EUROPEAN UNION

Re-STAGE

Integrative Decision Making in Rectal Cancer Care: Advanced Imaging, Predictive Models, and Patient-Centered Digital Tools



Andrada Ianus

School of Biomedical Engineering and Imaging Sciences
King's College London

5 years Cancer Mission:
Stronger Through Connection

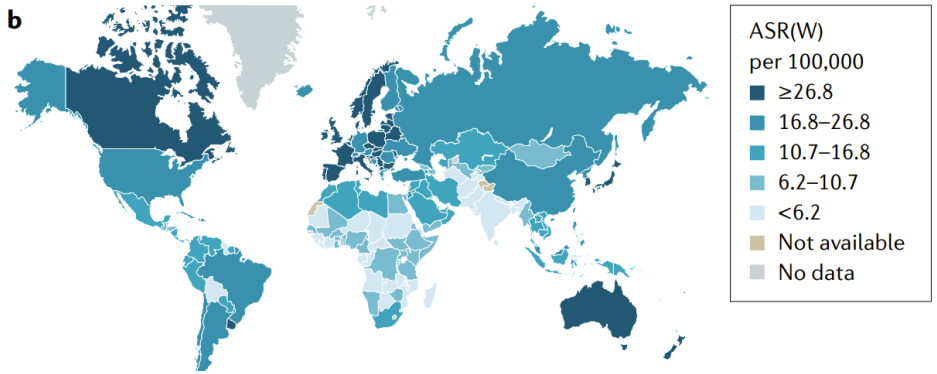
BRUSSELS
29 SEPTEMBER – 01 OCTOBER

Colorectal cancer - a major health burden in Europe

- **Incidence[1,2]:**
  - 2nd most diagnosed & 2nd leading cause of cancer deaths
  - ~ half a million new case annually across Europe
  - Lifetime risk: ~1 in 22 for men, ~1 in 35 for women



- **Incidence rising in younger adults[3] (< 55 years)**
  - 1 in 10 in 1995 vs 1 in 5 in 2019
  - Projected to further increase



- **~ 40 % case are rectal tumours**
  - Unique diagnostic and treatment challenges
  - More aggressive in young adults, higher recurrence risk
  - Proximity to other pelvic organs – challenge for surgery and radiotherapy



[1] GLOBOCAN 2020; [2] Keum & Giovannucci Nat Rev Gastroenterol Hepatol 2019, [3] ACS Colorectal Cancer Facts & Figures (2024)



Rectal cancer – treatment options

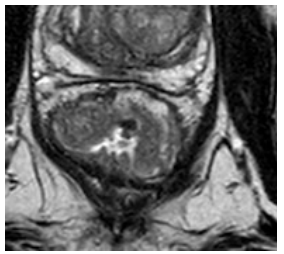
Locally Advanced Rectal Cancer



Neoadjuvant therapy



Restaging



Surgery



Non-surgical management

- **Watch and Wait** is an established approach after neoadjuvant therapy in rectal cancer with undeniable advantages regarding QoL
- **Pressure on adequate patient selection,** as evidence emerges on regrowth being associated with a higher rate of distant metastases
- **MRI - essential for patient selection and/or surgery planning**
  - Response assessment on MRI has substantial variability of interpretation, and accuracy regarding response may be disappointing
- **Uncertain time for patients, with many questions**



ReSTAGE Pillars

Basic research

- MRI biomarker development
- Tumour cells vs fibrosis vs muscle
- High resolution ex-vivo diffusion MRI
- Whole TME specimens



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Clinical translation

- Preclinical results - inform clinical protocols
- New MRI protocols added to the staging and restaging examination
- Evaluation of added value



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- Enable future training of ML for outcome prediction



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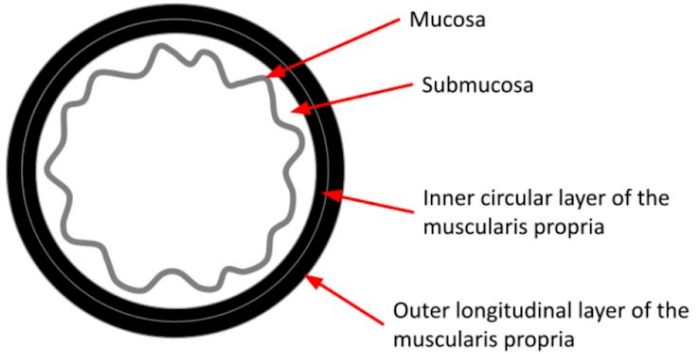
Patient centred digital tools

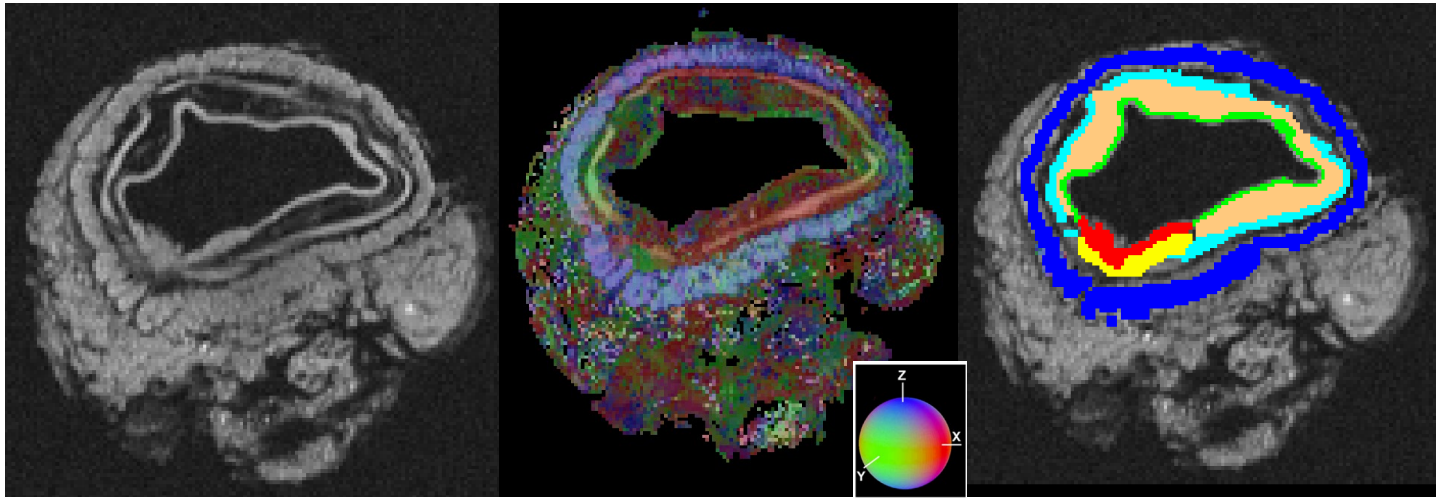
- Mobile app to facilitate QoL questionnaires
- Provide information about the disease and treatment options
  - increase the knowledge, decrease anxiety

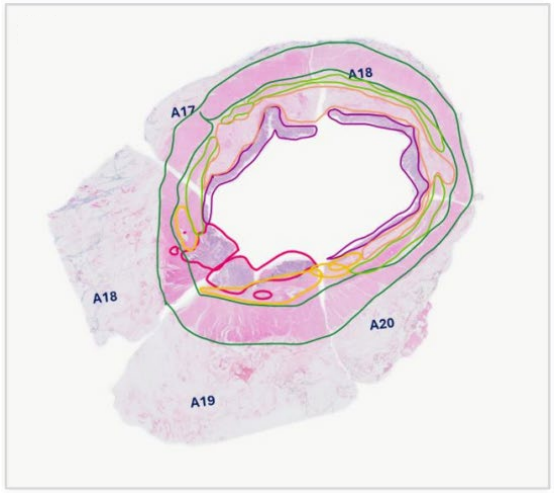


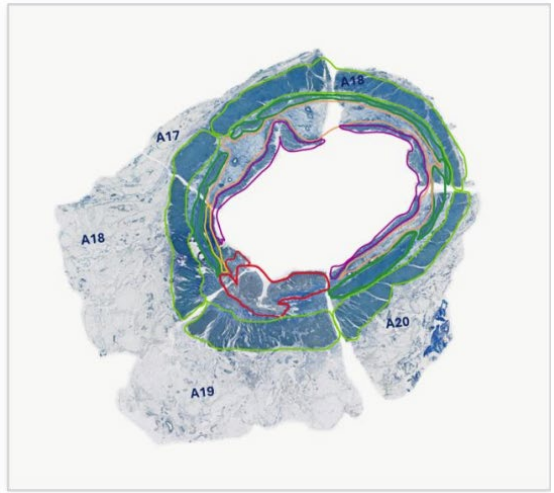
Preclinical Imaging

- **Ex-vivo high-resolution MRI of rectal cancer specimens and comparison with histology**
  - Resolution 0.5 mm^3
  - Multiple quantitative MRI contrasts
  - Complementary information about the tissue











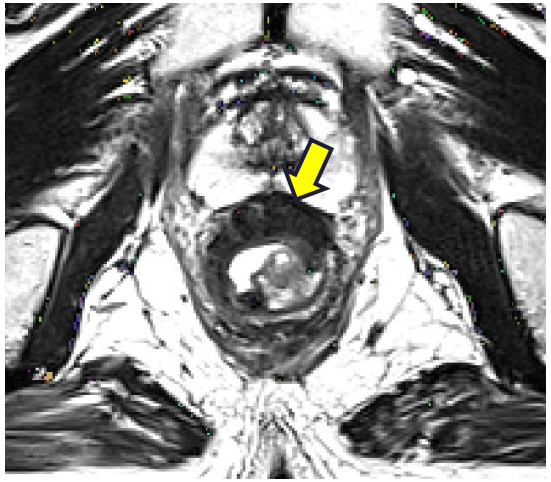
Clinical research

- **Imaging protocol – added to clinical imaging**
  - A high-res Diffusion Tensor Imaging protocol -> muscle architecture
  - Sequences with strong diffusion weighting, quantitative relaxometry
  - ~100 patients scanned

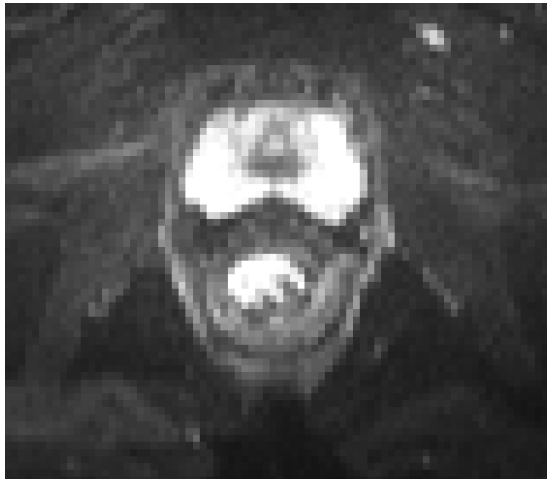
Restaging exam after NAT

Scar tissue with preserved underlying rectal wall architecture

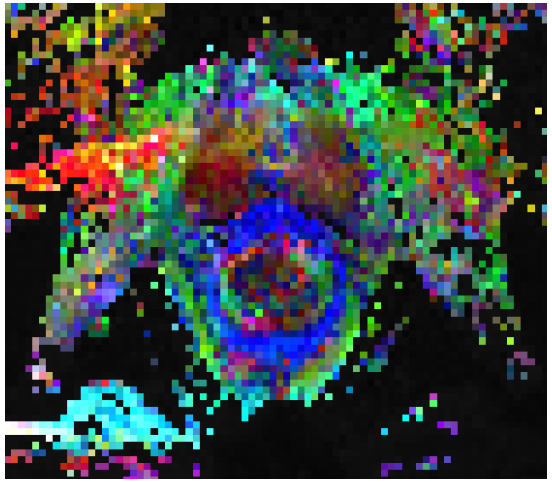
High res T2



DWI



Fractional anisotropy



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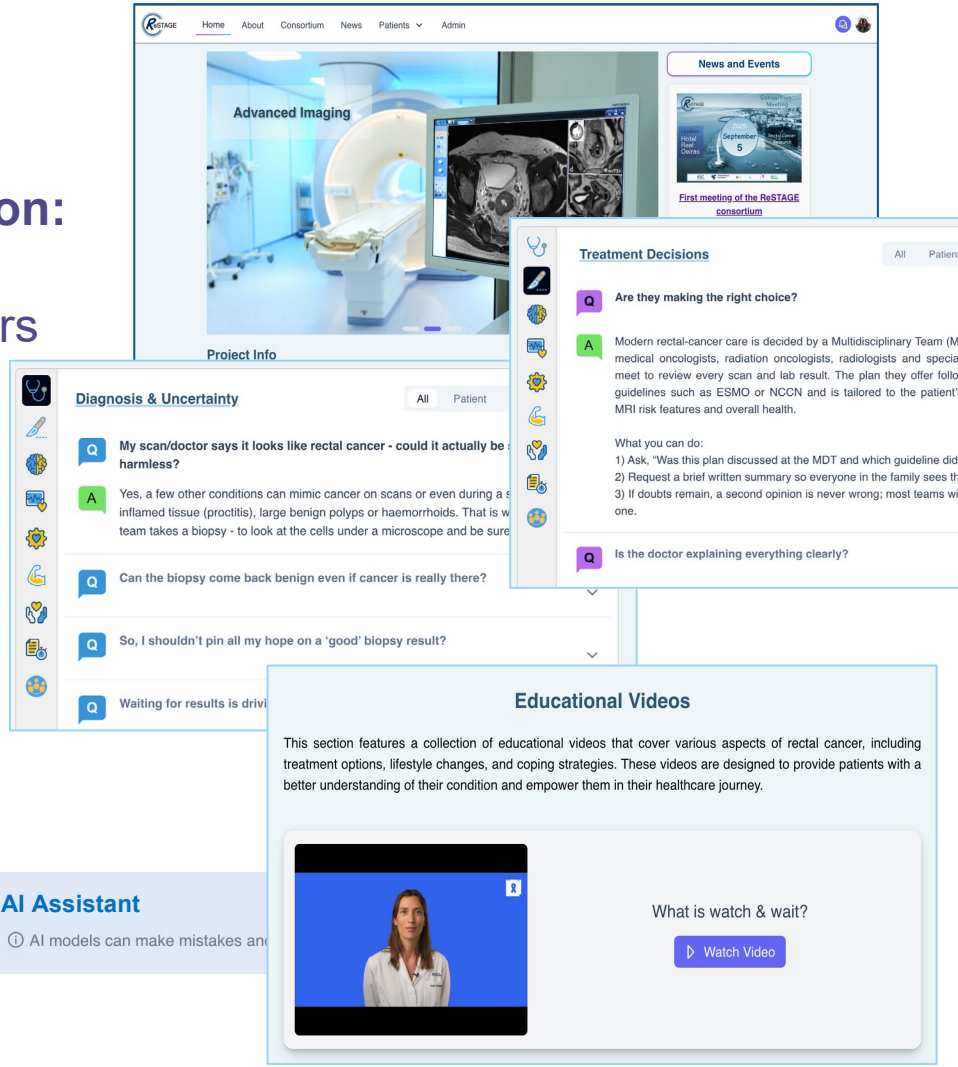


Digital tools and imaging repository

- **Website to support rectal cancer research and patient education: www.re-stage.eu**
  - Basic information about the project, consortium map and members
  - Patient section with FAQ and Educational videos
    - Common patient concerns, co-designed with patients
  - Integrated AI chatbot
    - Provides context-aware answers, trained on guidelines and FAQ

- **Mobile application – industry partner in France**
  - Easy collection of QoL questionnaires

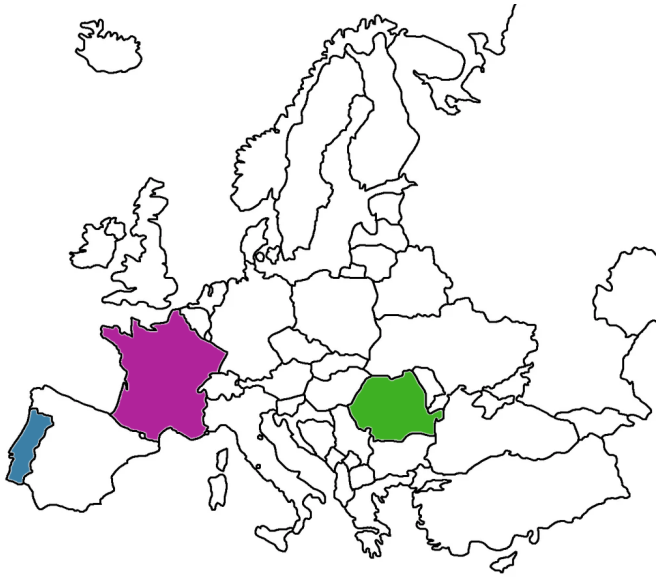
- **Imaging repository**
  - Supporting future research





Ultimate goals of ReSTAGE

- Improved and more reliable MR imaging in rectal cancer
- Better patient selection for Watch-and-Wait
- Faster decision to operate and more confident surgery planning for incomplete responders
- Better understanding of response variability to neoadjuvant therapy
- More informed, happier patients



EUROPEAN UNION



Thank you!

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ICM Institut régional du Cancer Montpellier | Val d'Aurelle

Centro Hospitalar Universitário do Algarve

ABC

MARIE CURIE ACTIONS

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THCS TRANSFORMING HEALTH AND CARE SYSTEMS

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