

State of the art

Immune checkpoint inhibitors (ICI) can cure advanced melanoma, but about half of patients do not respond to the treatment. Recently, **the gut microbiota has emerged as a master modulator of the response to ICI** and we and other groups showed that patients responding to ICI bear a compositionally and functionally different gut microbiome from non-responding patients. Currently, fecal microbiota transplant is being tested on oncologic patients undergoing ICI, especially those refractories in first-line. However, it has many **hurdles related to variability, engraftment, delivery and safety**.

Medical Need

There is an urgent need of **improving the outcome of ICI-based therapies in solid tumors**, including melanoma. Many patients fail to respond to ICIs or develop resistance over time, highlighting the necessity for interventions that **prime and sustain immune activation**. Additionally, there is a lack of **reliable predictive biomarkers** to determine which patients will respond well to immunotherapy.

Solution

FLachImmune peptides derive from bacteria flagellin-related genes of Lachnospiraceae. These peptides are constitutively **enriched in patients responding to ICI** and play a key role in priming antitumor immunity by **mimicking tumor associated antigens**. FLachImmune peptides can **induce antigen-specific CD8+ T cell reactivity, enhance tumor-infiltrating lymphocytes' expansion and their antitumor activity**.

Applications & Advantages

- FLachImmune peptides as **prognostic tool** to determine ICI therapy response
- FLachImmune peptides as **therapy in combination with ICI**
- **Culture-Free & No Live Biotherapy**, increasing safety and simplifying implementation
- **Manufacturing Excellence** offering high yield, rapid production, low costs and clinical-grade quality, with versatility for both peptide- and mRNA-based applications.
- **Flexible Proprietary Platform** with optimized pipelines, combination of dry & wet lab expertise potential application to other cancer indications easy integration into clinical workflows.

Opportunity

Istituto Europeo di Oncologia is seeking **industrial partners** and **investors** willing to support the development of FLachImmune peptides towards clinical applications

IP asset: patent application EP24191684.0, EP24164184.4 co-owned by Istituto Europeo di Oncologia and Istituto Nazionale Tumori-IRCCS Fondazione G. Pascale

References: Macadong et al. *Cell Host & Microbe* 2024; Ballerini et al. *Nat. Biomed. Eng.* 2025

Principal Investigator



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Principal Investigator of the *Microbiome and Antitumor Immunity Lab* at IEO
>15 years' experience in studying microenvironment-immune system interactions in human cancers, first-in-human demonstration of microbiome influence on ICI response.