IHI Call Days | Call 9

Motion Analysis, Multi-Omics, Novel Biosensors for Osteoarthritis Diagnosis and New Therapeutics: Manit**OA**ba

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Link to the:

- https://ihicalldays2024.converve.io/index.html?page=cat_tech2
- https://ihicalldays2024.converve.io/index.php?page=profiles&action=show&params%5Bid%5D=272&params%5Bshow%5D=pers&params%5Bpers_id%5D=286

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Challenges and objectives

- Osteoarthritis (**OA**) is a non-communicable disease defined with morbidity and mortality.
- Diagnosing **OA** early and accurately, along with preventing it and providing suitable treatment, poses significant challenges.
- There is a need to quantify functional loss and metabolic changes in serum and synovial joint fluid (SJF) using advanced technologies such as **motion analysis** + **multi-omics** > **biosensors** and generating > **new therapeutics**.

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WHO Osteoarthritis Fact

- In 2019, about 528 million people worldwide were living with osteoarthritis, an increase of 113% since 1990.
- About 73% of people living with osteoarthritis are older than 55 years, and 60% are female.
- With a prevalence of 365 million, the knee is the most frequently affected joint, followed by the hip and the hand.
- 344 million people living with osteoarthritis experience severity levels (moderate or severe) that could benefit from rehabilitation.
- With aging populations and increasing rates of obesity and injury, the prevalence of osteoarthritis is expected to continue to increase globally.
- Osteoarthritis is an inevitable consequence of aging.

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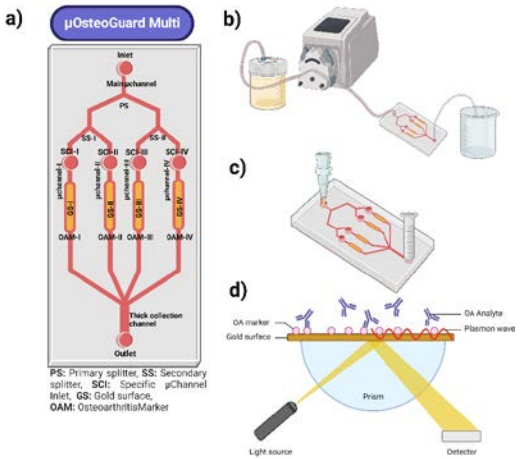
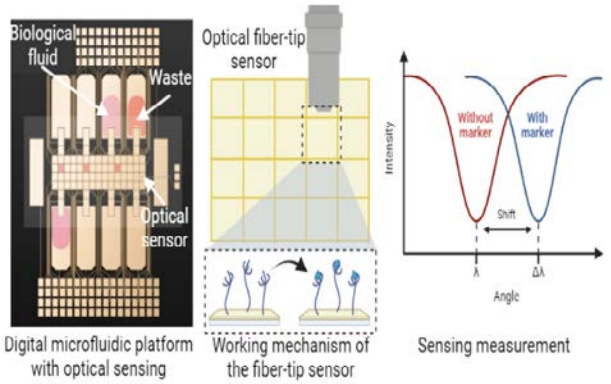
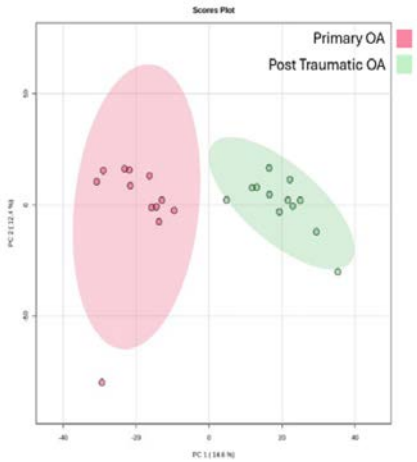
Your approach to solve the problem

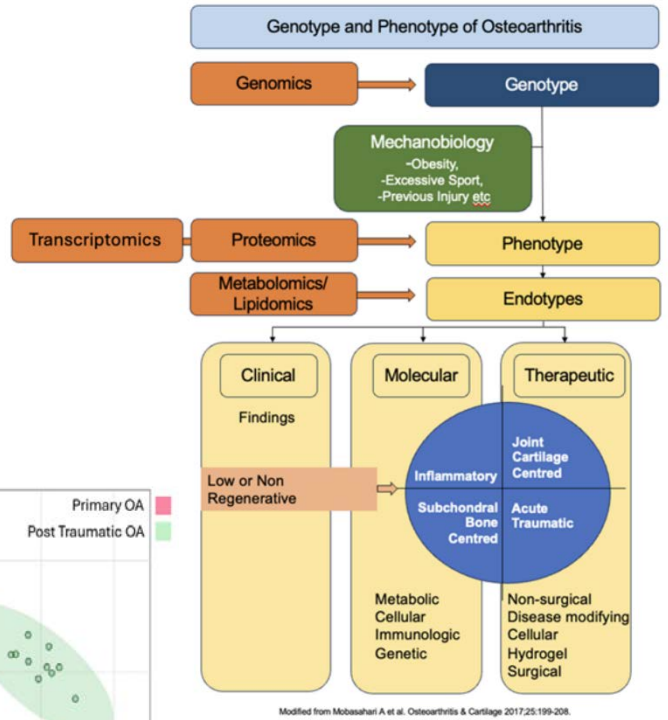
- Motion Analysis (**MAI**) Technology (https://maimotion.com/)
- **Multi-Omics** (https://chondromics.org/)
- **Biosensors**





Digital Microfluidics (Inflamation)
Surface Plasma Resonance (Anabolism)





- **New Therapeutics**

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Is your project suitable for IHI?

- **Multi-layered, Multi-centered** and **Multi-disciplinary** research.
- Where do you see the contribution of industry in your proposal?
  - **Biotechnology industry** or **SME**
    - Upscale our biosensor technology from TRL 4-6 to the market.
  - **Patient societies**
    - Patient-centred and personalized medicinal approach.
  - **Regulatory bodies**

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Outcomes

- **Marker-less motion analysis** can be used as a new paradigm for the early and accurate diagnosis of OA. This can be used to longitudinal evaluation of the natural course and response to treatment by regulatory bodies.

- **Multi-omics** outcomes can lead to the better development of **biosensors** for inflammation and anabolism (from the bench to the bedside)

- **New therapeutics** such as nucleic acid delivery already proven for bone regeneration can be transferred to joint repair.

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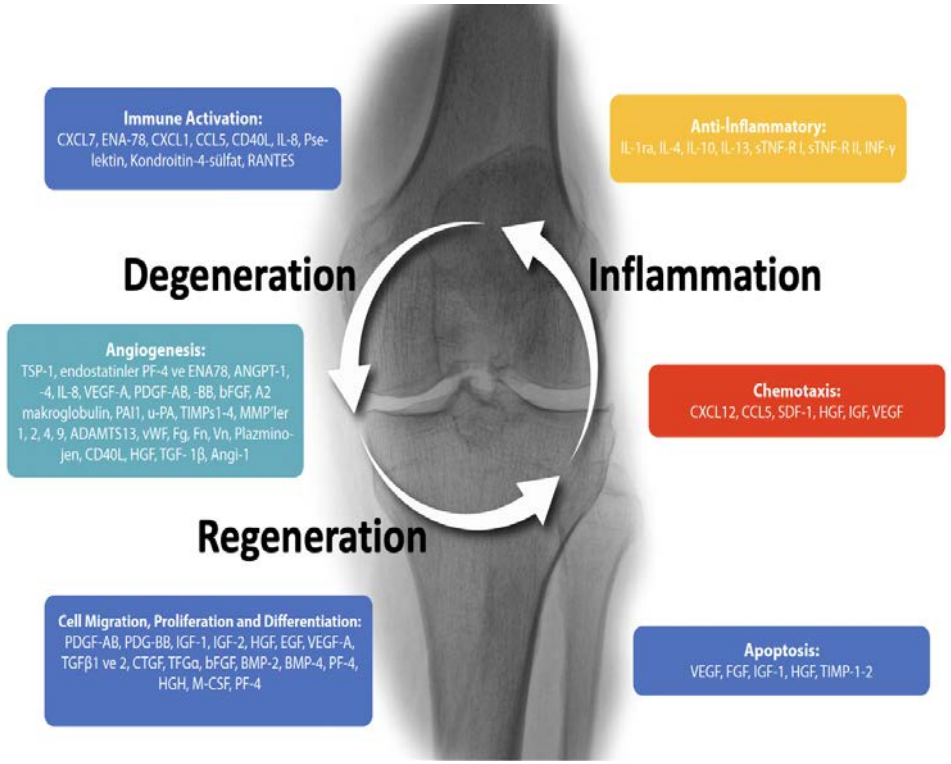
Impact

- Academic:
  - Article publication in the open research Europe platform.
  - Educating young researchers.
  - New research projects.
- Economic:
  - Patent applications.
- Societal:
  - Web page and social media platforms.
  - Electronic bulletins, newsletters, brochures and handouts.
  - Webinars and seminars.
  - Workshops and surveys.



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Knee Joint Articular Cartilage Treatment Algorithm*

1. Non-Surgical
   - Exercise
   - Weight management
   - NSAIDs
   - Unloading braces

2. Disease Modifying
   - Oral GAG & CS
   - IA Hyaluronan
   - IA Corticosteroid
   - IA Peptide

3. Hydrogel
   - Non-degradable polymeric hydrogels

4. Cellular
   - PRPs
   - Activated PRPs
   - Stromal Vascular Fraction
   - Mesenchymal Stem Cells
   - Extracellular Vesicles

5. Surgical
   - Micro- or Nano-Fx.
   - Mosaicplasty
   - Allografts
   - MACI
   - High tibial osteotomy
   - Subchondral bioplasty
   - Partial or total joint replacement surgery

*Modified from the OARSI Guidelines.

Expertise and resources

- We have:

- We are looking for:
  - Industrial partners
  - SMEs
  - Patient Societies
  - Regulatory Bodies

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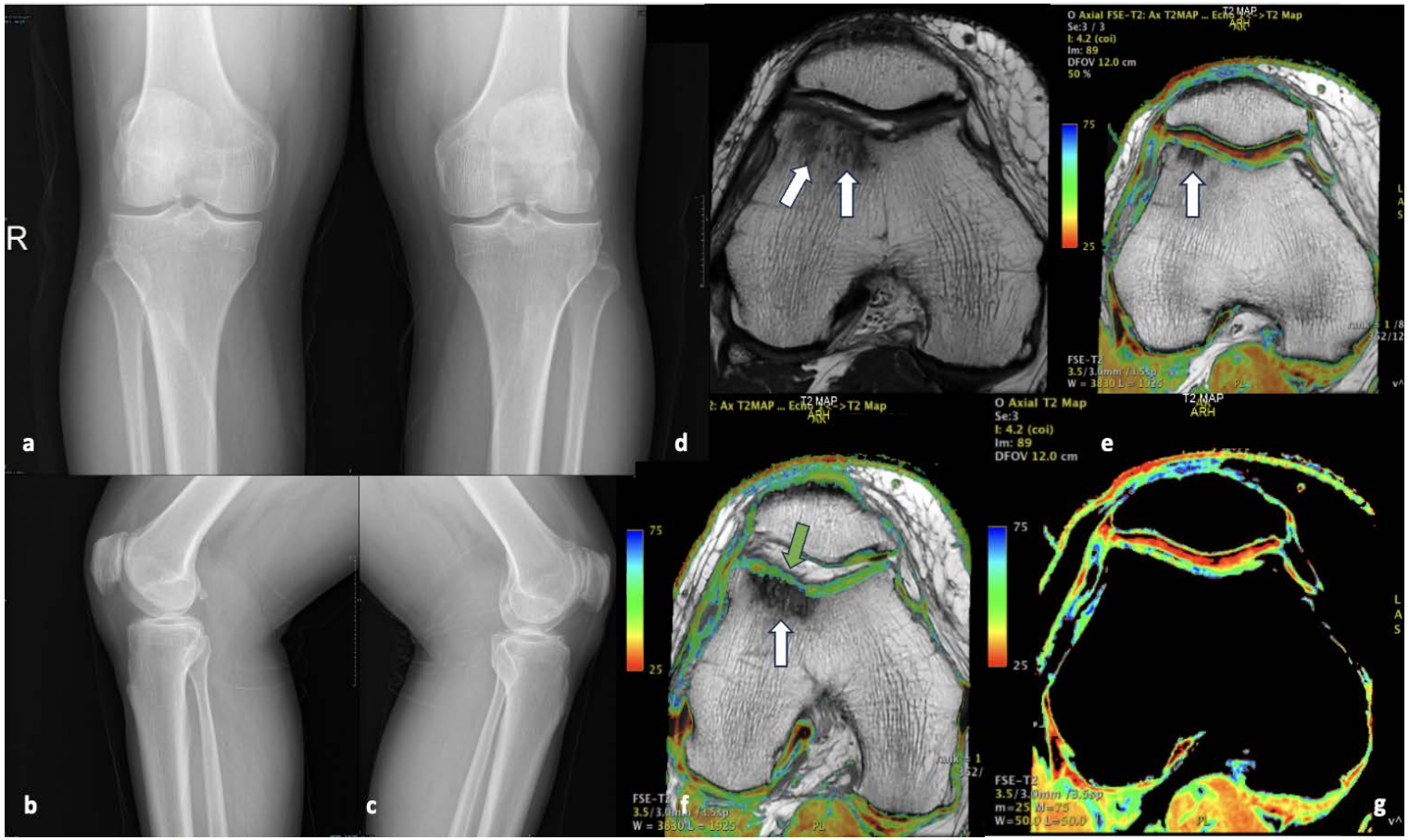
Additional information



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