Taighde Éireann
Research Ireland

curam Research Ireland Centre for Medical Devices

Technology Flyers

Research Ireland Centre for Medical Devices

Ireland's Medtech sector has become one of the leading clusters for medical device products globally. It is home to over 400 Medtech companies, including 9 of the top 10 medical device companies in the world. Ireland is the second-largest exporter of Medtech products in Europe and supplies medical devices to over 95 countries worldwide.

The stunning success of Ireland in the Medtech sector is due to (a) the active collaboration between companies, funding agencies and academic centres of excellence; (b) the exemplary regulatory support environment that ensures trouble-free clinical translation and commercialisation; and (c) the unmatched clinical research infrastructure that supports clinical trials and patient-focused research.

CÚRAM – Research Ireland Centre for Medical Devices was established by a €49 million investment from Research Ireland and industry. CÚRAM is an intersectoral, multidisciplinary and collaborative effort between academic institutes, non-profit organisations, funding bodies, regulatory experts, commercial entities and clinical experts, covering the full value chain of medical device development, from a tissue culture consumable to an advanced implantable medical device.

CÚRAM drives the translation of research into next-generation medical devices and implants. A collaborative approach combines fundamental and applied science with clinical and industry expertise. This booklet presents a selection of the innovative technologies being developed in the centre.

ENQUIRIES

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Research Ireland Centre for Medical Devices

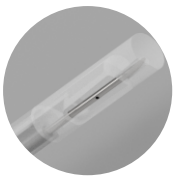
Pillar 1: Soft Tissue Platform Projects

Buccal Film Device for Peptides

A Buccal Film Device to deliver a Glucagon-like Peptide 1 Analogue to treat Type 2 Diabetes Mellitus

Application: Delivery of insulin and other peptides orally, rather than with an injection.

Funded Investigator: David Brayden

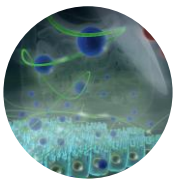


Endopierce

Minimally Invasive Targeting for Therapy in Large Intestine Disease

Application: EndoPierce - therapeutic delivery (tattooing, IBD drugs & cell therapeutics).

Funded Investigator: Eoin O'Cearbhaill

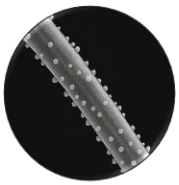


Targeted Drug Delivery for IBD

An Advanced Symptom Relief Hydrogel Platform which Enhances the Mucosal Repair in Ulcerative Colitis

Application: Enhances the mucosal repair in ulcerative colitis.

Funded Investigator: Yury Rochev, Abhay Pandit



Antimicrobial Coatings for Urinary Stents

Piezoelectric Lysozyme Films to Inhibit Biofilm, UTI & Encrustation

Application: Prevent or treat blockage of the urine flow during or after treating kidney stones, tumours or urinary incontinence.

Funded Investigator: Tofail Syed

Research Ireland Centre for Medical Devices

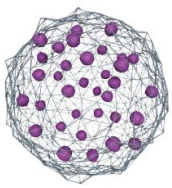
Pillar 1: Soft Tissue Platform Projects

Advanced Tubular Scaffold (PolyTrach)

Development of an Advanced Tubular Scaffold Prototype for Tracheal Regeneration

Application: Personalised stents and tissue-engineered tracheal implants.

Funded Investigator: Sally-Ann Cryan



Hollow Extracellular Matrix Spheres

Hollow Extracellular Matrix, Self-Assembled hollow spheres of uniform Polydispersity index

Application: Biomolecule delivery systems.

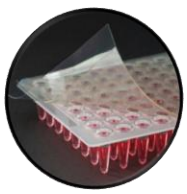
Funded Investigator: Abhay Pandit

Cost-effective Tissue Generation

Platform for the production of numerous tissue types

Application: Tissue Generation including Stem Cell, Tendon Repair, and Peripheral Nerve Repair.

Funded Investigator: Dimitrios Zeugolis



Bio-Inspired Tissue Adhesive Films

Nature-Inspired Films and Polymer Chemistry-based Films

Application: Biodegradable, strong, and wet-adhesive for surgical and wound applications.

Funded Investigator: Andreas Heise

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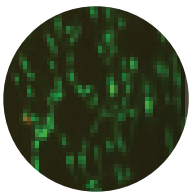
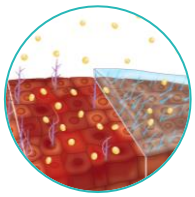
Pillar 1: Soft Tissue Platform Projects



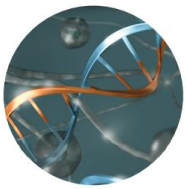
Medical Device Biophysical Functionalisation

Optimal Surface Topography for Cell and Tissue Regeneration
Application: Platform regenerative solution for tendon, nerve, and bone repair.
Funded Investigator: Dimitrios Zeugolis



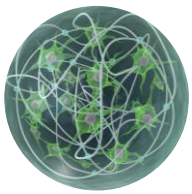
Multifunctional Cross-linked Hyaluronan Particles

Lower Cytotoxicity, and a Higher Payload Capacity Targeted Delivery Platform
Application: Inflammatory bladder, gastrointestinal disorders.
Funded Investigator: Abhay Pandit



RAB18 Gene as a Secretory Regulator in Wound Healing

Revert the Hyper Secretion in Diabetic Wounds to the Normal Scenario and Reduce the Chronic Inflammation
Application: Treatment for chronic diabetic wounds.
Funded Investigator: Abhay Pandit



Shape-controlled Tuneable Microgel Platform

Tool to Dissect the Mechanisms by which Naturally Occurring ECM Manipulation alters Cellular Response Locally
Application: Critical limb ischemia, intervertebral disc disease.
Funded Investigator: Abhay Pandit

Biocoil

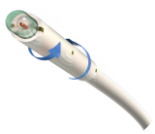
A Medical Device Coating Technology
Application: Silicone coating for GI stents.
Funded Investigator: Eoin O'Cearbhaill

Research Ireland Centre for Medical Devices

Pillar 2: Cardiovascular-Renal-Metabolic Platform Projects

Minimally Invasive Hydrogel for Heart Attack Recovery

An Extracellular Matrix (ECM)–mimicking Hydrogel using Catalyst-free Click Chemistry Covalent Bonding between two Elastin-like Recombinamers (ELRs)
Application: Reduce fibrosis in myocardial infarction.
Funded Investigator: Abhay Pandit



Microwave Ablation for Adrenal Hypertension

Treating Hypertension Using Microwave Thermal Ablation of the Adrenal Gland. A water-cooled device for adrenal tumor treatment
Application: Treating hypertension.
Funded Investigator: Martin O'Halloran

Continuous BP Monitoring Implantable Sensor

Accurate and Continuous Blood Pressure Monitoring. Implanted Sensor and Wearable Device Enable Accurate and Continuous Wireless BP Monitoring
Application: Interventions in hypertension and cardiovascular conditions.
Funded Investigator: William Wijns

hUC-MSC Therapy for Diabetic Wounds

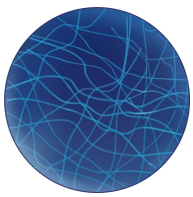
Umbilical cord-derived MSCs grown on a Decellularized Scaffold under Macromolecular Crowding as a Novel Therapy for Treatment of Wounds
Application: Diabetic foot ulcer and cell therapy.
Funded Investigator: Timothy O'Brien

Research Ireland Centre for Medical Devices

Pillar 2: Cardiovascular-Renal-Metabolic Platform Projects

Tracking Ketones to Improve Obesity Treatment

Non-Invasive, Predictive & Personalised Monitoring
Application: Ketone monitoring device.
Funded Investigator: Francis Finucane



Cardiac Patch for Myocardial Infarction

Injectable Extracellular Matrix based Cardiac Patch for Myocardial Infarction
Application: Protect and deliver a variety of cell types.
Funded Investigator: Abhay Pandit

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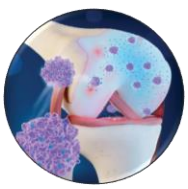
Pillar 3: Neural and Musculoskeletal Platform Projects

Convection Enhanced Drug Delivery System

Medical Device Capable of Drug Delivery within the Brain for the Controlled Treatment of Glioblastoma Multiforme (GBM)
Application: Controlled treatment of GBM.
Funded Investigator: Adrienne Gorman

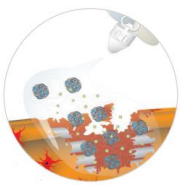
Phononic Microlenses for Focused Neuromodulation

High Spatial Resolution Targeting of Discrete Brain Regions
Application: Deep brain stimulation, Essential tremor, Epilepsy and Chronic pain.
Funded Investigator: Manus Biggs



Intra-Articular Nanoparticle Therapy for Knee Osteoarthritis

Injectable, Anti-Inflammatory, and Sustained Release
Application: Intra-articular delivery to arthritic knee joints, to provide localized drug release and pain relief.
Funded Investigator: David Brayden



An Injectable Microgel Vehicle to Repair the Annulus Fibrosus of the Intervertebral Disc

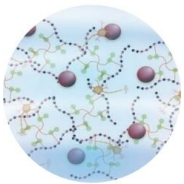
Therapeutic Intervention for Degeneration
Application: Intervertebral Disc Repair.
Funded Investigator: Abhay Pandit

Research Ireland Centre for Medical Devices

Pillar 3: Neural and Musculoskeletal Platform Projects

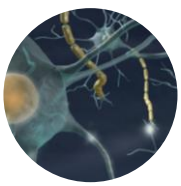
An Injectable Hydrogel for Spinal Cord Repair

Biomaterial-based Therapy for Spinal Sord Injury
Application: Therapy for spinal cord injury.
Funded Investigator: Abhay Pandit



Injectable Biomaterial Hydrogel

Injectable Biomaterial Hydrogel Technology Enhances the Survival and Functionality of Transplanted Stem Cells
Application: Parkinson's disease.
Funded Investigator: Abhay Pandit, Eilís Dowd



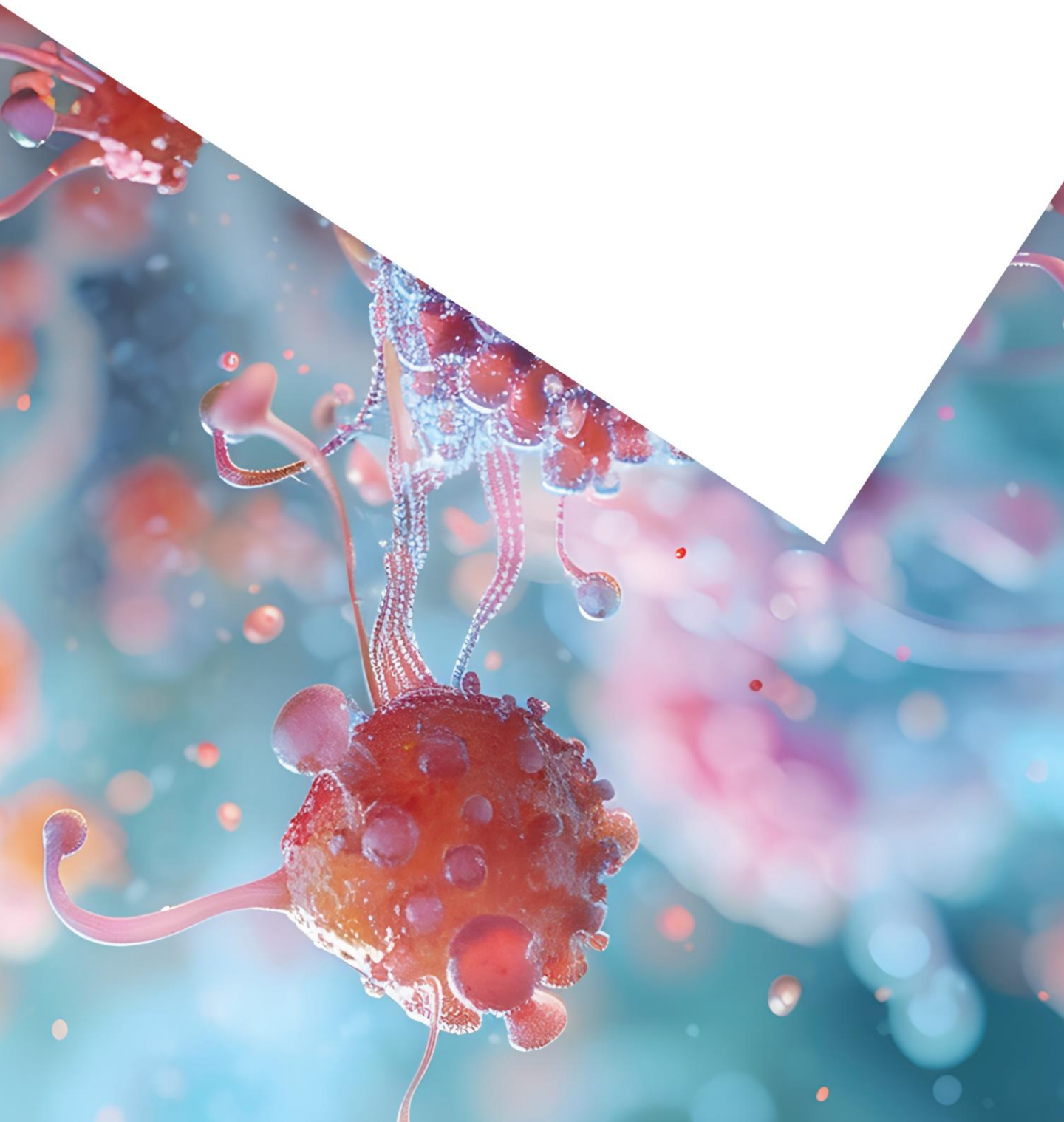
Electrically Active Drug Eluting Coatings

Improve the Biocompatibility and Charge Transfer Capacity of Implantable Electrodes, while also Facilitating Drug Delivery to Reduce Inflammation
Application: Treatment of neurological diseases and injuries.
Funded Investigator: Manus Biggs

Pillar 1

Soft Tissue

Platform Projects



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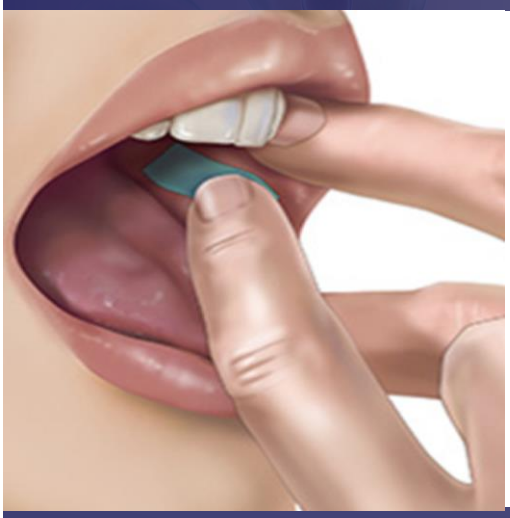
Buccal Film Device for Peptides

Next-Gen Buccal Film for GLP-1 Peptide Analogue Treatment for Type 2 Diabetes and Obesity

Needle-Free Peptide Delivery. High patient Acceptability. Enhanced Bioavailability

- No needles – better patient compliance
- No food interactions – unlike oral tablets
- Avoids liver first-pass – unlike oral tablets
- Scalable manufacturing: solvent-cast bilayer films
- Compatible with GLP-1, insulin, and other peptides
- Strong market case with health economics support



TRL 3 – Prototype Optimised

✓ Bilayer film with GLP-1 RA and bile salt enhancer
✓ Validated *ex vivo* bioassay(porcine buccal)
✓ Invention disclosure pending
✓ Sublingual route also shows greater absorption potential
✓ EU funding leveraged (BUCCAL-PEP)

Next Step: Partner for formulation scale-up & preclinical testing

LEAD INVESTIGATOR
David Brayden

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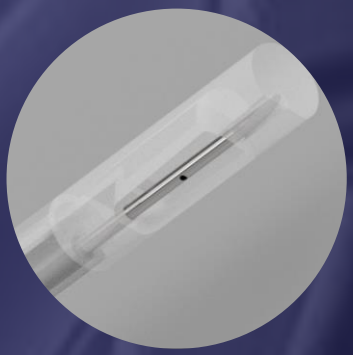
EndoPierce

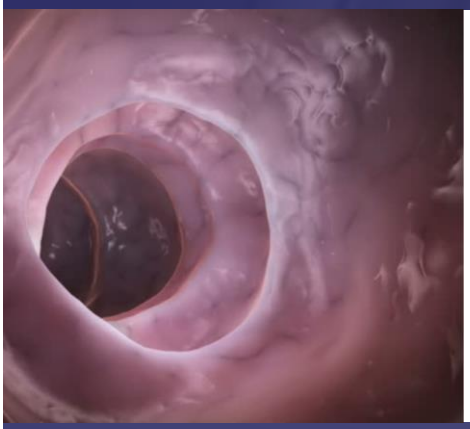
The Endoscopic Submucosal Injection Device

EndoPierce enables reliable and safe delivery of therapeutics and advanced diagnostic markers to the wall of the GI tract.



- Single handed operation
- Controlled delivery of material
- No leakage or perforation

Application areas are extensive and target precise local and regional delivery of diagnostic aids and therapeutics to the submucosal layer of the colon. For example, saline and dye injections, peritumoural tattooing, lymph node mapping or delivery of radioisotopes.



TRL 3-4

✓ Patent WO 2020/212624 A1
✓ Prototype developed
✓ The next steps include *in vivo* testing
✓ Next steps: Co-development with industry partner

LEAD INVESTIGATOR
Eoin O'Cearbhaill

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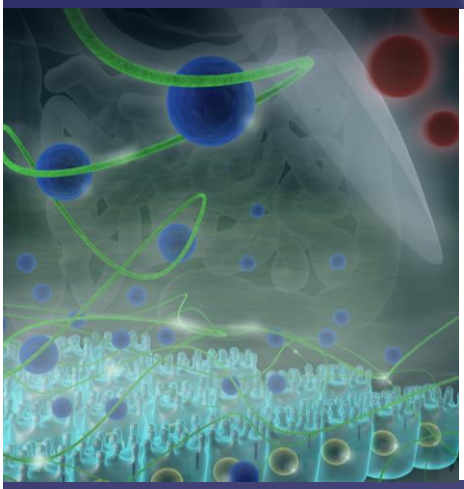
Targeted Drug Delivery for IBD

Hyaluronan Rectal Gel Enema to Treat Colitis and Strengthen Gut Barrier

- Drug-free nanoparticle system prolongs gut retention
- Strengthens epithelial tight junctions
- Demonstrated anti-inflammatory effects in colitis models
- Organoid model replaces animal testing
- Compatible with scale-up and regulatory translation
- Industrial formulation optimisation underway with Takeda Pharmaceuticals



TRL 3-4

✓ Optimised NP-HA gel formulation
✓ Efficacy in DSS-induced colitis model
✓ Human biopsy-derived organoids developed
✓ EU MDR/FDA regulatory pathway in planning
✓ 2 IDFs filed at University of Galway
✓ €800K industry investment (Takeda)

LEAD INVESTIGATOR
Yury Rochev

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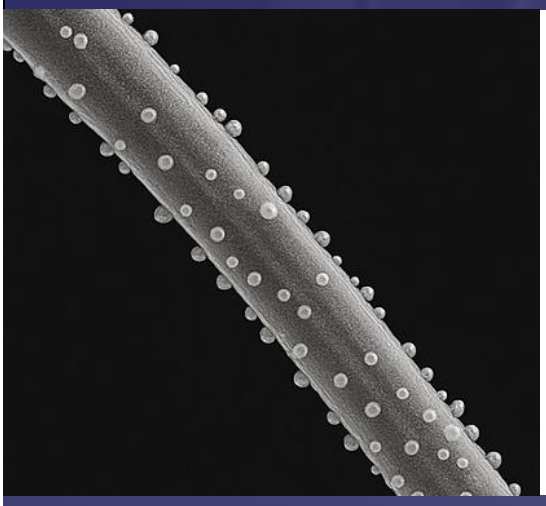
Antimicrobial Coatings for Urinary Stents

Piezoelectric Lysozyme Films to Inhibit Biofilm, UTI & Encrustation

- Immobilised tetragonal lysozyme retains antimicrobial activity
- Prevents *E. coli* biofilms in artificial urine conditions (24h, 37°C)
- Piezo- and pyro-electric properties validated (d33 ~3 pC/N)
- Coating attracts and lyses bacteria through electrostatic interaction
- Biodegradable and responsive to urinary tract conditions
- Potential to extend stent indwelling time & reduce infection
- Patent landscape shows clear space for biodegradable coatings
- This tech targets a $564M stent market and $2.5B UTI burden



TRL 3

✓ Proof-of-concept achieved for biofilm prevention
✓ Lysozyme coating on stents validated
✓ Scalable biofilm-resistant coating in progress
✓ Patent (IDF) filed: Polar lysozyme antimicrobial coating

Next Step: Scale-up, GMP testing & pre-clinical validation with partners

LEAD INVESTIGATOR
Tofail Syed

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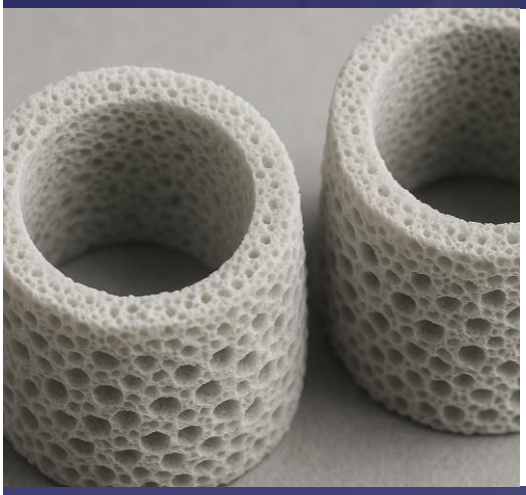
Advanced Tubular Scaffold (PolyTrach)

Tissue-Compatible, Clinically Tested, and Scalable

Why PolyTrach Stands Out

- Designed to reduce infection, dislodgement, and inflammation
- Tailored to patient-specific anatomy via 3D printing
- Combines synthetic strength with natural tissue compatibility
- Successfully scaled to porcine-sized scaffolds
- Pilot testing underway in porcine *ex vivo* lung perfusion model



TRL 3

✓ Targeted seeding strategy published
✓ Scaffolds scaled and manufactured
✓ Collagen-coated prototypes tested in porcine model
✓ Strong early results on airway patency maintenance
✓ Surgeon and KOL input integrated into design

LEAD INVESTIGATOR
Sally-Ann Cryan

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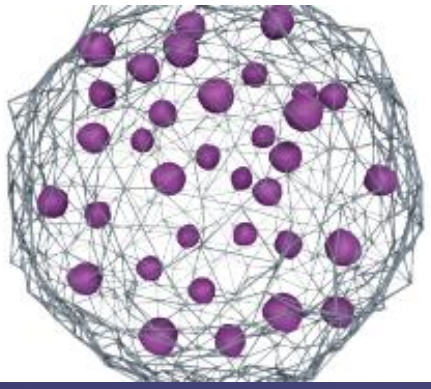
Hollow Extracellular Matrix Spheres

Overcoming the Limitations of Existing Drug Delivery Systems

Hollow extracellular matrix self-assembled hollow spheres of uniform polydispersity index.

- Cross-linked outer membrane and a hollow core facilitate significantly higher payload capacity than current biomolecule delivery systems
- Programmable degradation profiles which provide localised sustained delivery of biomolecules at the target site
- Reduced adverse side-effect profiles, drug degradation and loss and increased bioavailability at the site of interest
- Facilitates optimum efficacy and safety and simplifies dosing regimens, reduces side-effects and enhances patient compliance



TRL 4

✓ Patent US 2011/0123456A1
✓ Preclinical studies completed
✓ This technology is ready for licensing

LEAD INVESTIGATOR
Abhay Pandit

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Cost-effective Tissue Generation

120-Fold Increase in Matrix Deposition within 48 hours

- Current solutions in the surgical repair of tissues such as tendon, cornea, skin, peripheral nerve, cartilage and bone are limited
- Cell-based therapies have the potential to produce tissues in vitro, with a precision and stoichiometric efficiency still unmatched by man-made devices
- The current requirement for prolonged culture times (e.g. 84 days for corneal cell-sheet; 196 days for blood vessel) severely restricts cost-effectiveness
- This new technology enables a cost-effective, over 20-fold increase in extracellular matrix deposition within 48 hours of culture. This technology provides a platform for the production of numerous tissue types

TRL 4

✓ Patent EP 2532736 A1
✓ Preclinical trials completed
✓ This technology is ready for licensing

LEAD INVESTIGATOR
Dimitrios Zeugolis

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Bio-Inspired Tissue Adhesive Films

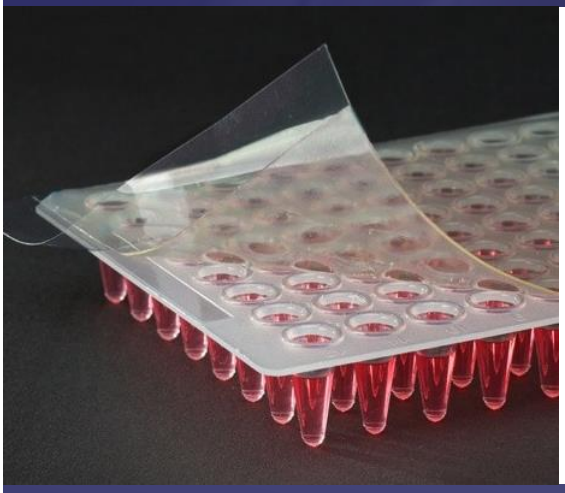
Biodegradable, Strong, and Wet-Adhesive for Surgical and Wound Applications

Nature-Inspired Films:

- Engineered for strong adhesion on wet tissue surfaces
- Inspired by barnacle cement protein (cp19k) for robust biological bonding

Polymer Chemistry-based Films:

- Features biodegradable, elastic polymer films with high stretch and strength
- Includes glycan-tuned surfaces to reduce immune response at implant sites
- Combines natural protein adhesion with synthetic polymer control



TRL 3

✓ Elastic films: 13 MPa, 220% stretch
✓ PEG/DOPA grafting enables wet adhesion
✓ cp19k-His shows Cell-Tak-like adhesion
✓ RNA-seq maps immune glycan response
✓ IDF filed for wet adhesive PCL polymer

LEAD INVESTIGATOR
Andreas Heise, Gerard Wall

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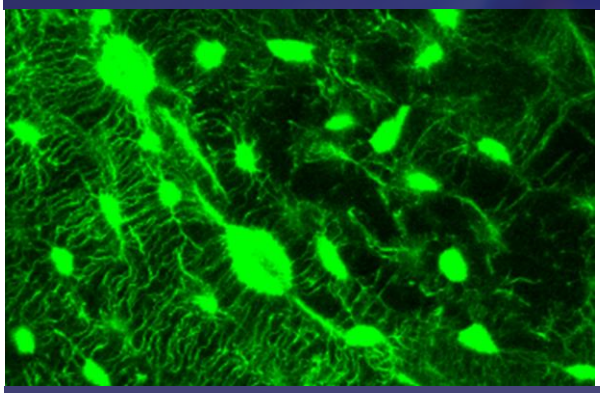
Medical Device Biophysical Functionalisation

Optimal Surface Topography for Cell and Tissue Regeneration

The application of biomaterials in regenerative medicine has for some time been restricted by the fact that cells do not grow or behave in the same fashion on the material as they do in the body.

- Identified and validated optimal surface topography for musculoskeletal-derived cell growth and function
- Cell morphology and performance closer to that of native tissue than what is typically seen growing on smooth or sub-optimal biomaterial surfaces
- Surface optimised for the physiological 'guidance' and signalling of cells
- This technology provides a platform regenerative solution for tendon, nerve, and bone repair



TRL 4

✓ Patent EP 2532735 A1
✓ Preclinical studies completed
✓ This technology is ready for licensing

LEAD INVESTIGATOR
Dimitrios Zeugolis

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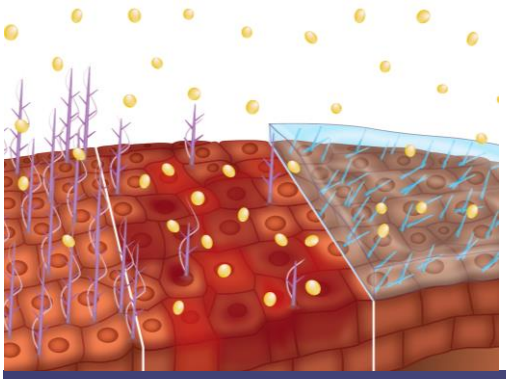
Multifunctional Cross-linked Hyaluronan Particles

Drug Delivery Platform

- The HA particles exhibit a lower cytotoxicity, and a higher payload capacity while surface functionalised cell-targeted moieties facilitate targeted deliver to the site of interest
- The hyaluronan exhibits an enhanced clinical efficacy profile relative to existing therapeutic interventions for interstitial cystitis (a bladder disorder condition)
- The hyaluronan nanoparticles combine low immunogenicity and high loading capacity while the hyaluronan particles tailored degradation profile increases bio-availability, barrier function and residence time to promote restoration/regeneration of the luminal lining for the treatment of inflammatory gastrointestinal and bladder disorders



TRL 4

✓ Preclinical studies completed
✓ This technology is available for further development in collaboration with industry partners

LEAD INVESTIGATOR
Abhay Pandit

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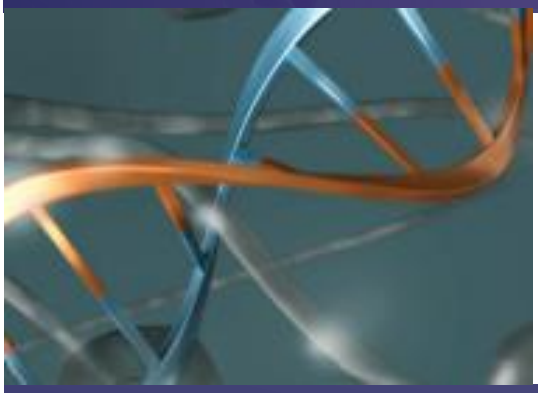
RAB18 Gene as a Secretory Regulator in Wound Healing

Drug Delivery Platform

Re-epithelialization which involves proliferation and migration of keratinocytes is a very complex yet crucial phase of wound healing.

- Microarray data analysis has identified Rab18, a secretory control molecule, which was found to be significantly downregulated in keratinocytes under hyperglycaemic conditions
- Rab18 has been shown to be associated with secretory granules which inhibit keratinocyte mobilization and thus reduce the secretory capacity of neuroendocrine cells

The potential of Rab18 to revert the hyper secretion in diabetic wounds to the normal scenario and reduce the chronic inflammation thus normalizing diabetic wounds has been validated.



TRL 4

✓ Preclinical studies completed
✓ This technology is available for co-development with industry partners or to be licensed

LEAD INVESTIGATOR
Abhay Pandit

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Shape-controlled Tuneable Microgel Platform

To Modulate Stem Cells Paracrine Responses

The technology, in contrast to artificial matrices, enables natural cellular responses that are unique to the 'fingerprint' tissue microenvironment, which controls specific cell functions, such as the angiocrine effects.

- The platform technology provides a tool to dissect the mechanisms by which naturally occurring ECM manipulation alters cellular response locally on a spatially defined 3D platform
- The technology does not require genetic manipulation of cells or the recreation of the natural repository of the cells in the body
- The spherical microgel offers high surface to volume ratio which allows for interaction and integration of the microenvironment into the local tissue mass transport, offering lower bulk resistance and higher stability

TRL 4

✓ Preclinical studies completed
✓ This technology is available for co-development with industry partners or to be licensed

LEAD INVESTIGATOR
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Biocoil

A Medical Device Coating Technology

Biocoil enables a silicone coating for GI stents that, through the ingrowth of surrounding tissue, will significantly reduce stent migration and tissue damage.

- Allows for controlled tissue ingrowth
- Can be used with off-the-shelf stents and their traditional delivery system without modification

TRL 3

Next steps: Co-development with industry partner

LEAD INVESTIGATOR
Eoin O'Cearbhaill

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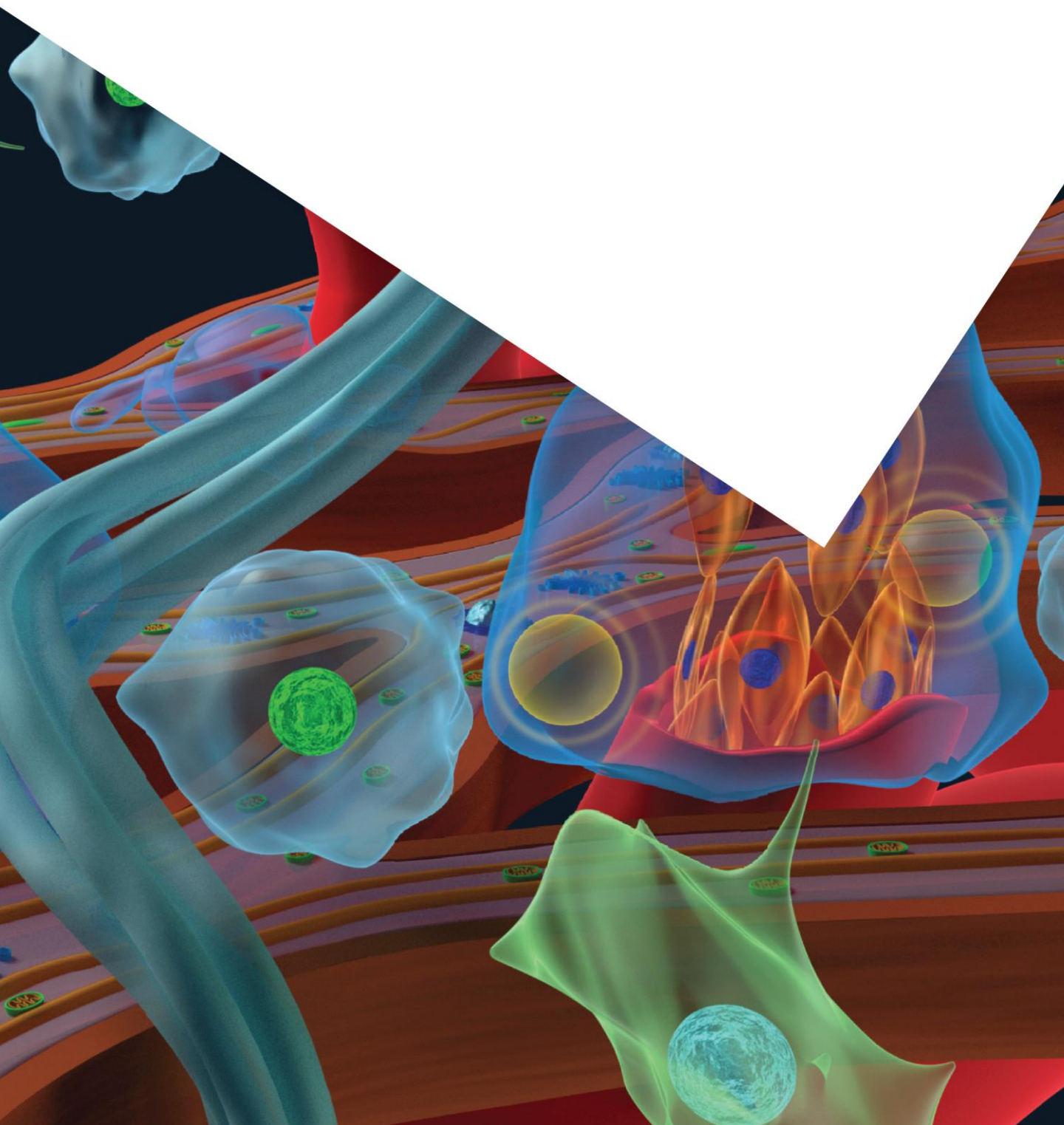
Pillar 2

Cardiovascular-Renal-Metabolic

Platform Projects



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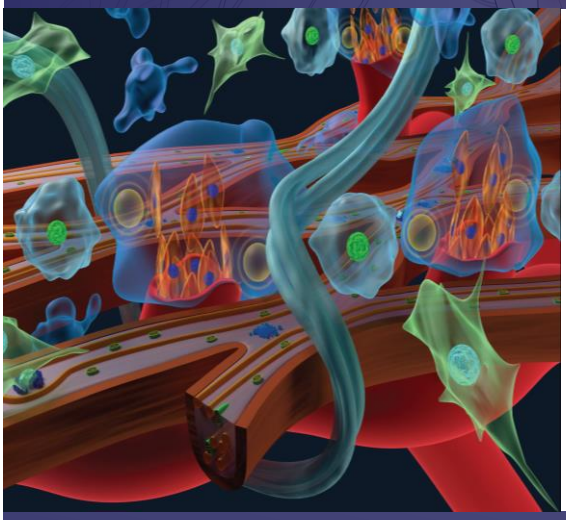
Minimally Invasive Hydrogel for Heart Attack Recovery (ELR gel)

Catheter-Delivered, Preclinically Validated, and Patented

- Minimally invasive catheter-based hydrogel delivery
- Targets fibrotic scar formation post-MI
- Boosts cardiac repair and improves heart function
- Validated in a large-animal STEMI mode
- EU patent granted; regulatory progress toward CE mark



TRL 4

✓ ELR hydrogel preclinically validated in ovine MI model
✓ Improvements in ejection fraction and wall thickness
✓ Novel catheter designed for steerability & cooling
✓ Early HTA shows cost-effectiveness potential
✓ EU patent granted: EP18196891.8

LEAD INVESTIGATOR
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Microwave Ablation for Adrenal Hypertension

Minimally Invasive, Targeted, and Preclinically Validated

- Water-cooled microwave ablation probe for adrenal tumor targeting
- Enables percutaneous access by interventional radiologists
- A small ablation zone (1cm^3) preserves healthy adrenal tissue
- Fast and focused heat delivery with minimal surrounding damage
- Minimally invasive alternative to adrenalectomy and lifelong meds

TRL 3

- ✓ Dielectric properties of adrenal tissue mapped in human and ovine tissues
- ✓ Ablation zones optimised via simulations
- ✓ 3D tumor models developed for hormone testing
- ✓ Mouse model of aldosteronism established
- ✓ EU patent granted: EP4223245A1 – Microwave ablation probe
- ✓ Theranostic iron oxide nanoparticles under study

LEAD INVESTIGATOR

Martin O'Halloran

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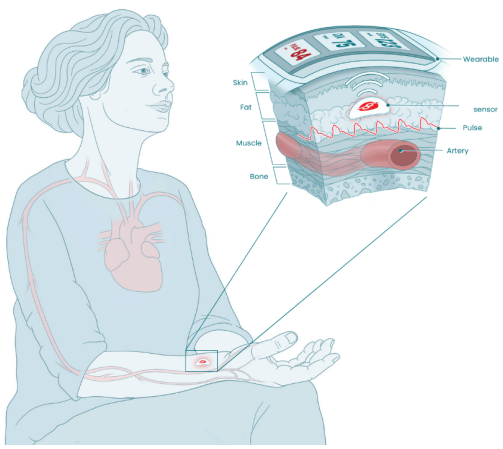
Continuous BP Monitoring Implantable Sensor

Real-Time, Wireless, and Clinically Relevant

- Sensor captures continuous, beat-to-beat blood pressure
- Wireless, implantable, and wearable integration
- Transmits real-time data to IOT devices for remote monitoring
- Enables personalised, proactive hypertension management
- Validated in 28-day large-animal study



TRL 4

✓ Sensor designed for higher sensitivity
✓ Reader system with signal conditioning
✓ Signal acquisition calibrated with Millar catheter
✓ Sensor tested *ex vivo* & *in vivo*
✓ No infection post-implantation
✓ 3 IDFs filed; 5 European partners
✓ Additional funding secured for further development

LEAD INVESTIGATOR
William Wijns

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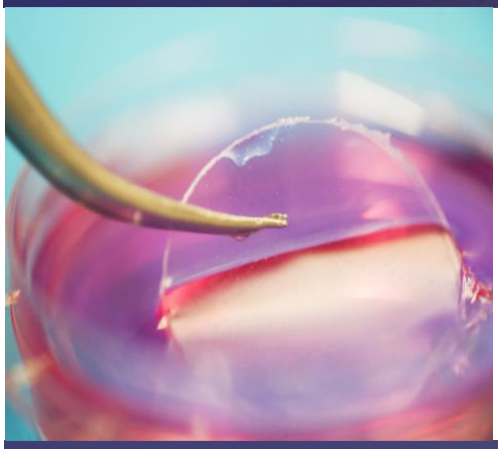
hUC-MSC Therapy for Diabetic Wounds

Enhanced Healing with Macromolecular Crowding & Collagen Scaffolds

- Uses umbilical cord MSCs grown under MMC for potent wound repair
- Scaffold-free & scaffold-based constructs tested for application
- Aims to treat diabetic foot ulcers & other lower limb wounds
- MMC enhances ECM deposition and growth factor retention
- Collagen sponge enables uniform cell distribution and integration



TRL 3

✓ MMC optimised for high ECM output using λ-carrageenan
✓ Scaffold-free construct improved granulation tissue *in vivo*
✓ Collagen sponge selected for construct development
✓ Preclinical efficacy model in diabetic mice established
✓ 8 IDFs submitted; 2 patents granted
✓ Industry engagement ongoing with Orbsen Therapeutics

LEAD INVESTIGATOR
Timothy O'Brien

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Tracking Ketones to Improve Obesity Treatment

Non-Invasive, Predictive & Personalised Monitoring

- Uses ketones as biomarkers to track treatment response
- Works across existing blood & breath ketone devices
- Enables early identification of non-responders to obesity therapy
- Avoids unnecessary exposure to ineffective treatments
- Supports clinical decision-making & resource allocation

TRL 3

✓ Ketone changes detected in fasting/exercise
✓ Pilot data links ketones to weight loss
✓ EMPOWER cohort launched for long-term tracking
✓ Hardware-agnostic software in development
✓ Early health economics shows strong value
✓ IDF submitted; validation ongoing

LEAD INVESTIGATOR
Francis Finucane

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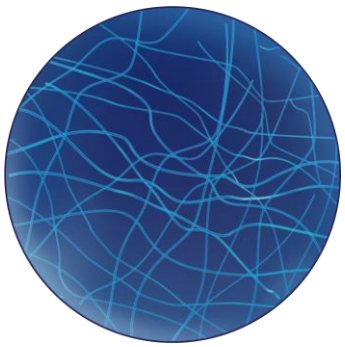
Injectable Extracellular matrix-based Cardiac Patch for Myocardial Infarction

Cardiac Patch incorporates an anti-inflammatory and stem cells in a extracellular matrix based biomaterial carrier.

Cardiac Patch represents an important innovation in stem cell therapy to protect and deliver a variety of cell types. It has a distinct advantage in minimising the limitation of low stem cell survival after implantation.

Cardiac Patch improves stem cell retention, cardiac functions, modulates the remodelling response, decreases apoptosis and alters the ratio of collagen type III/I in the myocardium following injury.



TRL 4

✓ Industry partners wanted to collaborate on applications to develop or license the technology.
✓ Preclinical studies completed

LEAD INVESTIGATOR
Abhay Pandit

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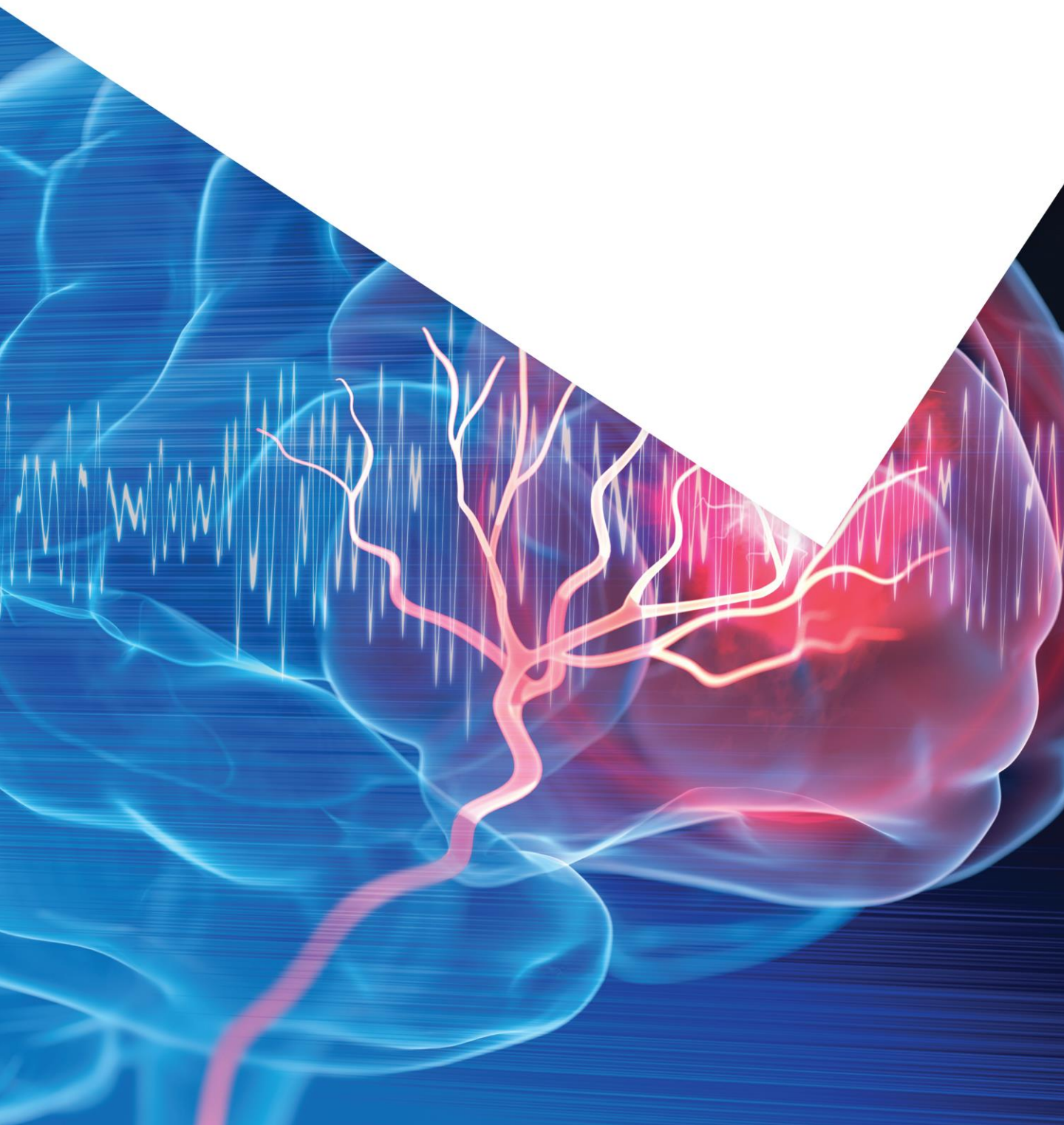
Pillar 3

Neural and Musculoskeletal

Platform Projects



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Phononic Lens Device for Targeted Neuromodulation

High Spatial Resolution Targeting of Discrete Brain Regions

- Uses focused ultrasound for brain stimulation — no surgery needed
- Custom microlens improve spatial resolution and accuracy
- Designed for early-stage neurological disorders (*e.g.* Parkinson's, epilepsy)
- Biodegradable materials + low-cost manufacturing for scalability
- Broad applications from neuromodulation to lymph node mapping

TRL 2

- ✓ Biodegradable PLLA piezo-material developed for energy harvesting
- ✓ Micro-lens prototyped using 2-photon lithography
- ✓ Acoustic lens design validated via COMSOL simulations
- ✓ Focused ultrasound targeting tested on brain models
- ✓ Next: *In vitro* efficacy, followed by *in vivo* testing
- ✓ IDF and IP strategy in progress with TTO

LEAD INVESTIGATOR

Manus Biggs

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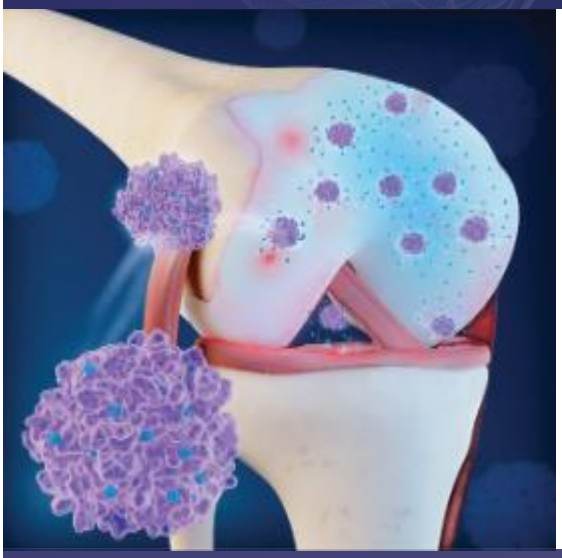
Intra-Articular Nanoparticle Therapy for Knee Osteoarthritis

Injectable, Anti-Inflammatory, and Sustained Release

- Targets inflammation and pain in osteoarthritic knees
- Combines HA coating with dexamethasone prodrug or celecoxib in nanoparticles
- Designed for 3-month sustained release
- Avoids systemic side effects of oral NSAIDs/steroids
- Builds on FDA-cleared injectable OA therapies



TRL 3

✓ Celecoxib albumin NPs reduce PGE_2 in OA cells
✓ Dexamethasone prodrug solid lipid NPs validated
✓ Licences approved for testing in *in vivo* rodent models
✓ IP patent application (UK2401848.3)
✓ Scalable production via microfluidics
✓ Hydrogel co-formulation funded (MedDevDoc 2025)

LEAD INVESTIGATOR
David Brayden

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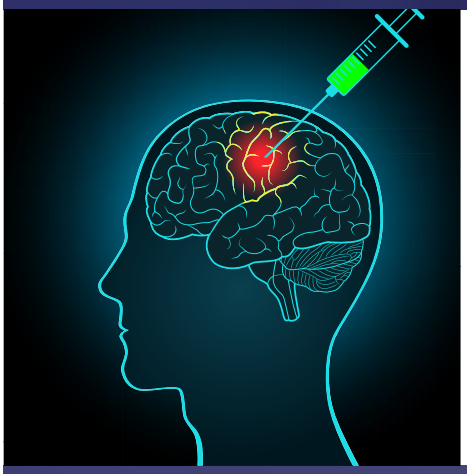
Convection Enhanced Drug Delivery System

Effective Treatment for Glioblastoma Multiforme

- This technology is a medical device capable of drug delivery within the brain for the controlled treatment of glioblastoma multiforme (GBM)
- There is no curative therapy for GBM, and surgical resection as a treatment option is not always feasible
- An effective way to deliver a therapeutic agent to the tumor and infiltrate cells that are not located in the tumor bed



TRL 3

✓ This technology is available for further development in collaboration with industry partners

LEAD INVESTIGATOR

Adrienne Gorman, Garry Duffy

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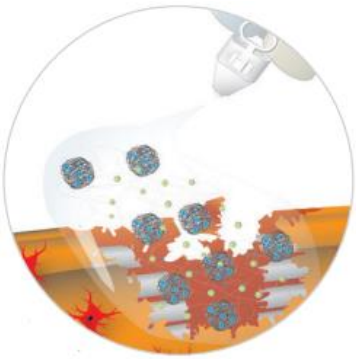
An Injectable Microgel Vehicle to Repair the Annulus Fibrosus of the Intervertebral Disc

Therapeutic Intervention for Degeneration

Early-stage therapeutic intervention of degeneration which avoids the need for highly invasive procedures. It exploits our knowledge of the signalling pathways cascades implicated in disc degeneration.

- An anti-inflammatory injectable bioactive molecule that attenuates the effect of induced signalling pathways by down-regulating the receptors significantly activated in the pathway implicated in the degenerative human annulus fibrosus
- Cells encapsulated in the microgel mimic the native morphology of annulus fibrosus cells in the disc
- Ideal carrier system for AF cell delivery to repair the intervertebral disc



TRL 4

✓ Preclinical studies completed
✓ This technology is available for co-development with industry partners or to be licensed

LEAD INVESTIGATOR
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An Injectable Hydrogel for Spinal Cord Repair

Biomaterial-Based Therapy for Spinal Cord Injury

The injectable hydrogel facilitates neuro-regeneration following spinal cord injury through inhibition of the innate inflammatory response.

- The hydrogel provides physical, chemotropic, and neuroprotective cues which mimic the natural 3D cellular and molecular regenerative environment of the neural space
- The injectable hydrogel therapy serves to bridge the lesion site and provide contact-mediated support to the injured spinal cord.
- The technology increases functional recovery and reduces inflammation at the injury site
- Direct injection into the injury site reduces glial scarring and collagen deposition resulting in increased neuronal survival across the lesion site

TRL 4

✓ Preclinical studies completed

✓ This technology is available for co-development with industry partners or for licensing

LEAD INVESTIGATOR

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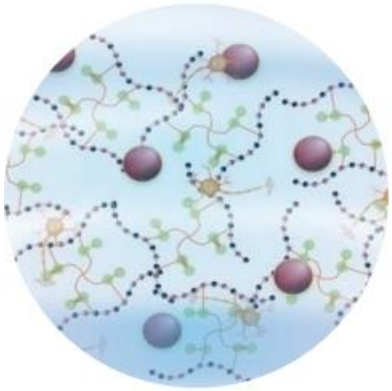
Injectable Biomaterial Hydrogel

Parkinson's Disease Treatment

Poor cell survival post transplantation represents a major problem for *ex vivo* gene therapies in the treatment of Parkinson's disease.

- The injectable biomaterial hydrogel technology enhances the survival and functionality of transplanted stem cells
- It attenuates the microglial response to the graft by addressing the multitude of factors that contribute to poor cell survival following transplantation
- Specific funcionalisation of the hydrogel facilities the release of biological cues, glial scar modulating enzymes, and pro-survival factors to enhance the therapeutic response of ex vivo gene therapy approaches.
- The hydrogel reduces the microglial and astroglial response of the host to the grafted cells post-transplant



TRL 4

✓ Preclinical studies completed

✓ This technology is available for co-development with industry partners or to be licensed

LEAD INVESTIGATOR

Abhay Pandit, Eilís Dowd

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Electrically Active Drug Eluting Coatings

To Improve Conductivity of Implantable Electrodes and Facilitate Drug Delivery

Electrically active drug eluting coatings can be used to improve the biocompatibility and charge transfer capacity of implantable electrodes, while also facilitating drug delivery to reduce inflammation.

- The technology aims to enhance the integration at neuronal electrodes by modifying the surface topography electrical activity and drug delivery capacity of neuro-electrodes
- The technology aims to improve on currently used implantable electrodes by coating the electrode surface with biomaterial-encapsulated drugs
- Surface topography and mechanical characteristics play an important role in how tissue responds to medical device implantation. Using this technology, it will be possible to improve the biomimetic characteristics of electrodes and therefore reduce the foreign body response after implantation

TRL 1

✓ Early simulation and ex-vivo tissue studies completed

✓ This technology is available for co-development with industry partners

LEAD INVESTIGATOR

Manus Biggs

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