EuroNanoMed

NEWSLETTER NUMBER 2

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BASQUE REGION (SPAIN) | FRANCE | GERMANY | HUNGARY | ICELAND | ISRAEL | LATVIA | LITHUANIA | POLAND | PORTUGAL | ROMANIA | SPAIN | SWEDEN | SWITZERLAND | THE NETHERLANDS | TURKEY | VENETO REGION (ITALY) | WALLONIA (BELGIUM)

Nanomedicine is the application of nanotechnology to medicine and healthcare. The field takes advantage of the physical, chemical and biological properties of materials at the nanometer scale to be used for diagnosis, treatment and follow-up of diseases. Given the immense potential impact of nanomedicine on public wellbeing and on economic growth, the field is of considerable strategic importance for Europe.

The EuroNanoMed ERA-NET initiative comprises 24 partners from 18 countries/regions. EuroNanoMed aims at fostering the competitiveness of European nanomedicine players through the support of trans-national collaborative and multidisciplinary Research and Technology Development (RTD) projects with participants from academia, clinical/public health communities, and industry (particularly small and medium-sized enterprises).

3rd Joint Transnational Call 2011

> Participation of 14 EuroNanoMed partners
> Call open from January 14 to April 15, 2011
> 41 projects submitted – 207 partners (average 5,1)
> 38 projects eligible and peer reviewed (193 partners)
> Peer Review Panel Meeting September 6 and 7, 2011
> Funding Decision by the Call Steering Committee on October 7
> Selected projects should start early 2012

> Funding commitment of EuroNanoMed partners: 10,7 M€

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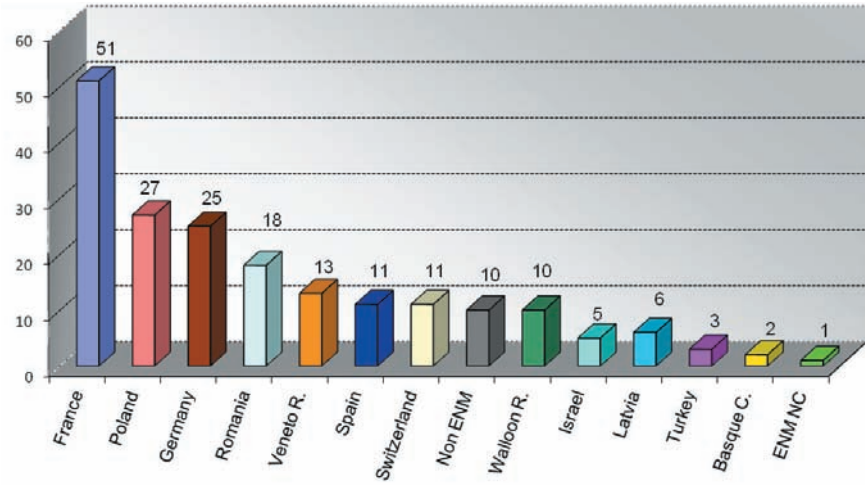
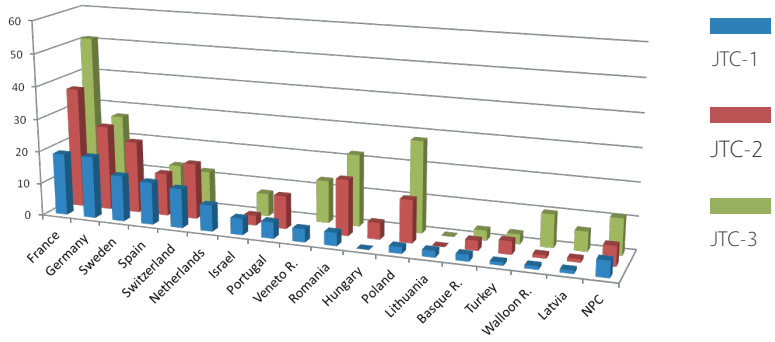
Applicants per Country



Applicants per Country



Evaluation Criteria

1. Accordance with the aims of the call Scientific and technological quality

> Novelty, innovation potential, methodology, technological maturity

2. Quality and international competitiveness of the participants

> Expertise of participants, previous work in the filed

3. Project Consortium

> Quality, well balanced, level of interaction, added value by transnational cooperation, coordination

4. Feasibility of the project

> Adequacy of human, technical, financial recourses

5. Potential Impact – "Exploitability"

> Knowledge transfer towards clinic / public health applications or industry / market

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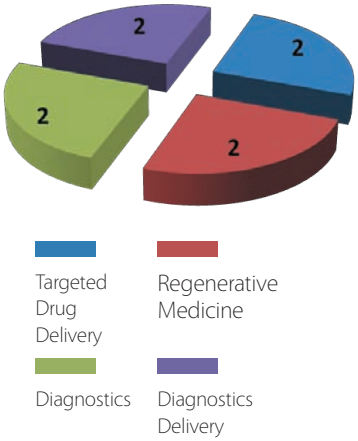
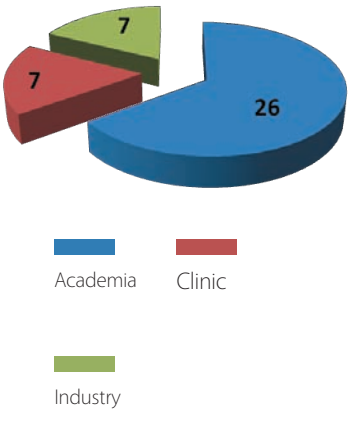
Funded projects

Main scientific fields



Consortium composition



Following the recommendations of the Peer Review Panel that were based on overall quality assessment of all eligible applications received in response to the 3rd Joint Transnational Call, the Call Steering Committee of EuroNanoMed selected the following projects for funding:

Project coordinator
Mihail-Gabriel Dimofte
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Senior reader in surgery, University of Medicine and Pharmacy "Gr. T. Popa" Iasi | Romania

Chemo-hyperthermal Delivery - Combined chemo-hyperthermal control of hepatic tumors, based on microwave-activated subendothelial-targeted nano-assemblies

Acronym

CheTherDel

Partners

- Corina Veronica Ursulescu | Emergency Hospital "Sf. Spiridon" Iasi | Romania
- Romeo Cristian Ciobanu | "Gheorghe Asachi" Technical University of Iasi | Romania
- Emanuele Papini | University of Padova | Italy
- Brigita Vigante | Latvian Institute of Organic Synthesis | Riga | Latvia
- Alf Lamprecht | University of Franche-Comté | Besancon | France

Abstract

Liver metastasis can be targeted with a variety of non-curative therapeutic methods. We aim to control the malignant disease as a chronically manageable problem. To target the malignant tissue in a selective way we shall use thermal modification of tissue using focal microwaves, that will expose new antigens in the liver structures. We will target these with functional nanoparticles loaded with magnetic particles, which are intended for long term tissue fixation. These particles can produce local heat by external activation, accompanied by local delivery of chemotherapy, using the instability of liposome's loaded with specific chemotherapeutic agents. Using this repeatedly we might be able to induce a highly effective combination of hyperthermia and chemotherapy in a localized area and to minimize systemic effect, for an effective control of liver tumors.

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Project coordinator
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Department of Hematology
Clínica Universidad de Navarra (CUN)
Pamplona (NAVARRA) | SPAIN

Design of novel anti-idiotype vaccines adjuvanted with RNA-based nanoparticles: entry into nanotechnology based personalized cancer immunotherapy.

Acronym

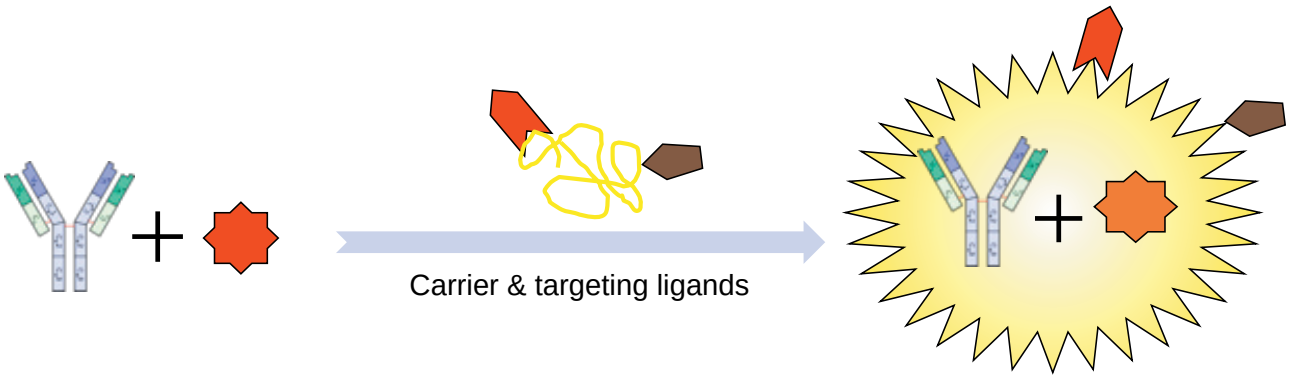
Nanovaxid

project partners

- Karl-Josef Kallen | CureVac | Tübingen | GERMANY
- Jan Walewski | Department of Lymphoid Malignancies | Maria Sklodowska-Curie Memorial Institute and Oncology Centre | Warszawa | POLAND

Abstract

Follicular lymphoma is an indolent and yet incurable malignancy. Idiotypic vaccination is an experimental strategy designed to prevent disease relapse after mild chemotherapy by instructing the patient's own immune system to recognize and eliminate residual tumor cells. Currently, idiotypic vaccination succeeds in no more than half of the patients. In this study, we plan to replace the adjuvant molecules of the old formulation with a single, powerful, RN-nano-adjuvant, which will be evaluated both at the preclinical and clinical level.



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Project coordinator
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Laboratoire de Chimie et Biologie des Métaux | Institut de Recherche Technologique et des sciences du Vivants | CEA Grenoble | France

AMYLOID PEPTIDE GRAFTED TO NANOPARTICLE FOR AMYLOIDOSIS DIAGNOSIS

Acronym

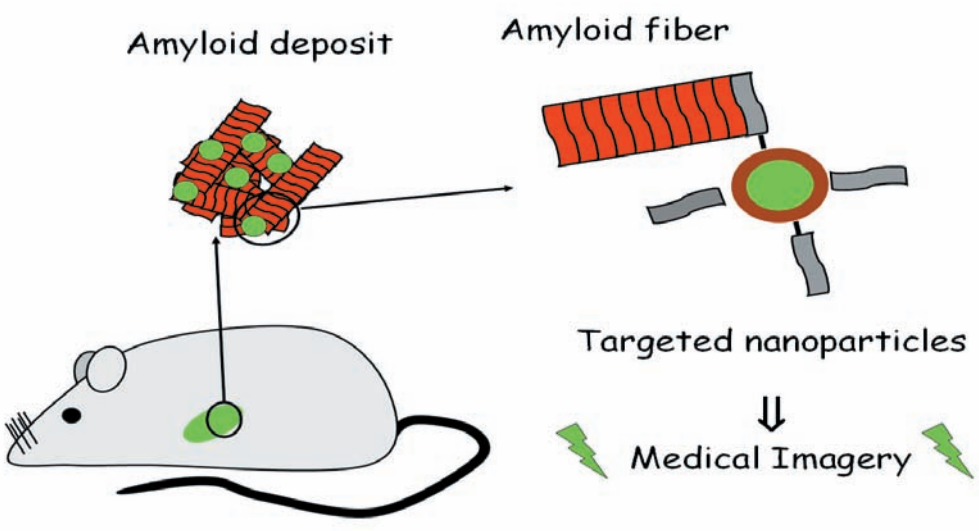
Dia-Amyl

Project partners

- Olivier Tillement | Laboratoire de Physico-Chimie des Matériaux Luminescents | Université Claude Bernard Lyon 1 Lyon | France
- Cédric Louis | Nano-H S.A.S. | Saint Quentin Fallavier | France
- Mireille Dumoulin | Centre d'Ingénierie des protéines | Université de Liège, Institut de Chimie | Liège | Belgium
- Xavier Montet & Eric Allémann | Université de Genève | Geneva | Switzerland

Abstract

Amyloidoses remain a considerable clinical challenge. Due to their numerous forms and their involvement in different organs and tissues, they are often misdiagnosed or diagnosed too late for an effective therapy. The project will focus on transthyretin, which is associated with familial amyloidotic polyneuropathy I, and on islet amyloid polypeptide, which is associated with type-II diabetes. The aim of this project is a proof of concept, consisting in the development and the validation of innovative nanoparticles with multifunctional properties for the amyloidose diagnosis by various imagery methods such as Magnetic Resonance Imagery or PET-Scan.
The final objective is to extract a general concept for targeting amyloid deposits, enabling a diagnosis at the early stages of amyloidose development. Hopefully, this will significantly increase the therapy efficiency.



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Project coordinator
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Fluorescent Organic Nanocrystals for the Early Diagnosis of Esophageal and Colon Cancer

Acronym

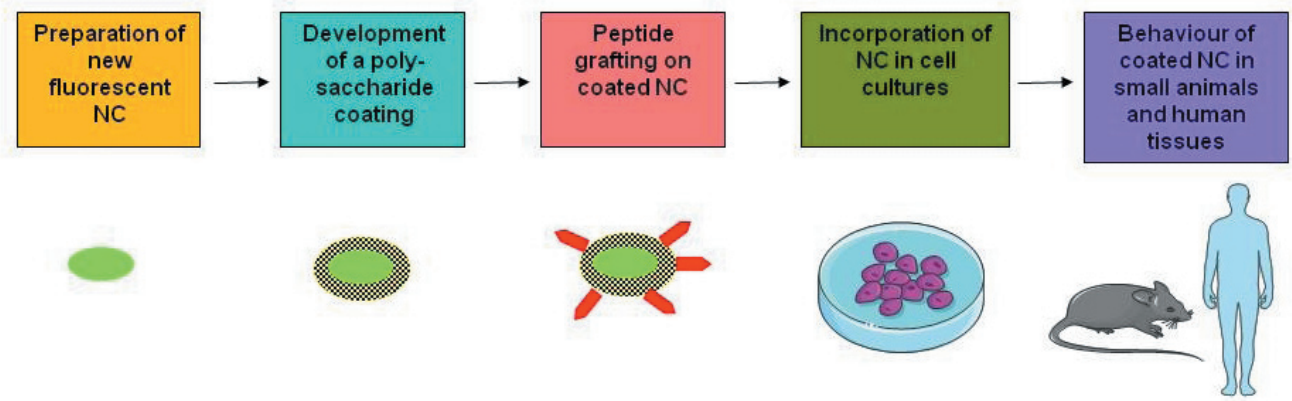
FONDIAG

Project partners

- Tomasz CIACH | Poland
- Bernard DUCOMMUN | France
- Giorgio BATTAGLIA | Italy (Veneto region)
- Franca DE LAZZARI | Italy (Veneto region)

Abstract

This project is aimed at developing new specific fluorescent probes, which could dramatically increase the sensitivity of Confocal Endoscopy for the early detection of dysplastic lesions or adenocarcinoma within the gastrointestinal tract. The original strategy that was imagined consists in preparing organic nanocrystals (NC) based on fluorescent dyes, coated by a polysaccharide shell, and grafted with peptides specific for esophagus or colon cancer cells. The bioavailability and toxicity will be tested on various normal and cancerous cells. The possibility to use our nanocrystals for detecting different premalignant and malignant conditions will be investigated on rats bearing models of esophagus or colon adenocarcinomas and/or dysplasia, as well as on fresh human tissues obtained from patients.



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Project coordinator
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Metastases targeting aptamers

Acronym

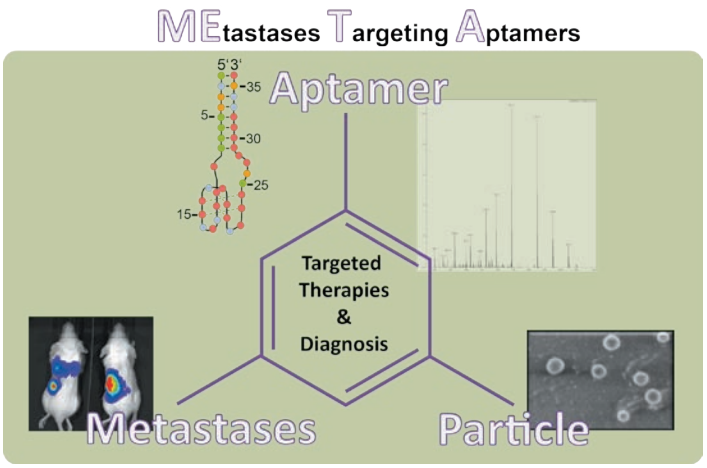
META

Project partners

- Proqinase | Germany
- Jürgen Groll | Germany
- Frederic Ducongé | France
- Jerz Silberring | Poland

Abstract

The selective targeting of tumours and metastases in vivo is one of the major challenges of biomolecular medicine today. Aptamers that recognize specific cell subpopulations have emerged as promising targeting vehicles and moreover they were shown to be suitable for in vivo imaging and 3D imaging of tumour sites. Compared to antibodies aptamers can be synthesized chemically and, thus, modified selectively without loss of activity. These advantages predestine aptamers for biomedical application in targeted therapy regimens and as in vivo diagnostics. The proposed project aims at the identification and characterisation of prostate tumour metastases targeting aptamers by applying an in vivo selection approach that uses orthotopic prostate tumour models. Once identified, in vivo proof of concept will be produced for the dual use of the novel aptamers. Firstly, aptamers will be linked to imagable labels and used in vivo as tools for the non-invasive imaging-based detection of primary and metastasizing tumour cells. Secondly, aptamers will be chemically coupled to nanoparticles loaded with chemotherapeutics and siRNAs, respectively, eliciting inhibition of tumour cell growth in vivo. Proteome analysis will be used to identify the proteins targeted by the aptamers, and will also allow to characterise the impact of aptamer-targeted treatment on the proteome of the tumour cells.



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Project coordinator
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Angiogenic nanostructured materials for non-consolidating bone fractures

Acronym

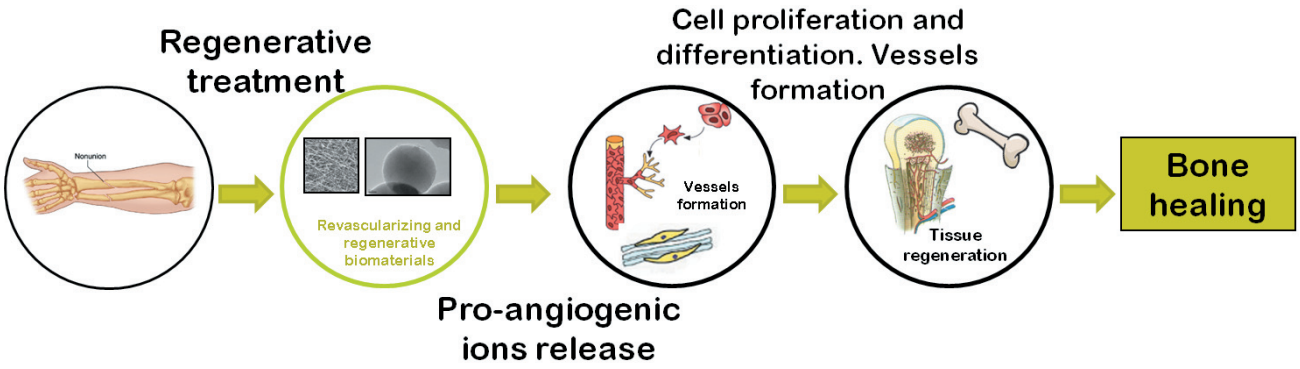
n-Angiofrac

Project partners

- Biomedical Research Networking center in Bioengineering | Biomaterials and Nanomedicine (CIBER-BBN) | Spain
- Warsaw University of Technology (TUW) | Poland
- Inserm | France
- Euroimplant | S.A | Poland
- Hospital CHU Pellegrin (CHU) | France

Abstract

One important strategy in tissue regeneration consists on developing smart tailored scaffolds able to signal and stimulate progenitor cells to colonize them and to activate their natural behaviour that results in the regeneration of new healthy living tissue. One of the main limitations of present scaffolds is their lack of vascularisation to support both the growth and viability of these regenerated tissues. Therefore, the development of new angiogenic materials capable to trigger new vessels formation and to induce vascularisation is a key issue. In this context, the development of novel biomaterials capable to release the right concentration of angiogenesis promoting ions is an innovative, cost-effective and promising strategy to achieve adequate tissue vascularization and regeneration.



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Molecular diagnosis of multifactorial psychiatric diseases: functional validation of identified gene variants using nanobodies coupled to fluorescent diamond nanoparticles

Project coordinator
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Institut National de la Santé et de a Recherche | Médicale-INSERM) | Center for Psychiatry & Neurosciences | Paris | France

Acronym

NanoDiaMed

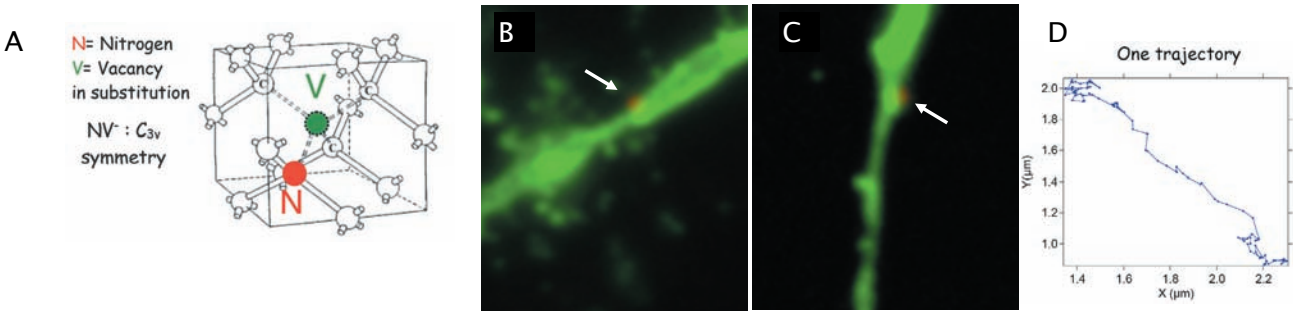
Project partners

- Aiden CORVIN | Institute of Molecular Medicine - Trinity College | Dublin | Ireland
- Anke KRÜGER | Julius-Maximilians-Universitaet Wuerzburg | Germany
- François TREUSSART | Laboratoire de photonique quantique et moléculaire ENS Cachan | France
- Carlo SALA | Institute of Neuroscience | CNR | Milano | Italy
- GATC Biotech AG | Konstanz | Germany

Abstract

We aim to validate psychiatric diseases-associated gene abnormalities using novel nanoprobes (FNDs).

Schizophrenia is a chronic, severe, and disabling brain disorder that has affected people throughout history. The illness occurs in 1 percent of the general population, but it occurs in 10 percent of people who have a first-degree relative with the disorder, such as a parent, brother, or sister, indicating a strong genetic component. Recent large-scale studies were able to characterize the genetic architecture of these psychiatric diseases that include common variants and rare variants. By combining expertise in human genetics, deep sequencing, chemistry of nanoprobes, nanobodies, neurobiology and novel microscopies, this study will have to identify novel rare variants and to validate their functional impact using novel nanoprobes based on fluorescent nanodiamonds coupled to antibodies in order to quantify parameters linked to neuronal function such as dendrite and dendritic spine trafficking, movements of receptors at synapses



Strategies to validate psychiatric diseases-associated gene abnormalities using novel nanoprobes
A: schematic representation of a fluorescent nanodiamond (fND).
B and C: visualization of fNDs (white arrows; visualized in red) in dendritic spines (visualized in green by a beta-actin-GFP transgene) that start to be formed in cultured cortical mouse neurons imaged with TIRF microscopy.
D. quantification of dendritic trafficking using fNDs inside dendrites of live cultured cortical mouse neurons imaged with TIRF microscopy.

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Project coordinator
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Nanostructured Gel for Cellular Therapy of Degenerative Skeletal Disorders

Acronym

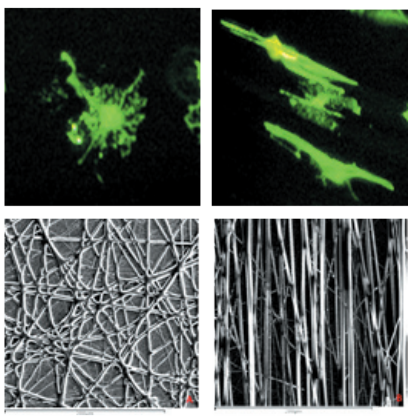
STRUCTGEL

Project partners

- SudhirBhatia | GENEKAM (Germany)
- Y. Murat Elcin | Ankara University Science Faculty (AUSCI) (Turkey)
- Benoit Pinteur, Bio Elpida (France)
- Omer Besalti | Ankara University Veterinary Faculty (AUVF) (Turkey)

Abstract

The project involves partners from Spain, Germany, France and Turkey. Amining to tackle degenerative skeletal tissue disorders such as osteoarthritis and osteoporosis, the consortium will combine high performance materials and advanced nanotechnology to design an implant with unique properties which can influence site-specific tissue regeneration. The project 'toolbox' consists of biocompatible hydrogel units (slices) with controlled mechanical properties and degradation time being combined with nanofibres to provide spatial orientation to cells. Different techniques will be used to incorporate biologically active molecules and to assemble the 3D gel/nanofibre construct after seeding with mesenchymal stem cells. Single gel slices and fully assembled bone and cartilage constructs will be propagated in vitro to demonstrate their biocompatibility and bioactivity. Feasibility studies will be carried out in vivo.



Demonstrative illustration: Electrospinning equipment for production of nanofibres and their alignment (left). SEM image of random and aligned PEA nanofibres (lower panel on the right) produced using this technology. Morphological response of endothelial cells on nanofibres organization (upper panel): left – when adhering on random and right - on algned nanofibres.