

## Dysbiosis in the intestinal microbiome in IBD diseases: differences between Chron and Ulcerative colitis (Pathos17 Cariplo Project)

Clarissa Consolandi<sup>1,2</sup>, Marco Severgnini<sup>1,2</sup>, Tania Camboni<sup>1</sup>, Gabriella Leccese<sup>3</sup>, Camilla Ceccarani<sup>1</sup>, Paolo Landini<sup>3</sup>, Daniele Noviello<sup>4,5</sup>, Flavio Caprioli<sup>4,5</sup> and Moira Paroni<sup>3</sup>

<sup>1</sup> Institute of Biomedical Technologies, National Research Council, Segrate (MI), Italy

<sup>2</sup> National Biodiversity Future Center (NBFC) S.c.a.r.l., Piazza Marina 61, Palermo, Italy

<sup>3</sup> Department of Biosciences, Università degli Studi di Milano, 20133 Milan, Italy

<sup>4</sup> Gastroenterology and Endoscopy Unit, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico, 20122 Milan, Italy

<sup>5</sup> Department of Pathophysiology and Transplantation, Università degli Studi di Milano, 20135 Milan, Italy

### Background:

Pathos17 Project aimed at the identification of the microorganisms involved in the chronic and relapsing intestinal inflammation resulting from a persistent activation of the mucosal immune system in Intestinal Bowel Diseases (IBD), through the evaluation of the alterations in the intestinal microbiome (IM) in Crohn (CD) and Ulcerative colitis (UC).

### Methods and Results:

Bacterial RNA from ileal biopsies (21 CD/20 UC patients) was subjected to metabarcoding sequencing, obtaining, through the phylogenetic characterization and functional predictions of the IM, a picture of the active microbial community of the intestinal mucosa. In CD patients, genera *Ruminococcus gnavus* spp. (related to the degradation of the intestinal mucus, favoring adhesion and invasion by pro-inflammatory genera) and *Escherichia-Shigella* were increased, whereas *Faecalibacterium* (putatively associated to a protective effect on the mucosa) was decreased. Several altered metabolic pathways in the two pathologies also allowed the understanding of the metabolic role of the microorganisms in IBD.

### Conclusions and Significance:

Our result confirms the hypothesis of a "community effect" of the IM, with alterations of multiple genera in CD. Moreover, they suggest the possibility of developing therapeutic treatments (probiotics or prebiotics) aimed at restoring the IM balance with specific increase of commensal bacteria reduced during the disease (e.g.: *F. prausnitzii*).

### Keywords:

Chron's disease (CD), Ulcerative colitis (UC), intestinal microbiome (IM), ileal biopsies

## References:

1. Loris Riccardo Lopetuso, Marco Severgnini, Silvia Pecere, Francesca Romana Ponziani, Ivo Boskoski, Alberto Larghi, Gianluca Quaranta, Luca Masucci, Gianluca Ianiro, Tania Camboni, Antonio Gasbarrini, Guido Costamagna, Clarissa Consolandi and Giovanni Cammarota. Esophageal microbiome signature in patients with Barrett's esophagus and esophageal adenocarcinoma (2020), PLoS One. 15(5): e0231789.
2. Gianluca Ianiro, Ernesto Rossi, Andrew Thomas, Giovanni Schinzari, Luca Masucci, Gianluca Quaranta, Carlo Settanni, Loris Lopetuso, Federica Armanini, Aitor Blanco-Miguez, Francesco Asnicar, Clarissa Consolandi, Roberto Iacovelli, Maurizio Sanguinetti, Giampaolo Tortora, Antonio Gasbarrini, Nicola Segata, Giovanni Cammarota. Faecal microbiota transplantation improves diarrhoea induced by tyrosine-kinase inhibitors in patients with metastatic renal cell carcinoma: a randomised clinical trial (2020), Nat Commun 11(1):4333.
3. Consolandi C, Turrone S, Emmi G, Severgnini M, Fiori J, Peano C, Biagi E, Grassi A, Rampelli S, Silvestri E, Centanni M, Cianchi F, Gotti R, Emmi L, Brigidi P, Bizzaro N, De Bellis G, Prisco D, Candela M, D'Elia MM. Behçet's syndrome patients exhibit specific microbiome signature (2015) Autoimmun Rev. 14(4):269-76
4. Gabriella Leccese, Alessia Bibi, Stefano Mazza, Federica Facciotti, Flavio Caprioli, Paolo Landini and Moira Paroni. Probiotic Lactobacillus and Bifidobacterium Strains Counteract Adherent-Invasive Escherichia coli (AIEC) Virulence and Hamper IL-23/Th17 Axis in Ulcerative Colitis, but Not in Crohn's Disease (2020), Cells 9, 1824

## Thematic Area:

- Microbiome: from Research to Clinics