of development.

COLLABORATION OFFER:

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Contact:
Innovation and Technology Transfer Office
Phone +34 881 815541
E-mail: montserrat.camina@usc.es
Edifício EMPRENDIA - Campus Sur S/N – 15782 - Santiago de Compostela (Spain)

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GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Owner: Universidade de Santiago de Compostela **Inventors:** Eva Cernadas García y Manuel Fernández García

BACKGROUND:
Quantitative analysis of optical microscopy images, i.e. the **recognition, classification, measurement and counting of interesting structures in the image**, is a field still little explored. Quantitative analysis of biomedical images is not routinely performed by professionals, even though the information it provides is useful for diagnosis and therapeutic treatments for many diseases. Usually, these analysis are not performed as they have to carried out by qualified personnel using manual methods, resulting in a high effort in time and resources. The research group has developed several **image processing algorithms** that are aimed to **automatize image analysis**, specifically the identification and counting of structures in this kind of images. In addition, the algorithms developed are endowed with the ability to learn for themselves from their own experience, becoming more efficient, thanks to **artificial intelligence** techniques, specifically related to **unsupervised machine learning**.

ACHIEVEMENTS AND RESULTS:
The developed software is currently being applied in the analysis of different images: 🎬 Histological images of adipose tissue: 🎬 Histological liver images 🎬 Immunohistochemistry brain images 🎬 Immunofluorescence brain Images They are being used by USC´s researchers, showing very promising results by improving and accelerating their research activity.

IDENTIFIED PURPOSES AND ADVANTAGES
The main purpose of the developed computer programs is to improve the analysis of microscopic images by using a system based on computer vision. The system operates with precision and it´s

fast enough to be used later in online routine analysis by different biomedical laboratories.

The main advantages are:

• Ease of use and change of parameters, with very practical interface, designed to be used by non-experts in the field.

• Traceability of the data and the possibility of modifying them. Quantifications can be saved and retrieved in the future.

• It is not required user experience in handling the tools for obtaining reproducible and reliable results.

• It allows to carry out automatic counts vs manual counts. This represents a significant time-saving and let the users to dedicate to other tasks with higher added value.

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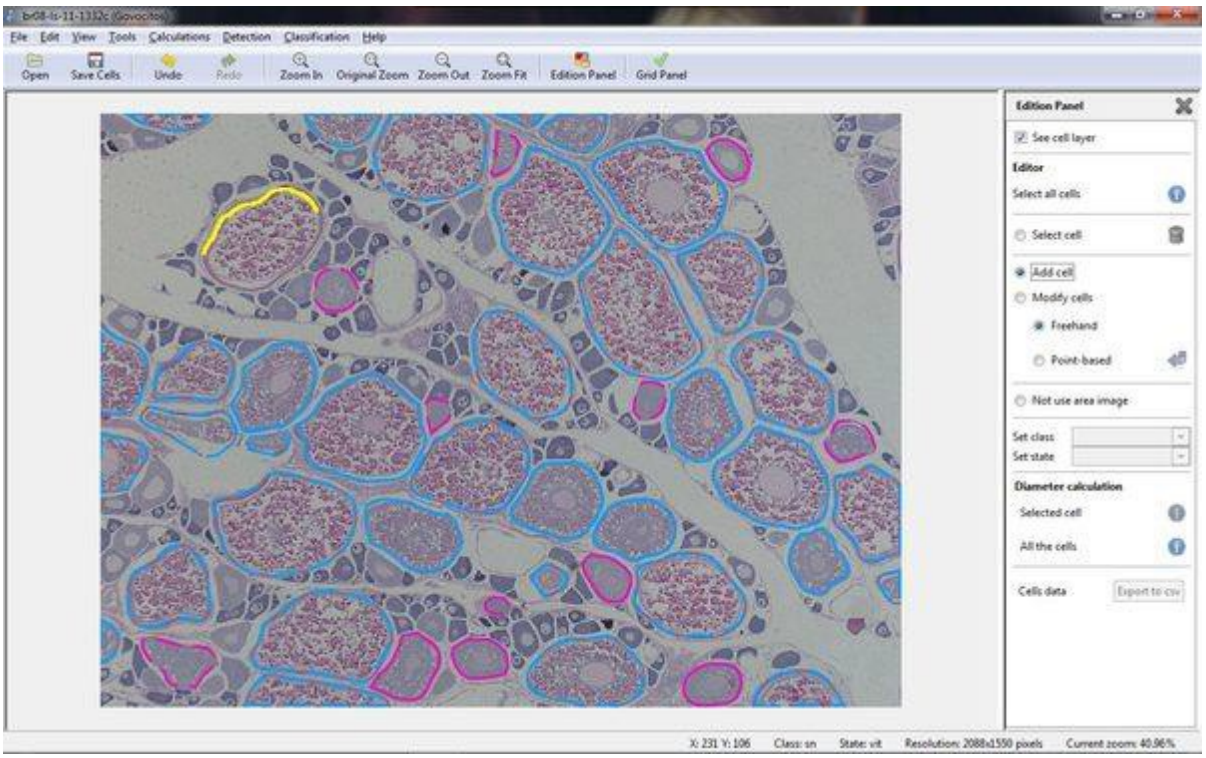
Contact:
Innovation and Technology Transfer Office
Phone +34 881 815526
E-mail: fernando.pardo@usc.es
Edifício EMPRENDIA - Campus Sur S/N – 15782 - Santiago de Compostela (Spain)



TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
ES 2546566 B2: Sistema para la administración de sustancias biológicamente activas preparado por técnicas de espumado empleando gases comprimidos o fluidos supercríticos **Priority Date**: July 23th, 2015 **Owner**: Universidade de Santiago de Compostela (USC) **Inventors**: Carlos García González, Carmen Alvarez-Lorenzo, Angel Concheiro Nine. **International Patent Application**: WO2017013288 A1 Recently, the protection has been extended to Europe and USA.

BACKGROUND:
Ecobone project is directed to a synthetic scaffold for bone regeneration. This scaffold has been designed to respond to the increasing demand in terms of the number (availability) and effectiveness (lifetime) of bone implants, derived from the increase in longevity, and consequently aging of the population worldwide. This project employs a material manufacturing technology that is unique in terms of processability windows, the quality of the product obtained and respect for the environment, which has been protected by patents. The efficient use of biologically active agents of autologous origin and the modulation of the degradation speed of the material to biorrelevant periods of time are other competitive advantages compared to the rest of commercial alternatives.

ACHIEVEMENTS AND RESULTS:
This technology provides a first-in-class synthetic scaffold for bone regeneration: ⌓ i) has good mechanical properties; ⌓ ii) release adequate quantities of bioactive agents in an the adequate time-frame; ⌓ iii) it is a scaffold capable of promoting the recruitment and union of cells; and ⌓ iv) has adequate porosity and interconnectivity to facilitate cell migration and angiogenesis. ⌓ These synthetic implants are designed in such a way that present an adequate osseointegration and bone regeneration. ⌓ This technology is able to provide two solutions aimed at two different market niches: 1) a scaffold with added value aimed at the general public; and 2) a scaffold that also incorporates

biologically active agents of autologous origin, directed to elite athletes.

In vivo studies have been conducted with scaffolds based on polyesters in Sprague-Dawley rat model in critical skull defect showing the histocompatibility and osseointegration of the implant at 7 and 14 weeks.

These results highlight the opportunity of modulated degradation in the range of 8 to 10 weeks of the PLGA polyesters protected by patent to obtain superior results.

IDENTIFIED PURPOSES AND ADVANTAGES

N/A

COLLABORATION OFFER:

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Contact:
Innovation and Technology Transfer Office
Phone +34 881 815585
E-mail: susana.torrente@usc.es
Edifício EMPRENDIA - Campus Sur S/N – 15782 - Santiago de Compostela (Spain)

TITTAN PROJECT PARTNER-REGION:
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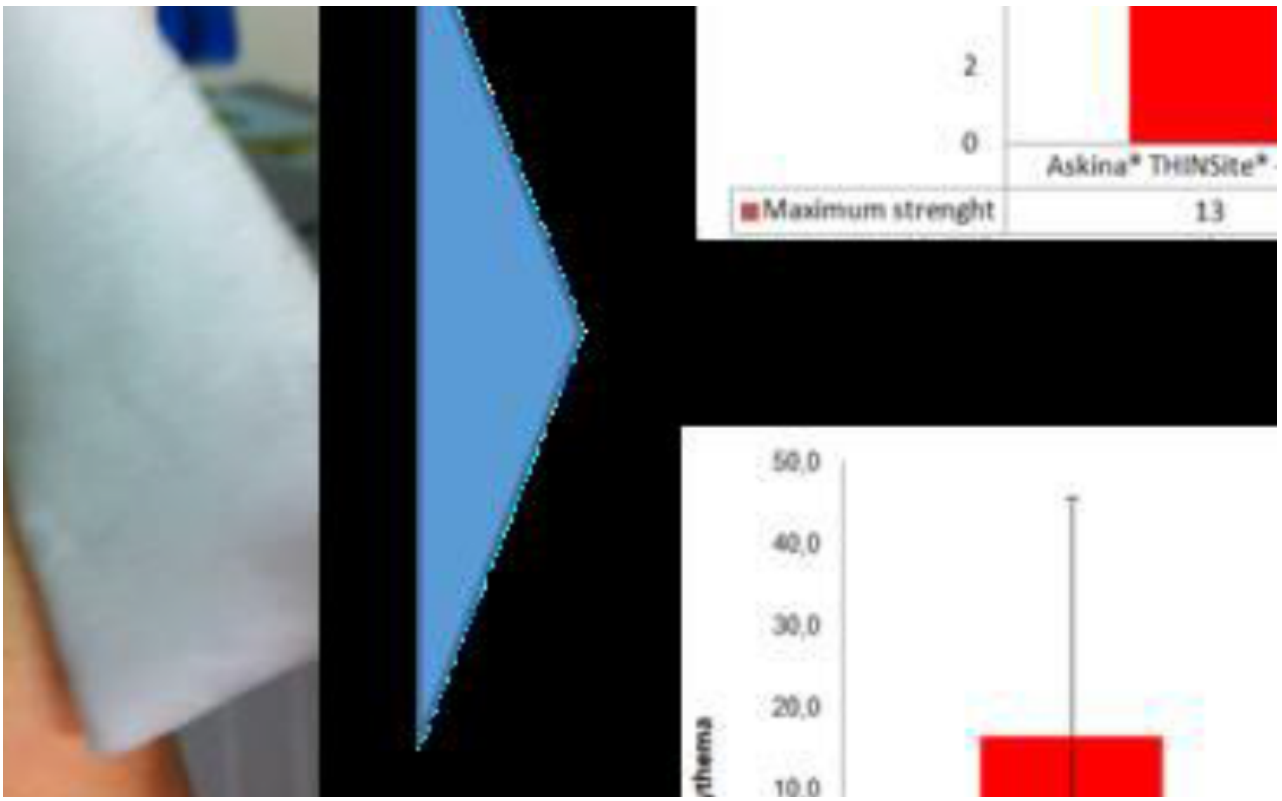
GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
P576.0 PP: Adhesive material, process and uses thereof. **Priority Date**: 2017.11.06 **Owner**: BestHealth4U, Unipessoal Lda **Inventors**: Sónia Ferreira and Nélson Oliveira

BACKGROUND:
At BestHealth4U, our mission is to develop nano-based products in the area of Life Sciences and Health, considered Class 1, providing a set of improvements in the quality of life that lead to a cost reduction for the system and improve environmental waste management. Our ultimate vision is to become one of the leading skin adhesive providers in the world. We will start by launching the Stick2Skin substance.

ACHIEVEMENTS AND RESULTS:
Our solution Bio2Skin represents a novel glue-less adhesive solution for medical applications avoiding skin injury in prolonged use or upon removal. Watch a demo here: https://www.youtube.com/watch?v=B_WqgKKHbBU.



IDENTIFIED PURPOSES AND ADVANTAGES

Bio2Skin is a material that results from the combination of highly biocompatible chemically-modified polymers and displays good adhesion properties. Bio2Skin binds to the natural features of skin offering good adhesion properties without damaging the skin either during use or upon removal, reducing or even eliminating the skin damage caused by the continuous use of current adhesives. Bio2Skin binds to the skin through hydrogen bonds and Van der Waals bonds, offering mild adhesion to skin and ensuring a safe and complete removal without damaging the integrity of the skin. The combination of highly biocompatible polymers of Bio2Skin respects the skin and avoids irritation and allergy problems even under continuous or chronic use.

COLLABORATION OFFER:

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Contact:

Sónia Ferreira (Founder/CEO)/ Anabela Carvalho
Besthealth4U, Lda
Praça Conde de Agrolongo nº123 4700-312 Braga
Phone: +351 939 362 036
e-mail: sonia.ferreira@besthealth4u.pt; infor@patents.pt

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GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
N/A

BACKGROUND:
Someone needs a blood transfusion every second, a challenge that is amplified by the fact that a) the transfusions needs to be given quickly to avoid hemorrhaging and b) only blood with compatible blood type can be used. But because blood type tests take 30 minutes, in an optimal situation, to show results, another problem arises: the universal blood type 0-negative needs to be used as the default type whilst it is quite rare with 2.9% of the world population. Plus, only a small proportion of 0-negatives actually donates blood. The latest advances in computer vision and machine learning allow for such detailed recognition of images that they can be applied to the identification and recognition of specific blood types and pathogens. To ensure the accuracy, this needs to be paired with reagent-based testing, which has also seen major advances in the past years.

ACHIEVEMENTS AND RESULTS:
We have created CRIAM, a portable medical device that identifies the human ABO and Rh blood type and subtype within 3 minutes. CRIAM represents a new methodology for blood phenotyping based on a cartridge (with the specific reagents for the test) and on image processing techniques to determine the occurrence of agglutination – between blood sample and reagent. There is no competitor for this device for the portability market.

IDENTIFIED PURPOSES AND ADVANTAGES
In emergencies, apart from the 30 minutes state-of-the-art devices take to show results, we have to add 16 minutes, on average, to transport the patient to the hospital and 31 minutes, in an optimal situation, to take the blood to be tested and bring the results back. CRIAM is the only portable POC blood test device that can provide results within 3 minutes. With CRIAM, all can happen within the ambulance. Other advantages include: • Inexpensive when compared to the current solutions available on the market. • Decreases the 0-negative blood type dependency, substantially improving the stock management for the institutions. For instance, emergency vehicles can use a range of blood types on the vehicle and transfuse the least rare one depending on the blood type of the patient.

• Inventory management is improved as CRIAM minimizes human error in getting the blood type, reading the barcode or interpreting the results incorrectly.

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Contact:

Vitor Crespo (Founder/CEO)
CRIAM Knowledge, Lda
Praça Conde de Agrolongo nº123 4700-312 Braga
Phone + 351 962 093 308
e-mail: vitor.crespo@criamtech.com

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
N/A

BACKGROUND:
The point-of-care diagnostic is evolving rapidly, coupled with the growth of medical and healthcare outsider hospitals and into the community. ENLightenment technology uses spectral analysis of light originating from blood samples to extract information about its chemical composition, in a precise, fast and ultra-portable way.

ACHIEVEMENTS AND RESULTS:
We present ENLab, a point-of-care, highly portable, medical diagnostics device, that acquires and analyses in real-time spectral information (UV-vis-SWNIR-NIR-MIR) from blood and other samples and allows the determination of different molecules and clinical patterns. Moreover, ENLab also stores the spectral information and the analyzed results centrally, allowing retrospective determinations to be made without the need to preserve the samples, as well as promoting the longitudinal monitoring of the patient.

IDENTIFIED PURPOSES AND ADVANTAGES
ENLab is a truly point-of-care, highly portable, device and it's costs are approximately 10 times lower than the existing solutions, which are not point-of-care. Additionally, being ultrafast and using almost no reagentes, it has a high efficiency.

COLLABORATION OFFER:
If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly. **Contact:** Nuno Sousa (Founder/CEO) *Enlightenment, Lda* ICVS-Universidade do Minho Campus de Gualtar- 4710-057 Braga Phone +351 918770552 e-mail: njcsousa@med.uminho.pt

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
N/A

BACKGROUND:
Chronic obstructive respiratory diseases (CORD), such as asthma and chronic obstructive pulmonary disease, are the third leading cause of death and the fifth cause of hospitalisations due to disease (affecting five millions people in Spain). Medication adherence in chronic diseases is about 50% and in CORD adherence to inhaled medication (IMA) is even lower, being associated with poor disease control and exacerbations. mHealth technologies are highly promising to improve IMA. Smartphones are common, portable, personal and connected, having the potential to shape health behaviours and contribute to patient-centred healthcare. The use of smartphone-embedded sensors can be a low cost solution to improve IMA (vs. e.g., inhalers with Bluetooth).

ACHIEVEMENTS AND RESULTS:

The team has been involved in projects aiming to develop apps for patients with CORD. The "Inspirers" app is already developed as a mHealth solution to improve IMA, through advanced image processing, gamification and social support (rewarding experience). The app is being tested in Portugal (versions beta Android and iOS) and it is expected that the first version will be launched at the end of 2018. The image processing techniques currently recognize the five inhaler types most used in Portugal.

IDENTIFIED PURPOSES AND ADVANTAGES

Our aims are:

1) Develop a Spanish version of the app, entering in the Spain market and opening the way of the vast international market of Portuguese and Spanish language;
2) Generalise the image processing techniques to all inhaler types marketed in Spain;
3) Assess the feasibility of the app involving the end users. The "Inspirers" app is expected to improve IMA, with great potential for optimization of data transfer and analysis related to symptoms and prescriptions, contributing to more sustainable healthcare systems.

COLLABORATION OFFER:

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Contact:
Pedro Augusto
Departamento de Apoio à Investigação e à Pós- Graduação
Faculdade de Medicina da Universidade do Porto
Al. Prof Hernâni Monteiro
4200-319 Porto Portugal
Phone: +351220426838
e-mail: sciman@med.up.pt

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
N/A

BACKGROUND:
Artificial Intelligence (AI) systems have been increasingly used to analyse the information and learn the patterns which help defining strategies for a personalized real-time learning process: computer-based platforms that simulate learning and/or assessment environments are giving satisfying results. 'Big Data' and 'Learning Analytics' (the latter comprises the measurement, gathering, analysis and communication of data about learners and their contexts) are, therefore, now part of the educational process since they allow predicting behaviors and learning patterns, thus targeting each student profile adequately.

ACHIEVEMENTS AND RESULTS:
There are no platforms with AI supporting systems based on 'Big Data' and 'Learning Analytics' in the anatomy or medical education context. We have, thus, developed one (VIMU platform, funded by project FCT / 8209/18/9/2014T), which allows immediate feedback about progress and directs the learners to the content in which they experience more difficulties. So, in addition to improving the effectiveness of the learning process, it also contributes to improving the logistics of the teaching process.

IDENTIFIED PURPOSES AND ADVANTAGES
The VIMU platform collects different information regarding the users learning progress. We now need a supporting AI system that will incorporate the meta-data already collected by the VIMU platform together with data related to the cognitive profiles of the study population. The integration of this information into pedagogical models will improve AI algorithms that predict the behaviors and patterns of individual study and knowledge acquisition. We then plan to commercialise the AI supporting system, especially because it can be readily applied to other pedagogical contexts.

COLLABORATION OFFER:
DEVELOPMENT COLLABORATION OFFER If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research

areas.

Contact:

Pedro Augusto
Departamento de Apoio à Investigação e à Pós- Graduação Faculdade de Medicina
Universidade do Porto
Al. Prof Hernâni Monteiro 4200-319 Porto Portugal
Phone: +351220426838. e-mail: sciman@med.up.pt

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
N/A

BACKGROUND:
20 years' experience in cost teaching and researching. Cost calculation model already validated in the II National Conference of Biobanks, Tarragona (Spain), 19-22 October. Cost calculation model already applied on National DNA biobank, Salamanca (Spain).

ACHIEVEMENTS AND RESULTS:
Cost Accounting model published on *Biopreservation and biobanking (2013).* Application of Cost Accounting model on National biobank of DNA published on *Pathobiology (2014)*. The use and design of the BSC in the health care sector published on *International Journal of Health Planning and Mngmt* (2018).

IDENTIFIED PURPOSES AND ADVANTAGES
I Design of Management tools: We developed a cost calculation model for biobanks. This work was financed by the National Biobank Network under the Carlos III Health Institute. The results were published first in a book: http://aecatienda.es/CONTABILIDAD-DE-GESTION-EN-LOS-BIOBANCOS-BEATRIZ-GONZALEZ-SANCHEZ-AECA-LibroEbook-ES-SPB0264174.html But also in an article that summarizes the fundamentals of the model: http://online.liebertpub.com/doi/abs/10.1089/bio.2013.0021 And afterwards, the real implementation of this model to the National DNA Biobank in this article: https://www.karger.com/Article/FullText/362796 These three works were really innovators in this line of research. ***II Application of economic evaluation techniques*:** Another line of research consists on economic evaluation of biotechnological innovations. At this moment we are developing a project in collaboration with the oncology service of the Ourense hospital. The title of the projects is "Cost-effectiveness analysis of trastuzumab in the treatment of early breast cancer subtype Her-2" (Code 2016/525). Being more recent we have not yet published

results

III Analysis of Management Control Systems in health care sector:

Another line of research named "Heads of service and management control system: Its effect on hospital performance", which we will also soon present results.

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this methodologies or other you may consider to your research areas or institutions, or in a **"License Agreement"** to use this methodologies directly.

The already developed model can be applied in other national or foreign biobanks.

Specific Software can be developed.

Contact:

Mª Beatriz González Sánchez
Facultade de Ciencias Empresariais e Turismo de Ourense
Edificio Xurídico-Empresarial s/n - 32004 Ourense
Phone: + 34 988 36 87 12
e-mail bgonzale@uvigo.es

TITTAN PROJECT PARTNER-REGION:

Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):

N/A

PATENTS:

P201500293: Method for diagnosing dental demineralization processes
Priority Date: 27/04/2015
Owner: Universidade de Vigo
Inventors: Pío Manuel González Fernández, Stefano Chiussi, Benigno Coello Delgado, María Rodríguez Domínguez, Miriam López Álvarez, Julia Serra Rodríguez

BACKGROUND:

Currently, caries is diagnosed basically by visual inspection, tactile exploration and conventional dental radiography. Nowadays, the clinical practice in dentistry does not have analysis equipment to determine in situ the degree of mineralization of the dental pieces, this being very important for the diagnosis of caries and the prevention of oral health.
The aim is to implement an innovative biomedical device, based on Raman spectroscopy, which performs an in situ analysis of the mineral components of the tooth (phosphorus, calcium and fluoride) for the diagnosis of caries and other associated pathologies.

ACHIEVEMENTS AND RESULTS:

The Cariescope equipment is based on Raman spectroscopy techniques and allows the analysis of mineralized tissues (tooth and bone) with a high degree of sensitivity. It is shown as a powerful diagnostic tool, as a dental optical biopsy, with application in the diagnosis of caries and the prevention of health, being a fast and non-invasive method.
The group has already completed the research phase, based on ex vivo dental pieces, obtaining a pattern of optical indexes for healthy tooth and caries. The results are protected by patent (extension USA, EU, China and Japan) and the results have been published in international impact journals.

IDENTIFIED PURPOSES AND ADVANTAGES

To our best knowledge there is not a similar biomedical instrumentation in the market for this purpose. The commercial success of this instrumentation requires the development of low-cost equipment for clinical use in odontology. For this, the development of an optimal prototype (compact and high-performance equipment) based in Raman technology is required. In short, this

project presents a high commercial potential due to the absence of competitors in the market and the high degree of innovation of the product.

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly.

Contact:

Pío González
Transfer Technology Office
Esc. Enx. Industrial -MTI – Campus Lagoas-Marcosende
36310 Vigo (Spain)
Phone: + 34 986130160
e-mail: e-mail: pglez@uvigo.es

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Owner: Universidade de Vigo **Inventors:** Sonia Losada Barreiro y Carlos Bravo Díaz

BACKGROUND:
Lipid nanoemulsions are an essential component in parenteral nutrition and in the controlled release of drugs. The first commercial lipid emulsions were based in soybean oil, but produced alterations in the immune system. Currently (fourth generation) fish oil (mixed with vegetable oils) is used for the benefits of its components in health. Its applications are multiple, highlighting its use in functional food preparation (for their nutritional properties) and as nanoencapsulated systems for achieve a controlled release of nutrients and/or bioactive components through the diet. They also find application in agriculture and cosmetics.

ACHIEVEMENTS AND RESULTS:
The introduction of fish oils makes lipid nanoemulsions more chemically unstable due to the oxidation of their components. Our laboratory has been working for more than 15 years in the control of these lipid oxidation reactions through the addition of appropriate antioxidants, and we have developed a methodology, unique to date, to be able to predict which antioxidants would be the best to increase the time of life and nutritional value of nanoemulsions.

IDENTIFIED PURPOSES AND ADVANTAGES
This method is relatively low cost and allows the analysis in a short time. It differs from others in that these are trial and error, while ours is based on the analysis of the molecular properties of antioxidants.

COLLABORATION OFFER:
If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or to develop new strategies to improve antioxidant efficiencies for controlling lipid oxidation. **Contact:**

Carlos Bravo Díaz
Transfer Technology Office
Esc. Enx. Industrial -MTI – Campus Lagoas-Marcosende
36310 Vigo (Spain)
Phone: + 34 986130160
e-mail: cbravo@uvigo.es; sonia@uvigo.es

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
P 201630620 **Priority Date:** 2016/05/12 **Owners:** University of Santiago de Compostela (USC) and Servizo Galego de Saúde (SERGAS) **Inventors:** Óscar Cordero Santamaría, Rubén Varela Calviño, José María Pego Reigosa **Submitted by**: Axencia de Coñecemento en Saúde (ACIS)

BACKGROUND:
Rheumatoid arthritis (RA) is considered an autoimmune and inflammatory disease. It is the most common form of chronic inflammatory joint disease and affects 1-2% of the general population. There is no a perfect biomarker for screening, diagnosis, precision medicine or follow-up of RA. Here, we present a kit for the screening, diagnosis, and/or monitoring of early or very early detection of RA (and cure the disease), and for precision medicine (to outline responders to the therapies).

ACHIEVEMENTS AND RESULTS:
Anti-CD26/DPP-IV autoantibody levels in serum of patients show diagnostic power (Fig 1). Our data suggest: a) A specific relation between anti-CD26 auto-antibodies with the joints and disease activity. b) These antibody levels are differently affected by each therapy (*or outline responders*) c) They provide different information compared to the most frequently disease activity parameters used at present (ESR, CRP, platelet count, Hb levels or haematocrit). d) Higher anti–CD26 antibody titers are detected in smokers. e) Anti–CD26 antibodies are not ACPA.

IDENTIFIED PURPOSES AND ADVANTAGES
Kit to detect a new serum biomarker with potential in screening, diagnosis, and follow-up. Potential in prognosis and to outline responders to biological therapies (precision medicine) and in other inflammatory diseases.

COLLABORATION OFFER:
If this offer is of your interest or you need more information about it, please contact us.

This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly.

Contact:
Innovation and Technology Transfer Office
Phone +34 881 815541
E-mail: montserrat.camina@usc.es
Edifício EMPRENDIA - Campus Sur S/N - 15782
Santiago de Compostela – Spain

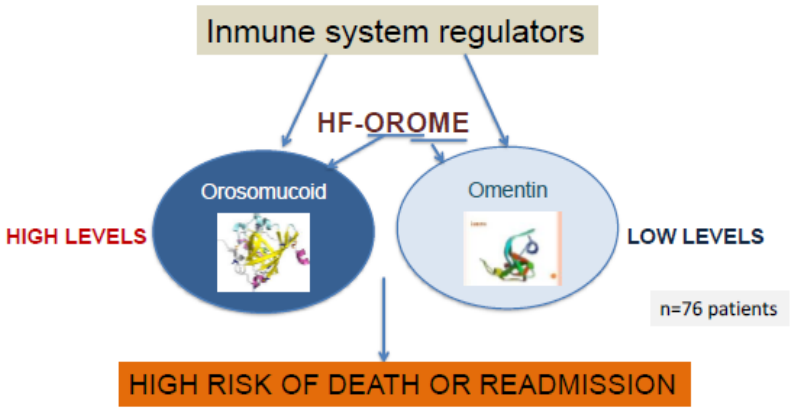
TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
EP17382100: Method for prognosis of the outcome of patients with heart failure (HF). **Priority Date:** 28 February 2018 **Owner:** Fundación FIDIS, SERGAS, USC. **Inventors:** Sonia Eiras Penas, Rosa María Agra Bermejo and José Ramón González Juanatey **Submitted by**: Axencia de Coñecemento en Saúde (ACIS)

BACKGROUND:
The present invention offers a solution to the lack of a novel and efficient method capable to predict the outcome of patients with HF. In this context, patients with a bad prognosis are expected to be hospitalized or die in the incoming years following the diagnosis of HF. This method is based on Orosomucoid (APG) and Omentin levels in an isolated blood sample from the patient. High concentration of AGP and a low concentration of Omentin in blood are associated with a bad prognosis. This improved method of prognosis is aimed to help on the design of the most appropriate treatment for the patient.

ACHIEVEMENTS AND RESULTS:
In the univariate analysis, we studied all the parameters related with the combined outcome (death or readmission for HF). Among these parameters, those that appeared to better predict mortality or readmission for HF were age HR, CI 95% 1.06 (1.01-1.12), heart rate HR, CI 95% 0.97 (0.96-1.00), high proBNP HR, CI 95% 1.00 (1.00-1.01), creatinine HR, CI 95% 3.64 (1.40-9.45) and high AGP and low Omentin levels HR, CI 95% 2.55 (1.24-5.24) in patients with AHF. In a multivariate analysis only AGP-Omentin remained as an independent predictor value of death or rehospitalization for HF.



IDENTIFIED PURPOSES AND ADVANTAGES

The present invention offers a solution to the lack of a novel and efficient method capable to predict the outcome of patients with HF. In this context, patients with a bad prognosis are expected to be hospitalized or die in the incoming years following the diagnosis of HF, due to the HF, or due to a complication of the HF. This method is based on the concentration of Orosomucoid (APG) and Omentin in an isolated blood sample from the patient. In this sense, a high concentration of AGP and a low concentration of Omentin in blood are associated with a bad prognosis. This improved method of prognosis is aimed to help on the design of the most appropriate treatment for the patient.

COLLABORATION OFFER:

If this offer is of your interest or need more information, please contact us. It can be materialized in a "**Partnership Agreement**" to adapt these technologies to your research areas, or in a "**License Agreement**" to use them directly.

Contact:
Technology Transfer Office
Phone +34 981 951195
E-mail: mabel.sampedro.parada@sergas.es
FIDIS
Santiago de Compostela – Spain

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Owner: Servizo Galego de Saúde **Inventors:** Pablo Varela-Centelles et al. **Submitted by:** Axencia de Coñecemento en Saúde (ACIS)

BACKGROUND:
The common feature of these solutions is simplifying procedures to reduce time and costs with a better or equivalent outcome. One solutions may turn a lab procedure into a chair-side one with obvious advantages. Other solution improves visualization and better access and patient comfort, with applications beyond oral surgery. The third solution offers a simpler approach peri-implantitis treatment in and preserves the implant macro-structure and their physical properties. The fourth solution for surgical procedures grants compatibility with existing systems, and permits using biological and synthetic materials reproducing intraoral conditions. Finally, our fifth solution offers image standardization obtaining identical perspectives of different objects in a simpler and easier way.

ACHIEVEMENTS AND RESULTS:
These devices are currently being developed for prototype production.

IDENTIFIED PURPOSES AND ADVANTAGES
To simplify procedures in clinical dental practice, teaching and research.

COLLABORATION OFFER:
If this offer is of your interest or need more information, please contact us. It can be materialized in a **"Partnership Agreement"** to adapt these technologies to your research areas, or in a **"License Agreement"** to use them directly. **<u>Contact</u>:** *Technology Transfer Office* Phone +34 981 951195 E-mail: mabel.sampedro.parada@sergas.es FIDIS, Santiago de Compostela – Spain

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
Patent: No **Owner:** Universidade da Coruña **Inventors:** GRUPO EXPRELA **Submitted by**: **INL** International Iberian Nanotechnology Laboratory

BACKGROUND:
The levels of Hmgb1 in serum and other body fluids are related to aging processes and associated to degenerative diseases including Arthritis, Alzheimer's and cancerous processes. In addition, measurement of Hmgb1 levels is also useful to detect processes of intra-amniotic inflammation during pregnancy and to follow post-infartation recovery.

ACHIEVEMENTS AND RESULTS:
We propose a new method based on the detection of the protein by binding to specific DNA targets modified for detection by fluorescence.

IDENTIFIED PURPOSES AND ADVANTAGES
Current methods for the detection of Hmgb1 levels are based on ELISA. The advantages will be antibody-independence and high sensitivity.

COLLABORATION OFFER:
If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to develop this technology to your interest areas. **<u>Contact</u>:** María Esperanza Cerdán Villanueva OTRI Universidade da Coruña Phone +34 981 167 173 E-mail: pilar@udc.es Edifício de Servizos Centrais de Investigación – Campus de Elviña 15071 – A Coruña - Spain

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
1. PPCT/EP2016/078406: Microscale cell filter **Priority Date:** 22/11/2016 **Owner:** International Iberian Nanotechnology Laboratory (INL) **Inventors:** Lorena Diéguez, Silvina Samy, **2. EP17189246: Device and method for analysis** **Priority Date:** 04/09/2017 **Owner:** International Iberian Nanotechnology Laboratory (INL) **Inventors:** Sara Abalde-Cela, Lorena Diéguez, Marta Oliveria, Joâo Gaspar

BACKGROUND:
Early dissemination of tumour cells is difficult to detect by traditional imaging and pathological methods. Cancer cells can be disseminated from the primary tumour through the lymphatic or circulatory systems; therefore isolating and analysing cancer cells from the peripheral blood of cancer patients offers a great alternative to tumour biopsy for low invasive diagnosis of metastasis. While the presence of cancer cells in body fluids is well known, current techniques for the isolation, analysis and characterization of cancer cells are not efficient and target only epithelial cells, ignoring the more aggressive phenotypes. Thus, efficient technologies able to tackle the latter challenges are urgently required. In recent years, microfluidics has been widely reported for efficient isolation of CTCs. At INL, we use microfluidic strategies for the isolation of circulating tumour cells, combined with fluorescence and Raman scattering for the characterization of those isolated cells. The development of these biosensing platforms encounters a remarkable advance towards personalized medicine, especially in the field of cancer research.

ACHIEVEMENTS AND RESULTS:
- **Patents:** 2 filed patents in the last two years. - **Publications:** several research papers published and under preparation. - **Preclinical trial** for the isolation device - Participation in **acceleration programs** (RUBYnanmomed):

o Nanomedtab: individual mentoring european scheme for startups
o StartupNano: 1st prize 2016 – 5 K and in-kind facilities
o Startup Braga: academia phase
o Resolve: 37 K for scale up strategy development for the medical device.
- **Company creation** (Jan 2018): http://www.rubynanomed.com/

IDENTIFIED PURPOSES AND ADVANTAGES

The **purposes** of the described technologies are:
- Development of medical devices for IVD (in vitro diagnosis) based on microfluidics.
- Isolation of circulating tumour cells from blood of cancer patients.
- Characterisation of those cancer cells for a personalized diagnosis.
- Identification of cell types for an improved prognosis.
- **Advantages:** non-invasive, selective, fast, personalized.

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us. This patent is partly licensed to RUBYnanomed for the analysis of blood samples in the liquid biopsy field. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly.

Contact:
Lorena Diéguez
INL
Phone : +351 253 140 112
E-mail: Lorena.dieguez@inl.int
Avenida Mestre José Veiga s/n 4715-330
Braga – Portugal

TITTAN PROJECT PARTNER-REGION:
Galician Health Knowledge Agency (ACIS)

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
N/A

PATENTS:
US 9198602 B2: Device for measuring skinfold thickness **Priority Date:** 2 Jul 2010 **Owner:** Universidade Do Porto **Inventors:** Manuel Rodrigues Quintas, Carlos Manuel Sousa Moreira Da Silva, Tiago Faustino Andrade, Maria Teresa Braga Valente De Almeida Restivo, Maria de Fátima De Castro Chousal, Teresa Maria De Serpa Pinto Freitas Do Amaral **Submitted by**: **INL** International Iberian Nanotechnology Laboratory **PCT/IB20100/055701:** Pending in Europe

BACKGROUND:
In late 2000's, the assistant professors at the Faculty of nutrition of University of Porto identified that the calipers used to assess body fat measurement were really difficult to handle and to fulfil the protocol of assessment. They also had lack of accuracy and digital communication. To tackle those issues, they involve the Faculty of Engineering which created the first prototypes and submitted the patent. To commercialize the product, it was given to Metablue (a spin-off of University of Porto) an exclusive contract of developing and licensing the product, which is now finally near production. In our days, the increasing notion that body fat is one of the main causes of several diseases and bad aging, made the difference for this small startup to find investment to bring this fantastic fitness tool to the market.

ACHIEVEMENTS AND RESULTS:
We have just finished the production of the first 5 pre-series units. Compared to the other calipers, Lipowise is more accurate, communicates via Bluetooth with smartphones & Tablets (iOS and Android) and also have a PC version, which can assess the measurements of the skinfolds and its evolution all over time. This kind of technology brigs the calipers finally to the XXI century and increases exponentially its simplicity of use and applicability.

IDENTIFIED PURPOSES AND ADVANTAGES
It's more and more studied that it is body fat and not only excessive weight, that paves the path to several chronical diseases, namely diabetes type 2, certain types of cancer or coronary diseases. The regular and accurate assessment of body fat has an enormous advantage because it can increase quality of life, when acting before those diseases appear, giving the citizens the possibility

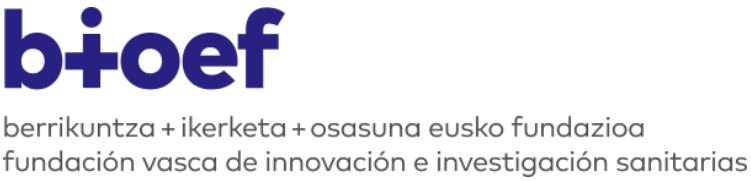
to live longer and healthier. This should be a standard measurement!

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to research areas, or a **"License Agreement"** to use this patent directly in selected markets.

Contact:

Ricardo Moura
CEO de Metablue Solution
Phone : +351 962591498
E-mail: ricardo. moura@metabluesolution.com
Rua de Sá de Bandeira, nº 481, 1º Esq
4000-436 Porto – Portugal



Basque Foundation for Health Research and Innovation (BIOEF)

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
ARMASSIST's intellectual property is protected as follows: • the technology is patent protected (WO2009141460 and EPO EP16382312.3) • the software is copyright protected as CONTROL FIRMWARE FOR ARMASSIST DEVICE – US Copyright Office 1-5174081201 and REHABILITATION PLATFORM SOFTWARE - US Copyright Office 1-5174081267.

BACKGROUND:

Market:
ARMASSIST is aimed at a big and expanding market with confirmed purchasing and licensing interest from current and potential clients:
• The robotic rehabilitation market reached $221M in 2015 and is predicted to reach $1100 in 2022 with an annual rate of 26%.
• The rehabilitation robot companies that started in the 90's are now solid enterprises with + $30M in revenue, +150 employees (i.e. Hocoma, Tyromotion).
• Tecnalia has been contacted by several centers in Spain and other European countries interested in purchasing the ARMASSIST asset immediately (when available).
 	
ARMASSIST 2.0 is head to head with existing commercial solutions for the clinical environment (competitors are costlier) as well as home-based rehabilitation.
• Clinical setup (ARMASSIST used as motorized device for passive and active rehabilitation):
  • Armeo Spring, Hocoma
  • ArmMotion, RehaTechnologies
  • Inmotion, Interactive Motion Technologies
  • (all solutions are significantly more expensive than ARMASSIST)
• Home based (ARMASSIST used as non-motorized assessment tool for active rehabilitation)
  • Pablo, Tyromotion
  • YouGrabber, YouRehab

ACHIEVEMENTS AND RESULTS:

With the goal of providing a tool to help the 15 million stroke survivors (per year), 30% of which suffer permanent disability, TECNALIA developed ARMASSIST, an assistive upper limb rehabilitation robot for people with a neuromuscular disability.

ARMASSIST enables patient-tailored rehabilitation at home or in a clinical setup. The robot allows the patient to train ergonomic reaching movements, minimizing undesired shoulder movements and constantly tracking the patient's ability to self-support the weight of his or her own arm.

The asset is composed of two key components: ARMASSIST and TeleReha:

- ARMASSIST: low cost mobile robot that allows active and passive rehabilitation for the elbow and shoulder (with the possibility of adding a forearm, wrist and finger accessory) for stroke patients with upper limb impaired function.
- TeleReha: modular game-based rehabilitation software platform intended for home or clinical use with remote access capabilities. The remote access allows the clinician to monitor, evaluate and plan the evolution of the patient's progress as well as modify the protocol to adjust it to the patient's evolution.

The device is currently in TRL 6-7, with an existing pre-industrial prototype that has been intensively clinically tested and demonstrated to the clinical community in trade fairs and international conferences.

The technology is being licensed to a potential industrial partner for manufacturing and distribution to the Chinese market. This partner could potentially, if needed, the manufacturer for other distributor in markets outside mainland China (i.e.: Europe and USA).

Development Degree: PED: WITH ORDERS

IDENTIFIED PURPOSES AND ADVANTAGES

ARMASSIST presents the following advantages:

- Cost effectiveness:
  - Target price is 50% lower that the closest competitor in the market
  - Designed for patient use with minimal supervision in a clinical setup (and home-based), allowing for multi-patient scenario by a single therapist.
  - Very short setup time and compact design. When in use, the system occupies reduced space in the clinical facility or at home. The system can be easily stored away when not in use.
- Integral:
  - Designed to treat a wide range of impaired patients ranging from low functioning, severely impaired users to high functioning patients.
  - Allows to treat the patient through all the recovery cycle (from acute to subacute phase) giving possibility to adapt the active assistance given by the system.
- One-to-one customization and result/benefit optimization:
  - ArmAssist allows patient evaluation and patient-tailored therapy customization.

- Videogame-based rehabilitation environment, key for patient motivation, promoting patient engagement, directly influencing the success of the rehabilitation protocol in a timely manner.

COLLABORATION OFFER:

We look for a licensing partner with two different models:

- In case of a manufacturing and commercialization license model, the company would have the following roles:
  - Product industrialization (adapted to the company's portfolio)
  - CE Mark process
  - Leverage its distribution network to sell
  - Product development follow-up
- In case of a commercialization-only license model, the commercializing company would not need to invest in the industrialization of the system. The industrialization developed by our Chinese partner could be transferred.

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number indicated below.

Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:

BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):

FIK initiative-a private interdisciplinary scientific/technological development initiative
Developed by Fundación TECNALIA (Research Institution).

Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:

ELCODE system intellectual property is protected at three levels:

- The concept, device and method is protected by an European Patent application (EP17382407 - Device and method for controlled and monitored transdermal delivery of active agents and use thereof, 28/06/2017)
- The design of the electrodes is currently in the process of being registered in European Union Intellectual Property Office
- The know-how related to personalization/parametrization of the system for specific applications is protected as an industrial secret.

BACKGROUND:

ELCODE project was founded in 2013 within biomaterials and biomedical engineering research groups of TECNALIA under the FIK Initiative (initiative to research and bring to the market new technology under Healthy aging and Neurorehabilitation).
The multidisciplinary team has developed R&D methodology and series of clinical prototypes for several applications used in “in vitro” and “in vivo” tests with different active substance. Transdermal drug delivery has always been a pain free, self-administration and generally applied in local topical delivery solutions vs. other delivery routes such as injection or oral. However, traditional transdermal drug delivery (passive diffusion based patches) still faces some challenges to substitute other delivery methods. To begin with, passive patches technology is not able to provide control over the depth of the administration, having the risk of reaching blood system (with secondary complications in liver or stomach and dilution of effect) and not being so effective in the zone to be treated. On the other hand, its delivery profile cannot be controlled and it shows significant intersubject variability, hence excluding personalized treatment characteristic for the patient centered applications and products. Furthermore, the molecular weight of the active substance is traditionally a limiting factor for transdermal delivery.

ACHIEVEMENTS AND RESULTS:

Electrode Controlled Delivery System (ELCODE) for trans-dermal delivery and release, based in iontophoresis technology, is offering unique features of temporal and spatial control of trans-dermal delivery overcoming those challenges. This technology has a series of advantages:

- Drug controlled release (depth and time) allowing personalized and more efficient delivery than other patches.
- Minimize one of the biggest handicaps of iontophoresis commercial products, skin erythema apparition, due to the electric current applied.
- Small, easy to place and use.

Transdermal drug delivery was a $31.6 billion market in 2015, expected to grow at a 11.6% CAGR to 2025. In this global market, iontophoresis segment accounts for nearly 12,5%, accounting for $4b in 2015 and reaching $12b in 2025. First applications for ELCODE could be to treat neurological disorder drugs (i.e. schizophrenia) avoiding need of patient to interact with the drug, effectively do allergen diagnosis tests allowing simultaneous delivery of different agents without an injection, deliver therapeutic agents avoiding reaching blood system, deliver skin care treatments more effectively.

Our goal is to create a spin-off that will focus on development, rapid prototyping/pilots, pre-clinical and clinical studies in order to provide ELCODE technology transfer to contract and brand manufacturers of final application products. At the same time, we have identified and confirmed interest with Brand Manufacturers for applications from pharma and cosmetics industries, distributors and final application sites such as institutes for aesthetics, sports and rehabilitation clinics and we have performed the proof of concept tests and confirmed potential of ELCODE technology in specific applications.

IDENTIFIED PURPOSES AND ADVANTAGES

Electrode Controlled Delivery System (ELCODE) for trans-dermal delivery and release is based in iontophoresis technology. This technology has the following advantages:

- Drug controlled release (depth and time) allowing personalized and more efficient delivery than other patches.
- Minimize one of the biggest handicaps of iontophoresis commercial products, skin erythema apparition, due to the electric current applied.
- Small, easy to place and use.

COLLABORATION OFFER:

We look for:

- Cosmetics or pharma company that has identified an application and wants to develop a pilot with our technology
- Smart Capital that want to participate in a Seed round of 0,8M€ (0,3M€ could be already covered) with the following objectives:
  - Industrialize product
  - Pilot test in 2-3 pharma and aesthetics companies and look for new clients
  - Support patent protection

- Establish a team of 2-3 people (CEO, CTO, and administrative)

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number indicated below.

Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
FESIA's intellectual property is protected by 2 patents and a new one to be filed in 2018: • Apparatus for external activation of paralyzed body parts by stimulation of peripheral nerves PCT/EP2009/068023 (A1 & B1) • System and method for functional electrical stimulation PCT/EP2014/062474 (A1) • Additional patent is under writing to be filed in 2018

BACKGROUND:
TECNALIA started to research in **Functional Electrical Stimulation (FES)** in 2008, under the FIK Initiative (initiative to research and bring to the market new technology under Healthy aging and Neurorehabilitation) with a multidisciplinary biomedical and engineering team. One of the research lines focused on a new FES technology that could improve rehabilitation after severe neurological disorders affecting motor functions. This was the seed of FESIA project, which progressed in creating a product to offer solutions to specific pathologies based on the new FES Technology. Neurological diseases affect the capacity of motor control and in most cases, have been treated in acute and subacute periods through manual therapy with some orthotics support. In the last years emerging technologies have made huge progress to develop solutions/medical devices to enhance rehabilitation of different pathologies through neuroimaging, neurostimulation, robotics or muscle oriented technologies. Some of them are still in research and demonstrating its effectiveness in different studies since others (like FES) have already shown its improvement vs. manual therapy and orthotics and are now being introduced to the market.

ACHIEVEMENTS AND RESULTS:
In the FES field the conventional technology is using one anode and one cathode to make the stimulation, facing some challenges in effectiveness due to positioning of the electrode and selectiveness/precision of the stimulation. FESIA's matrix electrode technology allows to stimulate each area more precise and selectively when compared to current FES solutions in the market. **FESIA** has a series of advantages: • Improve the effectiveness of rehabilitation

- Reduces fatigue of patient
- The system is easier to install/adapt/calibrate, ensuring a proper use of the therapist and providing independence for the patient and
- Improves monitorization and customization for each patient
- Allows use of FES in a more initial period after the accident.

The global FES neurorehabilitation and muscular stimulation market is estimated in $169M in 2016 and $215M in 2020. In addition to that, the market for upper and lower extremity neuroprostheses is estimated in $205M in 2016 and $293M in 2020. Both markets, focus of FESIA, will add >$500M in 2020 in an 8% growth industry.

FESIA is a technology based company with the aim of improving rehabilitation and quality of life of people who have sufferered a neurological disease through selling/renting cutting edge medical devices. We already have an industrial product (Fesia Walk) and are in the middle of the certification process before launching it to the market. At the same time we have developed a tight relationship with Key Opinion Leaders in Neurotechnology in Spain to position our products reaching with some of them to agreements of installation of pre-certified products or letters of interest, and have also started to exhibit in key events in Europe.

IDENTIFIED PURPOSES AND ADVANTAGES

FESIA has a series of advantages:

- Improve the effectiveness of rehabilitation
- Reduces fatigue of patient
- The system is easier to install/adapt/calibrate, ensuring a proper use of the therapist and providing independence for the patient and
- Improves monitorization and customization for each patient
- Allows use of FES in a more initial period after the accident.

COLLABORATION OFFER:

We look for:

A) Private or public rehabilitation centres that want to try our product.

B) Smart Capital to complete a 1,1M€ round for the next 2 years (500k€ already committed by investors). Objectives of the financing round would be:

- Finalize manufacturer's license and certification process
- Launch FESIA Walk in Spain and start first contacts in Europe
- Strengthen FESIA team (quality, software, commercial profiles needed)
- Reinforce IP protection strategy
- Finalize and launch FESIA Grasp at the end of the year
- Develop at home version of FESIA Walk

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number indicated below.

Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
GEA-WIFALL's intellectual property is protected by the following patent: • WO2006000605A1. Priority date: 06/21/2004.

BACKGROUND:
Problem to solve: Falls are one of the main health problems among the elderly. Studies show that falls affect one in three people over 65, a figure that increases to one in two for people over 85 years of age. The consequences of falls are both physical (blows, fractures, etc.), psychological (fear, anxiety, etc.) and social (isolation, loss of autonomy, etc.) and involve large additional costs. ***Goals:*** The main objective of the GEA project was to develop an algorithm that could detect a fall with high sensitivity (high percentage of accuracy in the detection of falls) and specificity (low percentage of false positives). The secondary objective of this project was to develop a teleassistance device that would be easy to use by an older person, integrating the fall detection algorithm and providing the location and communication functionalities required in case of a fall.

ACHIEVEMENTS AND RESULTS:
GEA-WIFALL is a Fall detector for telecare. It is a portable device of small size to be placed continuously in the waist and that monitors the activity of the user. In case of automatically detecting a fall or lack of user activity or that the user presses the panic button, an alarm message is generated that is sent to the service platform of the building in which the user is located. This message is sent through a Bluetooth module and would communicate with the antenna closest to those located in the infrastructure. The alarm message includes the necessary information so that the platform can triangulate the user's position.

IDENTIFIED PURPOSES AND ADVANTAGES

Following we present all the work done for this development:
Throughout the project, different evolutions of the fall device have been developed, ending with a device that was tested in a pilot project carried out in Portugal under real conditions in 2012. The pilot involved 30 people over 65 years for three months.

- Fall detection algorithm tested in field conditions with an effectiveness greater than 99%.
- Telecare device with automatic fall detection and panic button, which includes GSM communication (messages and voice) and GPS tracking.

COLLABORATION OFFER:

We look for:

C) Licensing partner.

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Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
MAXSENS's intellectual property is protected by: • WO2016097382 (A1) - SYSTEM AND METHOD FOR ELECTROTACTILE FEEDBACK Claim 1: A system for transferring proprioceptive information from a prosthesis or from a sensory system disposed at a body part having poor or no sensation, to the skin of a user wearing such prosthesis or sensory system. DEC-2015

BACKGROUND:
Target problem: to solve amputees lack of feedback to improve prosthetic limb acceptation and functionality. 20% amputees abandon the prosthesis: • Amputees lack sensory feedback in the prosthesis to control movements such as hand opening-closing, applied force, flexion-extension and rotation. • Control of multi degree of freedom can be mastered but requires time and patience and at the same time prevents simultaneous movements (e.g. user cannot rotate and open/close hand at the same time).

ACHIEVEMENTS AND RESULTS:
Our solution: FES (functional electrical stimulation) to obtain sensory feedback Add-on device for prostheses that: • Represent spatial variables with spatial coding and intensity with parameter modulation (frequency). • Train the patient stimulating specific patterns with afferent FES. MAXSENS working principle has been tested in 15 upper limb amputees. Amputees could recognize 8 prosthesis states with more than 90% accuracy. It required only 20 minutes of training. Amputees could significantly increase performance of prosthesis.

Bionic Prosthetics market:

- In 2017 account for 20-25% of the market, so our addresable market for Maxsense in 2017 is $250-313M.
- Growing faster than mechanical ones.

IDENTIFIED PURPOSES AND ADVANTAGES

MAXSENS aims to solve the problem that amputees have of lack of feedback to improve prosthetic limb acceptation and functionality. MAXSENS consists of a system for transferring proprioceptive information from a prosthesis or from a sensory system disposed at a body part having poor or no sensation, to the skin of a user wearing such prosthesis or sensory system. It applies FES (functional electrical stimulation) technology to obtain sensory feedback.

COLLABORATION OFFER:

We look for:

A) Licensing partner.

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Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
REHAND's intellectual property is protected by 2 patents (status: "submitted"): EP16382036.8 and EP16382037.6

BACKGROUND:
Problem solved: • Device for fingers rehabilitation. • Portable, compact and ergonomic. • Ambidextrous design (the same device can be configured to train the right hand as well as the left hand).

ACHIEVEMENTS AND RESULTS:
TECNALIA has developed **REHAND**, a modular robotic device for hand rehabilitation. Following we present all the work done for this development: • State of the art done by TECNALIA-Italy (February 2011) • Preliminary prototype design done by TECNALIA-Italy. • Second prototype developed by TECNALIA Health division. • The two prototypes were presented to HOCOMA (global market leader for the development, manufacturing and marketing of robotic and sensor-based devices for functional movement therapy), the first prototype was discarded by Hocoma (April 2013). • The first prototype evolved to be used in the IsMore project (February 2014) and it was licensed to the Basque company VITIA under the name "ReHaHand" (2016). • The second prototype (chosen by Hocoma) is, as of today, being tested at the Hocoma, Zurich facilities (January 2015). A functional prototype of robotic device for the rehabilitation of the hand following the product specifications designed by HOCOMA.

IDENTIFIED PURPOSES AND ADVANTAGES

REHAND has the following goals:

- Dexterity rehabilitation device that can be commercialized as an accessory to robotic solutions for the rehabilitation of the upper limb.
- The device can also be commercialised as stand-alone.

COLLABORATION OFFER:

We look for:

- Licensing partner

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Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com

Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

TITTAN PROJECT PARTNER-REGION:
BIOEF, Basque Foundation for Health Research and Innovation, Basque Country

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
FIK initiative-a private interdisciplinary scientific/technological development initiative Developed by Fundación TECNALIA (Research Institution). Within this initiative, we have developed different products and several NBTCs have been created.

PATENTS:
TEXTIA's intellectual property is protected by 2 patents filed and validated already in many countries: D) "FITTING ELEMENT WITH CONTROLLED STIFFNESS WO 2011/079865. CT/EP2009/068020" E) "ELEMENT WITH VARIABLE STIFFNESS CONTROLLED BY NEGATIVE PRESSURE WO2014/140389"

BACKGROUND:
TECNALIA has designed **VARSTIFF**, an intelligent textile material that can adopt different shapes and that, when applied to a vacuum, becomes rigid until reaching hardness equivalent to that of a conventional plastic. The material returns to the flexible state when the vacuum is removed. This revolutionary material also offers solutions in other areas of health, such as orthopedics, where it offers advantages over common solutions that use elastic bands that are closed with Velcro or inflatable pads. These solutions apply pressure and, therefore, exert force on the skin, which decreases comfort, in addition to lacking the necessary rigidity. The automotive, leisure and sports are other fields, in which this material can provide new utilities that guarantee the safety and comfort of users. In automotive, this material will provide greater comfort and personalization of elements, such as seats that fit each person, energy absorption systems in the doors or flexible trunk trays. In the field of sport, it can lead to flexible camping elements such as chairs, tables, mats, etc. Also, this material can be a pioneer in the development of high-performance protective textiles, such as clothing for high-risk sports or safety bodies.

ACHIEVEMENTS AND RESULTS:
We are the new Gore-Tex! A platform that provide client companies the function to vary the stiffness of their products from rigid to solid state & vice versa with a technology called **VARSTIFF**. We produce a patented technology/material that can vary its stiffness state. It is based on: • Inner material: sheets of proprietary composite material with specific properties to stick

together or separate when air is introduced or extracted
- Envelope: necessary to make the vacuum
- Valve: to extract or introduce air when necessary and ensure the air is not flowing in/out
- Pump: that can be electronic or mechanic depending on the application.

IDENTIFIED PURPOSES AND ADVANTAGES

We sell the material to companies that want to introduce it in a final product (i.e. jackets, immobilizers, child seat for a car, flexible screens, etc.).

The problem that we solve varies with each application but it is based on providing the rigid/flexible functionality. We select a couple of examples from projects in the pipeline:

- Child seat for taxis and cars: only 1 child seat vs. 6 in child lifetime vs current solutions, possibility to remove it and pack easily avoiding the problems of taxis
- Flexible screens for mobiles: solution to make rigid the screen when needed to push the buttons and write
- Immobilization seat: solution made in VARSTIFF substitutes personalized made seat that costs 7.000€ reducing 75% costs.

COLLABORATION OFFER:

We look for:

- Companies that want to introduce our functionality in their products.
- 325k€ smart capital to complete our seed round of 750k€ (60% already committed by investors) with the following objectives:
  - Internal product development (Foldable Children Restraint System) and technology evolution
  - Team reinforcement
  - Accelerate commercial prototype sample development
  - Commercialization, IP and other structure costs

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number indicated below.

Contact:

TECNALIA-Ventures

Attn: Gorka Hermoso
T. 902 760 000
T. +34 946 430 850
ventures@tecnalia.com
Parque Científico y Tecnológico de Bizkaia
C/Geldo, Edificio 700.
E-48160 Derio (Bizkaia) -Spain-

The University of Strathclyde – Digital Health & Care Institute (DHI)

TITTAN PROJECT PARTNER-REGION:
The University of Strathclyde – Digital Health & Care Institute (DHI), Scotland

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
The Digital Health and Care Institute

PATENTS:
N/a

BACKGROUND:

The DHI is an innovation centre focussed on Digital Health in Scotland. Our networks, reach and capabilities are able bring the right people together and provide them with the means to identify, design, evaluate and invest in new solutions to the country's priority health and care challenges.

Scotland's public sector, academia, charities and industry need a place to co-design digital solutions to some of our country's biggest health and care challenges. We bring these groups together, allowing them to imagine and create new services, products and new ways of working.

Our unique needs-led approach is an essential link between the Scottish Government's national priorities and the wealth of talent across different sectors and communities in Scotland. Through all of its Scottish Government sponsored challenges, DHI is exploring the following questions.

- **How can services be redesigned from the outset to be citizen centred, accessible and usable?**

DHI is in the scoping stage of a challenge titled the 'Future of Care', which looks at how new types of digital data sharing, communication and coordination can support the delivery of 'citizen centred' and 'integrated' health and care objectives. It will draw use cases from DHI's other challenges to ensure solutions can be deployed across many different types of services.

- **How can this be balanced with system requirements such as population health risk management, information governance and commercial sustainability?**

All DHI challenges will explore this balance. In particular, we are initiating our **Next Generation Asthma** challenge in partnership with **Asthma UK**. This will further develop DHI's delivery model, by blending a co-design approach with some of the new types of market capability explored in our Demonstration and Simulation Environment. It will look at how Asthma care can use citizen-generated inhaler and lifestyle data to develop personalised and predictive approaches, while also powering data driven population health management capabilities.

ACHIEVEMENTS AND RESULTS:

Our SCOTCAP and AF challenges have both been accepted into the Scottish Government Modern Outpatient Programme. DHI is working at a National level and bringing together multiple health boards for these challenges to support adoption at scale.
DHI is working with procurement teams in the Scottish Government, NHS National Services Scotland and the Enterprise Agencies to allow Scotland to 'procure innovation'. The DHI SCOTCAP will pioneer this 'Innovation Partnership' approach, allowing a competitive R&D process to result in the setting up of a procurement framework. This is distinct from other innovation work that uses pre-commercial procurement – meaning those businesses contributing to innovation have no resulting route to deployment at scale.

IDENTIFIED PURPOSES AND ADVANTAGES

DHI is providing several digital platforms to support its health and care partners to innovate. These platforms are provided to act as 'proxies' for what the market will be able to offer. Specifically, to support co-management of care, there are two platforms of note.

- The first is a **Data Exchange Layer** – powered by Storm ID's Lenus platform. This is a product / business agnostic open platform that lets a citizen aggregate and consent to sharing of their own data from connected apps. It offers the ability to discover or build services on top of the platform to take advantage of these new data flows.
- The second is a **Personal Data Store –** powered by Mydex CIC. This is also an open platform that lets the citizen hold and port their own data from a variety of sources (including non-healthcare). It gives a structured, consent driven 'third option' for how to handle data – outside of the control of either government or corporate providers.

COLLABORATION OFFER:

DHI is currently developing new business models based on emerging technologies with SMEs from its Phase 1 projects. After an initial learning phase, this will be opened up as a new service offered to Scottish SMEs. For now, anyone interested can register in our capability pool.

Contact:
Laura Rooney
Laura.rooney@dhi-scotland.com
01414447424
Inovo Building
1st Floor, Suite B,
121 George Street,
Glasgow

TITTAN PROJECT PARTNER-REGION:
The University of Strathclyde – Digital Health & Care Institute (DHI), Scotland

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Research and Development in Scottish Universities

PATENTS:
N/a

BACKGROUND:

The University of Strathclyde has the largest Digital Health Research group of any University in the UK and is leading in this area of expertise.

Several Scottish universities have either led or substantially contributed to projects and programmes in assisted living technologies funded by the Technology Strategy Board / Innovate UK / SBRI (case study 3.1.1) including the Universities of Glasgow, Strathclyde and St-Andrews.

ACHIEVEMENTS AND RESULTS:

Spin-out companies developed as part of research programmes & R&D projects conducted within Scottish Universities include:

- Aurum Biosciences (University of Glasgow):
www.aurumbiosciences.com

- MIME (University of Aberdeen):
http://mimetechnologies.com/

- Aridhia Informatics (University of Dundee)
http://www.aridhia.com/

IDENTIFIED PURPOSES AND ADVANTAGES

Scotland has 19 Universities and higher education institutions, with many of those actively involved in research and R&D activities in collaborations with the NHS, health industry, innovation centres and research funders. Some examples of the collaborations:

- University of Aberdeen: Funding of £11.8M was awarded from EPSRC to Aberdeen

'dot.rural' hub although the exact proportion of this funding allocated to the projects described above (TOPS, MIME, ASICA) is not known.

- University of Aberdeen: ITTS: Total Budget: € 2 321 754,72 - Total Funding Request: € 1 583 42,06 (01/09/2011-31/03/2014)
- University of St-Andrews: TSB ALIP COBALT £520,832
- University of Strathclyde: TSB SBRI Advanced Pattern recognition Technology for Multi Articulating Prosthesis (APTMAP, 2013-2015): Funded Value: £386,003 / Total project budget: £770,972

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number on the right. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly.

Contact:
University of Strathclyde,
Glasgow
Dr Matt Mouley Bouamrane
mattmouley.bouamrane@strath.ac.uk

Some Results:

An economic evaluation of 'delivering assisted living lifestyles at scale (dallas) University of Glasgow and University of Strathclyde.

Launched in 2012, 'delivering assisted living lifestyles at scale' (dallas) was a large-scale intervention examining digital health for integrating preventative care for daily life. This study investigated general UK population value for mobile health (mHealth) lifestyle apps seeking to improve an individual's sense of the 6Cs (connectedness, control, choice, collaboration, community and contribution) for future inclusion in the NHS digital agenda.

Summary: https://www.gla.ac.uk/media/media_561269_en.pdf

TITTAN PROJECT PARTNER-REGION:
The University of Strathclyde – Digital Health & Care Institute (DHI), Scotland

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Scottish Health Innovations Ltd (SHIL). The Scottish Health Innovations Ltd has been in existence since 2002. As an organisation they work very closely with NHS Scotland to identify, protect, develop and commecialise healthcare innovations to improve patient care. SHIL support NHS staff with innovative ideas to commercialise these with expert services including intelectual property advise, Project management, idea incubation, funding advice, development and pot-commercoalisation monitoring.

PATENTS:
-WO2017017456 “Vascular catheter”- granted in UK, pending in Europe and USA. -WO2017085499 “Variable curve jig for an intramedullary device”, granted in UK, pending in Europe and USA.

BACKGROUND:
WO2017017456 – Vascular catheter: Renal failure is characterized by an inability of the kidneys to detoxify the blood. As an entity, it may be sub-classified by speed of onset into chronic, and acute sub-variants. The natural history, prognosis, and treatment of these two entities are very different. Chronic renal failure (CRF) is characterised by a slow predictable, and mostly irreversible loss of kidney function, developing over years to decades. In the Western world it is largely a consequence of diabetes, high blood pressure, or an intrinsic renal disease. Because the condition progresses slowly and predictably, preparations can be made to anticipate the eventual need for dialysis or transplant. An artero-venous fistula may be fashioned, or as a bridging measure, the patient may be fitted with a long-term dialysis catheter. Typically, these catheters have blunt ends, which demand a complex insertion technique, need x ray guidance, and are "tunnelled" under the skin to reduce the risk of infection. Long term dialysis catheters generally stay in place for months, or even years. In contrast, acute renal failure (ARF) develops within the course of hours to days, often on the background of previously normal kidney function. It may develop as a consequence of serious illness, dehydration, trauma, burns, or drug toxicity. The majority of acute renal failure is reversible upon treatment of the underlying cause. If untreated however, ARF rapidly leads to life threatening disturbances in pH and electrolyte homeostasis. In such instances haemodialysis, or haemofiltration must be initiated immediately, and this is usually accomplished by way of a short-term 'acute' dialysis catheter inserted into a central vein.

Acute dialysis catheters are distinct from chronic dialysis catheters in several ways. They are pointed to facilitate simple insertion, and their short indwelling duration means they do not need to be 'tunnelled' under the skin to avoid infection. Insertion does not require continuous x-ray guidance, and is often carried out by an intensive care physician rather than a dedicated renal physician. As such, acute dialysis catheters are faster and easier to insert in an emergency, making them appropriate for the management of acute renal failure. This invention is applicable to both acute and chronic haemodialysis catheters

Extracorporeal carbon dioxide removal is an emerging modality of treatment for patients with certain classes of respiratory insufficiency. Treatment is similar to dialysis, in that blood is removed, treated, and returned to the body. Because of the similarity, this invention could also be adapted to perform extracorporeal carbon dioxide removal.

All dialysis catheters contain two lumens, namely an 'arterial' lumen configured to aspirate blood from the blood vessel for treatment and a 'venous' lumen configured to eject treated blood back into the blood vessel. Both lumens are generally placed within a large central vein.

If the blood flow in a dialysis catheter is unreliable, it interferes with the continuity of treatment. The blood flow rates required for dialysis and haemofiltration are relatively high (200 to 450 ml/minute). This flow generates a region of low pressure in the vein around the apertures of the aspirating lumen. This vacuum may under certain circumstances, entrain the internal wall of the vein onto the apertures, causing an abrupt reduction or cessation of flow to the dialysis/haemofiltration machine. The dialysis/haemofiltration machine detects the pressure change, and stops the flow of blood. This temporarily relieves the vacuum, allowing the machine to be restarted, but often the problem recurs repeatedly. Repeated interruptions of flow reduce the efficacy of the treatment, and lead to blood stagnation and subsequent clotting in the dialysis/haemofiltration membrane. Clotting necessitates changing the circuit and membrane, resulting in prolonged interruption to dialysis and increased expense. Repeated disposal of the stagnant blood may eventually lead to anaemia in the patient.

Techniques used to improve poor flow in a dialysis catheter include manipulating or rotating the catheter, increasing the pressure in the vein by administration of intravenous fluid, or reversing the direction of flow through the catheter. These interventions may be repeated, and consume the time and attention of medical staff. Reversing the flow of blood also results in admixing of treated and untreated blood resulting in inefficient blood treatment/dialysis. Dialysis catheters, in particular central venous catheters are associated with a relatively high risk of infection and clotting, which can lead to low blood flow to the blood vessel and scarring and narrowing thereof.

There remains a need for catheter assemblies, which allow for rapid aspiration rates, without the associated problem of vessel wall entrainment occluding the apertures of the aspirating lumen.

WO2017085499 - Variable curve jig for an intramedullary device: The intramedullary device is inserted into the medullary canal of the long bone,and is held in place by screws or pins that are driven laterally through the bone at each end of the nail. The screws also pass through pre-drilled holes in the end of the intramedullary nail, thereby reducing or preventing movement of the nail/bone while the fracture is healing. Holes must be bored laterally through the bone "blind" in order to insert the screws, and these must be aligned with the pre-drilled holes in the ends of the

intramedullary nail. It can be very difficult to accurately predict where the holes at the distal end of the intramedullary device are located. In order to position and drill the holes accurately in the bone ajig is commonly employed to correctly locate the holes in the nail closest to the jig attachment.

The jig is attached to the protruding (proximal) end of the nail after insertion of the nail into the medullary canal, and typically extends generally parallel to the nail. The jig has pre-drilled holes that align with the holes in nail when the jig and the nail are properly attached and aligned. This works quite satisfactorily for the proximal holes to be drilled through the bone, but since the jig is only attached to the nail at one end, and the jig and nail can be quite long (up to around 50 cm), it can be very difficult to align the distal holes in the jig with the distal holes in the nail, and this is the reason why jigs tend to be short and only identify the positioning of the proximal holes.

In particular, intramedullary devices tend to bend along their longitudinal profile, and this bend tends to be exaggerated upon implantation into a long bone. Significantly, the bend of the intramedullary device cannot be predicted, as each bone bends slightly differently. The bend of the intramedullary device following implantation makes predicting the location of the holes at the distal end of the intramedullary device even more challenging.

ACHIEVEMENTS AND RESULTS:

VASCULAR CATHETER: The catheter assembly of the present invention is configured to ensure that the vein wall cannot be entrained onto the arterial lumen apertures which would result in complete or partial occlusion of said apertures. This ensures consistent blood flow through the arterial lumen with the associated benefits detailed below.

A) A reduction in the amount of downtime where the patient isn't receiving renal replacement therapy (RRT).

B) A reduction in the intensiveness of the medical intervention and labour required due to nurses and doctors having to manipulate unreliable dialysis lines less frequently.

C) A reduction in the number of repeated line insertions due to failure of an existing line.

D) A reduction in the loss of blood due to stagnation, clotting and subsequent disposal, thereby reducing the number of blood transfusions required and the risk of anaemia.

E) A reduction in the number of filter membranes required due to a reduction in blood stagnation and subsequent clotting in the dialysis machine.

IDENTIFIED PURPOSES AND ADVANTAGES

Catheter: The present invention relates to a catheter, in particular a vascular catheter suitable for use in chronic haemodialysis, acute haemodialysis, haemofiltration, or extracorporeal $C0_2$ removal. There is also provided a method of inserting and retracting the catheter from a human or animal body and a method of treating blood using the catheter of the present invention, in particular in a

method of haemodialysis (chronic or acute), haemofiltration or extracorporeal carbon dioxide removal
Curve Jig: The present invention relates to a variable curve jig for affixing intramedullary device, in particular an intramedullary nail in a body. There is also provided a method of determining the position of holes to be drilled through a bone which align with holes in the nail.

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us at the address and telephone number on the right. This offer can be materialized in a "Partnership Agreement" to adapt this technology to your research areas, or in a "License Agreement" to use this patent directly.

Contact:
Scottish Health Innovations Ltd
Ninewells Hospital & Medical School
Dundee
DD1 9SY
(Postal) DD2 1UB (Sat Nav)

DOLNY
ŚLĄSK

Lower Silesian Voivodeship Marshal Office (LSVMO)

TITTAN PROJECT PARTNER-REGION:
Lower Silesian Voivodeship Marshal Office , Lower Silesia

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Telemonitoring

PATENTS:
Not aplicable

BACKGROUND:
Rural areas often have problems with providing, in this area, care by family doctors. This is often due to large distances from family medicine centers as well as their lack. In this situation, it is necessary to support the care process by technology. Through the use of mobile technologies, it is enable remote monitoring of the patient's vital parameters. The patient equipped with such devices makes measurements and is informed about their results. In case they deviate from the standards set for the patient, the system can inform the medical personnel and the monitoring center about this event. The experience of Lower Silesia in this area results from the CareWell project. The implemented project concerned only 50 patients in the intervention group. However, getting experience allow us to state that the system itself supports the patient by informing him about his health. Measurement results can also be passed to informal carers who are members of patients families. Such support makes it possible to minimize the involvement of doctors. The patient is informed by the system what he should do.

ACHIEVEMENTS AND RESULTS:
This approach of Lower Silesia has shown that it is possible to demonstrate greater economic efficiency. Patients with chronic diseases most often make their own decisions about self-management of their diseases. However, it requires patient-doctor partnership and cooperation in the field of care and educational support. Self-education complements traditional patient education, supporting patients in maintaining the best possible quality of life with their chronic disease.

IDENTIFIED PURPOSES AND ADVANTAGES
By implementing the self-management concept, the patient has a sense of self-efficacy - the certainty to conduct the behavior necessary to achieve the desired goal. Self-efficacy means that patients often succeed in solving problems identified by the patient himself. Planning to increase the scaleup to a thousand patients, it is necessary to develop programs that teach the skills of independent management of chronic disease. This is a prerequisite for the further development of integrated care. This sustainable approach for chronic diseases can soon become an integral part of high-quality primary care.

COLLABORATION OFFER:
If this offer of cooperation is your interest or you need more information about it, please contact us. This offer can be realized using “Open Innovation Platform” to adapt the mobile technology in your research areas. **Contact:** Antoni Zwiefka Phone: +48 71 770 4305 e-mail: azwiefka@umwd.pl;

TITTAN PROJECT PARTNER-REGION:
Lower Silesian Voivodeship Marshal Office , Lower Silesia

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Telerehabilitation

PATENTS:
Frączkowski Kazimierz: Patent. Polska, nr 222610. Inteligentny mobilny czujnik ruchu : Int. Cl. G01C 21/16. Zgłosz. nr 400494 z 24.08.2012. Opubl. 31.08.2016 / Politechnika Wrocławska, Wrocław, PL ; Kazimierz Frączkowski. 4 s. : 1 rys. An intelligent mobile motion sensor http://pubserv.uprp.pl/PublicationServer/generuj_dokument.php?plik=PL_000000000222610_B1_PDF

BACKGROUND:
Strokes are the second cause of mortality in the world, the third in Poland and in Europe and the first cause of disability of people over 40 years of age. The social and economic consequences are enormous because about 70 percent of patients who survived stroke remain disabled. This is why the additional support of rehabilitation is very important for patients. It can be made possible by the application of computer games in rehabilitation of patients after stroke. The interactive computer games allow the patients to perform rehabilitation exercises, which are an integrated part of the game's scenario. During the treatment, the type of the game and its level of difficulty are selected depending on the degree of paresis of the upper limbs and predisposition of the patient

ACHIEVEMENTS AND RESULTS:
Results of examinations concerning the properties and possibilities of application of the Mobile Intelligence Motion Sensor (IMCR) were collected from the rehabilitation and monitoring of the human posture. The verification of the human motion was made in relation to the real human gesticulations. The resent study is based on data collected from cameras that are used to verify the information submitted by means of IMCR. Sensors were placed on the selected regions of the human body. These data are helpful in the elaboration of three-dimensional model for visualization of human motion. The technical capabilities and functionality of the system may find application in medicine and sport.

IDENTIFIED PURPOSES AND ADVANTAGES
Two groups of patients with a comparable degree and type of post-stroke effects participated in the study, one of them was rehabilitated in a traditional way and the other one was rehabilitated using the FizoGame system. Obtained results from both quantitative monitoring of progress

parameters in rehabilitation with the use of computer games, and the evaluation of this medical technology by patients in questionnaire surveys, indicate that, facing the rising costs of care of patients with stroke and the indication for rapid rehabilitation, telerehabilitation may be considered as an integral element of the management/self management of patients after stroke. The knowledge about sustainable integrated health and social care, lessons learned from CareWell Project, has generated a model that can be applied in any European regions, within the personalization process. It has successfully demonstrated that personalized care can significantly increase the quality of life.

COLLABORATION OFFER:

If this offer is of your interest or you need more information about it, please contact us. This offer can be materialized in a **"Partnership Agreement"** to adapt this technology to your research areas, or in a **"License Agreement"** to use this patent directly.

Contact:
Kazimierz Frączkowski
Telerehabilitacja Mobilna Ltd
Ul Wktora Brossa 6, 53-134 Wrocław
Phone: +48 530 700 753
e-mail: kazimierz.fraczkowski@pwr.edu.pl

Gemeente Almere

City of Almere

TITTAN PROJECT PARTNER-REGION:
City of Almere

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Health Factory - Center for Innovative Craftsmanship healthy Ageing Friesland

PATENTS:
N/A

BACKGROUND:

Project CvIVHAF

Center for Innovative Craftsmanship healthy Ageing Friesland

Challenge

The home care organisations in Friesland (a province in the north of th NL) have three main challenges: a miss match on the labour market, providing care near to the client/patient, improving selfmanagement of care by client and care giver

Solution

This project organizes the Public-Private Cooperation and innovative strength that is needed ro innovate care for the elderly. Three main goals are identified: 1) Innovate through innovation labs, 2) educate through learn/work places, and 3) sharing of knowledge through care innovation portal and research in practice.

Role Health Factory

HF stimulates of the use of innovative technologies in health care by realizing a skills lab for this project.

Initiator

MBO Friesche Poort (institution for vocational education)

ACHIEVEMENTS AND RESULTS:
Project in progress

IDENTIFIED PURPOSES AND ADVANTAGES
1) Innovate Care 2) educate (future)care workers 3) sharing of knowledge

COLLABORATION OFFER:
sharing of knowledge support the realization of skills labs

TITTAN PROJECT PARTNER-REGION:
City of Almere

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Health Factory - **Project Fieldlabs**

PATENTS:
N/A

BACKGROUND:

Project Fieldlabs

Care in the 21st century neighbourhood

Challenge

A mismatch has evolved between demand and provision/supply of care now that due to new legislature, care provision is being moved from care homes to the neighbourhoods. The care professional is being confronted by a changing demand from the client, informal care and new care technology. This calls for a new approach to education for the care sector.

Solution

Within the Metropolitan Area of Amsterdam this Public-Private Collaboration is realizing three Field labs: Buildings, owned by care providers where an environment is created to stimulate continuous learning. For students, care professionals and teachers.

Health Factory

HF provides project management for field labs

Initiators

ROCVA, ROC van Flevoland (schools for vocational education)

ACHIEVEMENTS AND RESULTS:
Two Field Labs have been realized, project is in progress

COLLABORATION OFFER:
Sharing knowledge Support realizing field labs

TITTAN PROJECT PARTNER-REGION:
City of Almere

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Health Factory - BRAVO

PATENTS:
N/A

BACKGROUND:

Project BRAVO – Fall prevention

Challenge
To fall is the most common cause of injury by accident for elderly people. In the NL every 5 moinutes an older person is injured by falling to the extent they need to go to the hospital ER.

Solution
To be able to calculate the risk of falling is an important factor in preventive interventions. In the BRAVO-project HF and several SME's collaborate to develop knowledge on technologies that help predict the risk of falling in a realistic and practical environment (home/hospital). Also knowledge om acceptance of this technology is being gathered.

Health Factory
HF supports this research by providing lab facilities and dissemination.

Initiators
HvA, Domein Digitale Media en Creatieve Industrie en Domein Gezondheid and SME's (University of Applied Sciences)

ACHIEVEMENTS AND RESULTS:
Ongoing project – aimed at developing predictive technology

COLLABORATION OFFER:
Sharing of knowledge Finding project participants Developing a consortium Apply for European funding

TITTAN PROJECT PARTNER-REGION:
City of Almere

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Health Factory – Project FIT

PATENTS:
N/A

BACKGROUND:

Project FIT
Living at home with dementia

Challenge
When people are confronted with dementia, they want to live in their own home for as long as possible. Also government wants people to grow old in their own home and environment. Despite the availability of (technological) means of support to enable them to stay in their own environment, dementing people, their informal carers and care professionals, find it hard to choose technological solutions and to adaprt to the use of these solutions.

Solution
In FIT needs and services are being matched so that the client can be provided with a customized solution (products and services of support) for his or her situation in the different phases of dementia.

Health Factory
HF supports FIT in planning phase and during execution of the project offers lab facilities to partner SME Brevidius. The acquired knowledge will be applied to initiate new products and services.

Initiators
HVA, knowledge center CREATE IT

ACHIEVEMENTS AND RESULTS:
Development of new products and services

IDENTIFIED PURPOSES AND ADVANTAGES
Providing dementing clients with customized products and services addapted to their situation and the phase of dementia they are in.

COLLABORATION OFFER:
Knowledge sharing

TITTAN PROJECT PARTNER-REGION:
City of Almere

GOOD PRACTICE INVOLVED IN TA2 (*collected in the Assesstment Report*):
Health Factory – Project FreeWheels

PATENTS:
N/A

BACKGROUND:
Project FreeWheels Self driving wheel chair **Challenge** Lonelyness and dependency occur a lot with people who deal with mobility issues, like for instance elederly and people who are in wheel chairs. The need of physically disabled people for more independent living and personal autonomy was taken to heart in the co-creation of FreeWheels. **Solution** In this project the first self driving wheel chair is being developed. It enables users to live their lives more autonomous and independent. **Health factory** HF provides this project with R&D facilities and offers a practical testing environment by means of a living lab in a real live situation. **Initiator** Cinnovate (SME)

ACHIEVEMENTS AND RESULTS:
Self driving wheel chair being developed in stages Project development in stages , ongoing

IDENTIFIED PURPOSES AND ADVANTAGES
Autonomy and mobility for people with physical impediments

COLLABORATION OFFER:
Seek partners & Share knowledge