

TRANSCAN-3 JTC2021  
International  
Networking Event



This project is co-financed by the  
European Union and the Republic of Turkey  
Bu proje Avrupa Birliđi ve Türkiye Cumhuriyeti tarafından  
finanse edilmektedir



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**[@Lipids\\_IdISBa](https://twitter.com/Lipids_IdISBa)**



# IdISBa: Health Research Institute of the Balearic Islands

IdISBa is one of the 31 ISCIII *Health Research Institutes* in Spain



IdISBa has experience in managing EU projects from different Calls.

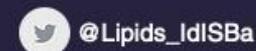
The EU projects **currently active belong to the following Calls:**

- JTI-CP-IMI - Joint Technology Initiatives - Collaborative Project (IMI)
- Join Action on Antimicrobial Resistance and Healthy care-Associated Infections
- 2<sup>nd</sup> Call SUDOE 2017
- EuroNanoMed II JTC 2014
- H2020-MSCA-IF-2018 Individual Fellowships
- H2020-WIDESPREAD-2018-2020

On April 1<sup>st</sup> 2021 started a new EU project in which ***Lipids in Human Pathology*** participates as **collaborator:**

ERA-HDHL“Development of targeted nutrition for prevention of undernutrition for older adults (PREVNUT)”

## Lipids in Human Pathology



Blog IdISBa

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Lipids in Human Pathology in 2018

Lipids in Human Pathology is an interdisciplinary group of chemists, biochemists, biologists, medical doctors and dietitians committed to understand the role of membrane lipids in cell pathophysiology. With this, our overall aim is to apply this knowledge to the development of new tools for early diagnosis and treatment monitoring for conditions such as inflammatory bowel disease and colorectal cancer.

We are currently focused on three main research areas:

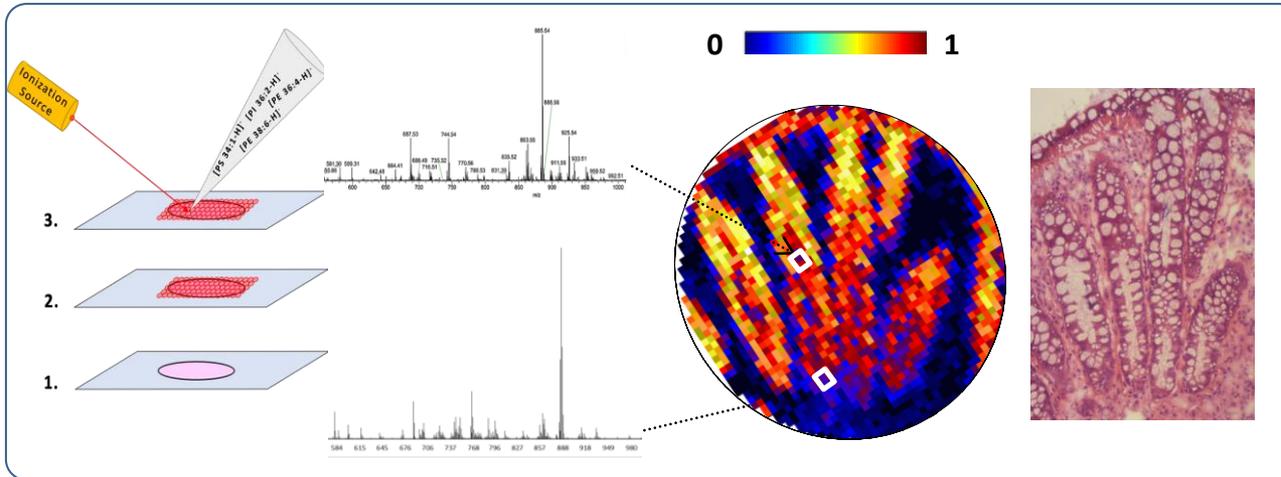
- 1) Role of **membrane lipids**, particularly phospholipids, in the tumorigenic process in **colorectal cancer** and in chronic diseases as **inflammatory bowel disease**.
- 2) Obtain the necessary lipidomic data for the development of **new diagnostic and treatment tools**
- 3) Changes in the lipidome occurring in **immune cells** during immune response

<https://gwendybc22.wixsite.com/lipidshumanpathology>

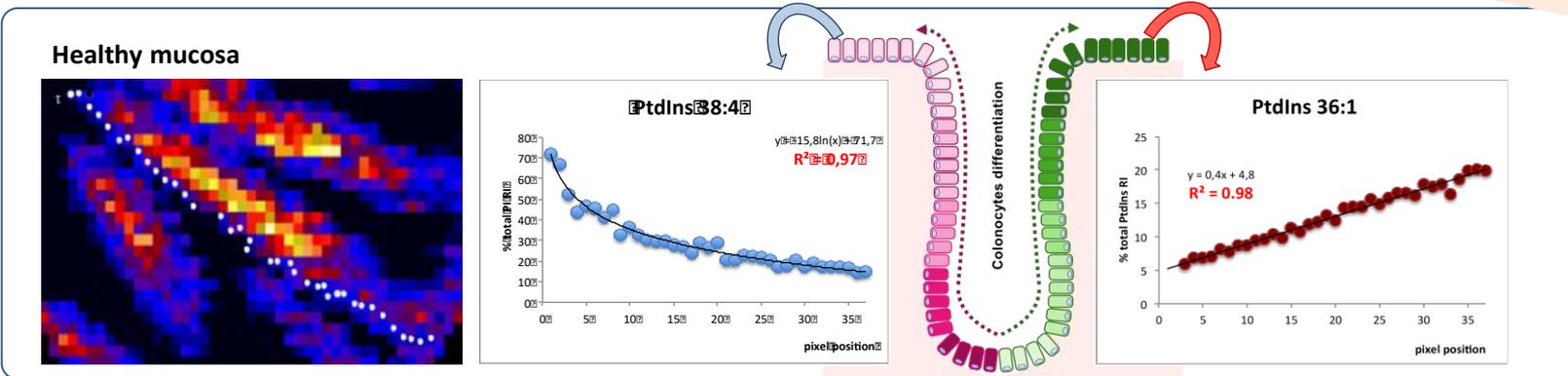
# LHP current research:

## Using the Lipidome established by *Imaging Mass Spectrometry* (IMS) as a *resourceful* tool to *refine* CRC subtypes classification

In collaboration with the **Group of Spectroscopy and Mass Spectrometry of the University of the Basque Country**, we use one cutting edge techniques in IMS to understand cell malignization and identify new diagnostic & prognostic biomarkers.

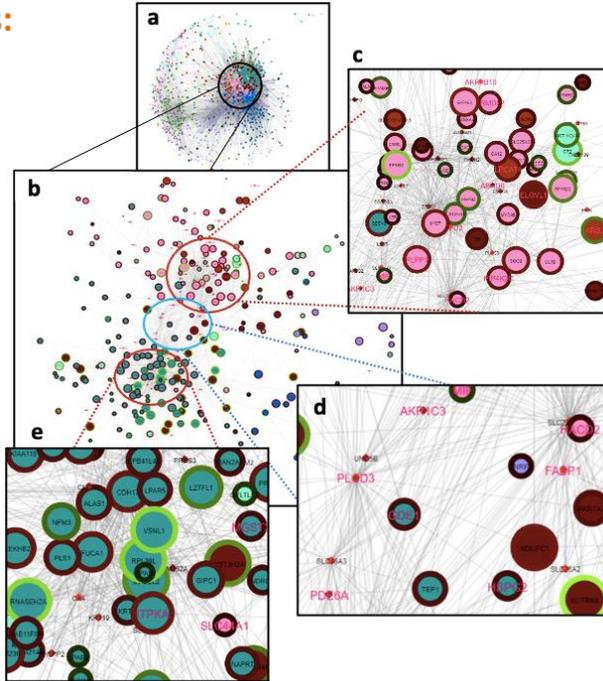


**Key result**



# LHP current research: Using the Lipidome established by *Imaging Mass Spectrometry* (IMS) as a *resourceful* tool to *refine* CRC subtypes classification

WGCNA analysis:  
Transcriptomic  
+  
Lipidomic data



Importantly, these studies are currently being developed using **human samples and colon organoids models**.

**Human samples**

**Human organoids**

Visceral adipose  
tissue



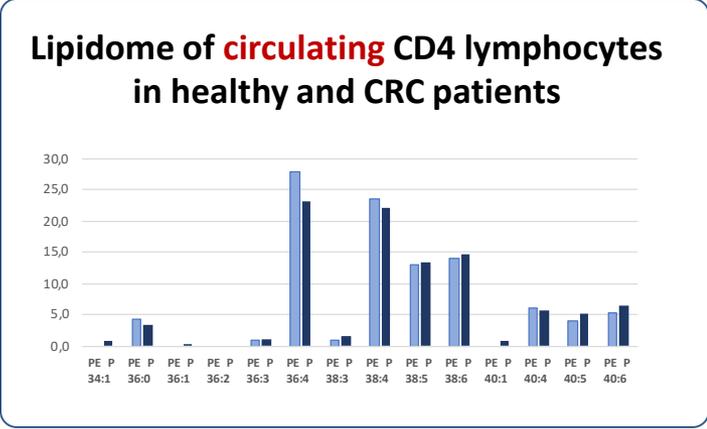
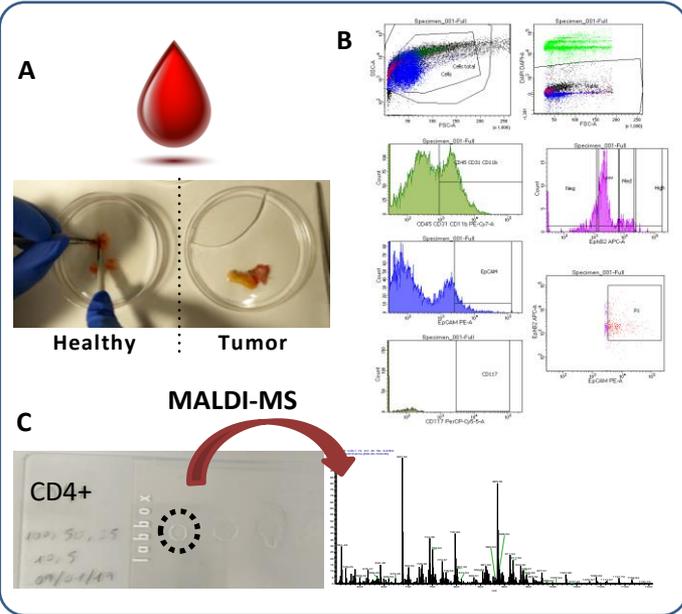
**Tumor mucosa**

**Healthy mucosa**

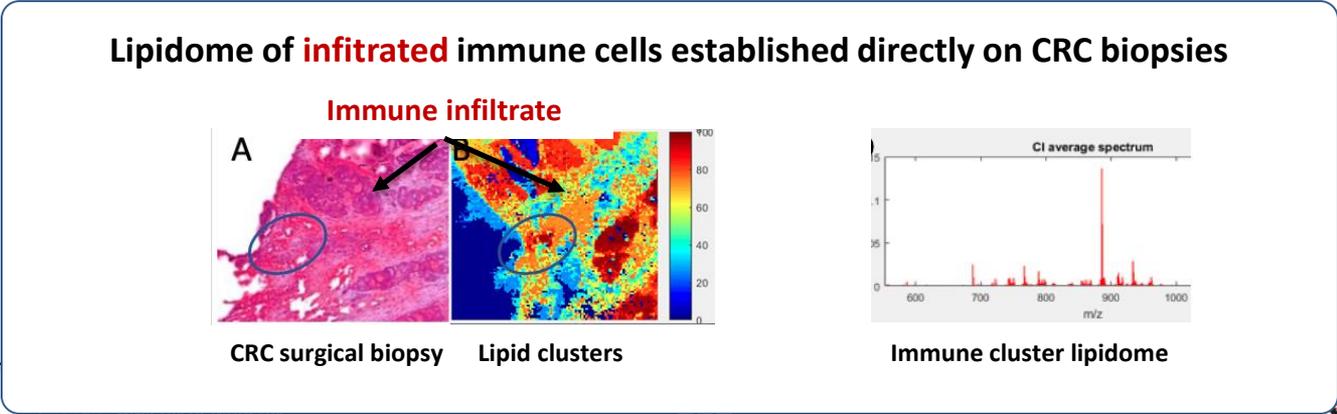
One of our research lines is focused on the **changes in the lipidome occurring in circulating and infiltrated immune cells in CRC patients**.

# LHP current research:

## Using the Lipidome established by *Imaging Mass Spectrometry* (IMS) as a *resourceful* tool to *refine* CRC subtypes classification



- CD4 Lymphocytes
- CD8 Lymphocytes
- CD14 monocytes
- CD66B neutrophils
- CD19 B-lymphocytes
- NKT cells
- NK cells



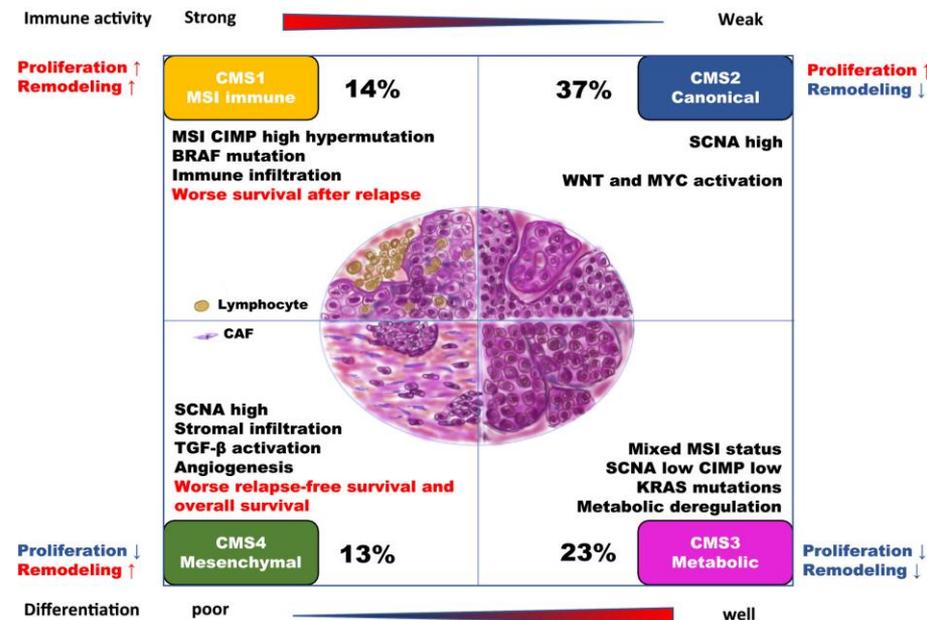
# Concept underlying the Title:

## Multiomic approach to TME: Exploring the added value of IMS-Lipidome as a resourceful tool to improve TME subclasses definition

**Aim 1: Identification and validation of tumour microenvironment (TME) subclasses and their contribution to the resistance mechanisms (sub-aims 1.1 and 1.2)**

**1.1 Dissection of tumour cells/tumour-infiltrating immune/stromal cells and identification of TME subclasses (single-cell analyses, mass cytometry, MALDI-imaging, multidimensional immunohistochemistry, etc.) for TME studies (3D culture systems; patient-derived organoids; patient-derived xenografts; syngeneic, genetically modified and chemical carcinogenesis-induced mouse models...).**

**1.2 Definition of the contribution of TME to resistance mechanisms and identification of new therapeutic targets through multiomics (epigenomic, transcriptomic, proteomic, metabolomics, MEMBRANE LIPIDOMICS, study of the microbiome and virome, etc.) to assess functional characteristics of TME-tumour cell interplay within the primary tumour and/or metastases, to identify candidate TME targets and to assess the activity of pathway-targeting agents.**



H. Sawayama, Ann Gastroenterol Surg 2020;4(5):528-539  
<https://doi.org/10.1002/ags3.12362>

# Multiomic approach to TME: Exploring the added value of IMS - Lipidome as a resourceful tool to improve TME subclasses definition

- **Objectives:**
  - To take a *multiomic* approach to analyze TME composition, by at least:
    1. **Tumor genome sequencing** to establish CMS (searching partner)
    2. **Lipid IMS** at two levels of mass resolution to establish TME **Lipidome** at 10 microns of spatial resolution (coordinator WP)
    3. **Spatial Gene Expression** analysis to Map the whole Transcriptome Within the Tissue Context (coordinator WP/partner)
    4. **Single cell RNA-sequencing** analysis of infiltrated immune (searching partner)
    5. **IMS to establish TME Proteome** (potential Polish partner)
  - Integrate all the “omic” and clinical data using **System Biology approaches** (searching partner) **to improve TME subclasses definition**
  - (TBC) Investigate the underlying mechanisms using **organoids/co-cultures methods or** genetically modified and chemical carcinogenesis-induced mouse model

# Multiomic approach to TME: Exploring the added value of IMS - Lipidome as a resourceful tool to improve TME subclasses definition

- **Expected results**

- To obtain a detailed picture of TME composition at the molecular level that could help to refine the CMS molecular subtypes currently established for CRC
- The identification of new and solid targets for immunotherapy
- The validation of an IMS protocol compatible with daily clinical routine in terms of cost and accuracy.

# Consortium - profile of known partners *(if any)*



No	Partner Name	Type	Country	Role in the Project
01	IdISBa (GB-C)	RTD	Spain	Coordinator – Spatial Lipidome and Transcriptome (TBD)
02		RTD	Poland	Spatial Proteome
03				
04				
05				
06				

# Consortium - required partners



No	Expertise	Type	Country	Role in the project
01	Single cell genomic analysis	RTD/SME		Single cell analysis of biopsies Tumor genome sequencing
02	System Biology Analysis	RTD/SME		Integrate all Omic and Clinical Data
03	Clinical group expert in CRC	RTD/SME		Manage Clinical Data / Patients recruitment
04				
05				
06				



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Group Publications on IMS-lipidome:

DOI: [10.1021/jasms.0c00133](https://doi.org/10.1021/jasms.0c00133) DOI: [10.1007/s00216-019-02212-3](https://doi.org/10.1007/s00216-019-02212-3) DOI: [10.1016/j.bbalip.2018.04.017](https://doi.org/10.1016/j.bbalip.2018.04.017) DOI: [10.1016/j.bbalip.2016.09.013](https://doi.org/10.1016/j.bbalip.2016.09.013)

DOI: [10.1021/acs.analchem.5b03978](https://doi.org/10.1021/acs.analchem.5b03978) DOI: [10.1007/s13361-015-1268-x](https://doi.org/10.1007/s13361-015-1268-x) DOI: [10.1007/s00216-015-8673-7](https://doi.org/10.1007/s00216-015-8673-7)