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Health Benefits of Fermented Dairy Products for Targeted Populations PROLIFIC Project Innovative fermented dairy products and ingredients for targeted populations

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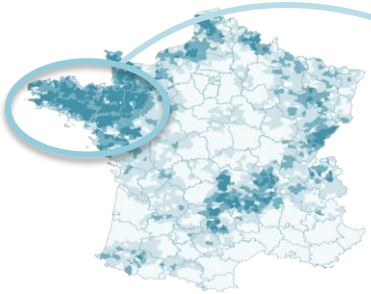
AHFES Fermentation Webinar
November 8th, 2021

Health Benefits of Fermented Dairy Products for Targeted Populations

PROLIFIC Project

Innovative fermented dairy products and ingredients for targeted populations

Context: A favorable ecosystem in Great West, France



Source: CNIEL-French Dairy Board (2018)

Competitive dairy sector

Strong academic-private partnership

Shared desire to make the best use of "white gold“

Co-construction of ambitious pre-competitive research projects

Ex. PROFIL 2014-2019, PROLIFIC 2020-2025

Context

Food fermentations (eg lactic and propionic fermentations) are one of the oldest ways of preserving perishable foods.

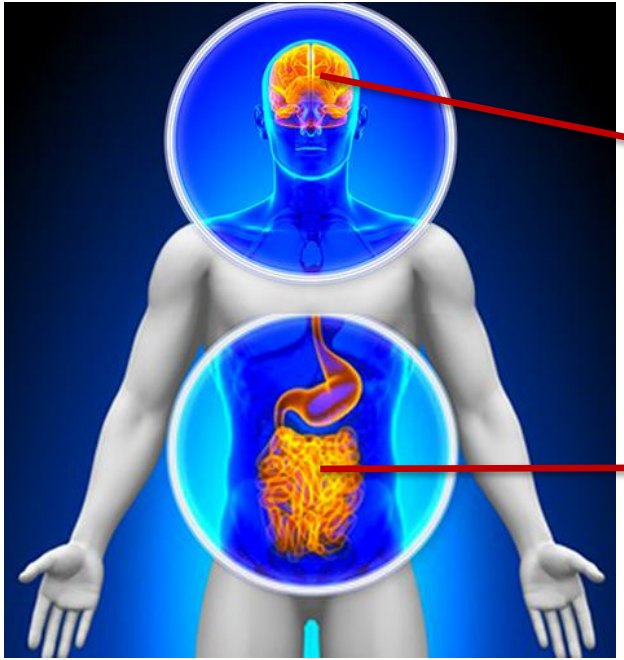
Can Fermented Dairy Products have a positive effect on digestive functions and on the gut-brain axis?

In addition to the production of organic acids, the activity of bacteria during these fermentations radically transforms the raw material and generates compounds of interest whose action and benefit can go far beyond a mere preservation.

Nutrient intake, organoleptic qualities, biopreservation,
Immunomodulation, food-microbiota-health interactions, milk microbiota, inflamation, cognition…

Context

Increasing incidence of chronic digestive and neurological pathologies…



Neurodegenerative pathologies
(Parkinson's, Alzheimer's, cognitive decline)

Neurodevelopmental pathologies

Inflammatory pathologies
(ulcerative colitis, Crohn's)

Functional digestive disorders
(IBS; 10-15% population)

Food allergy

… And chronic stress.
(risk factor for chronic diseases)

PROLIFIC « May your diet be your first medicine »

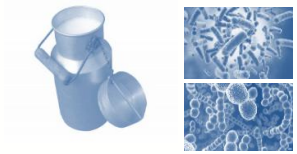
ENS-
Central Nervous
System (CNS)
interactions

Lactic- and Propionic- Acid bacteria
Metabolites of interest
(SCFA, CLA, oligosaccharides, vitamins, etc.)

Food microbiota-intestinal
epithelial barrier (IEB)
interactions

IEB-Enteric nervous
system (ENS) interactions

Scientific continuum and expertise



Milk Components
Microbiology, Nutrition & Health

Foods
Biological activities

Gut & Microbiota
IBD, allergy

Gut-brain axis
Cognitive Functions

IRISA — LS2N/ComBI — *(bioinformatic)*

CIRM_BIA, STLO — *(microbiology, milk processing)*

bia — *(allergy)*

numecan — *(nutrition, cognition)*

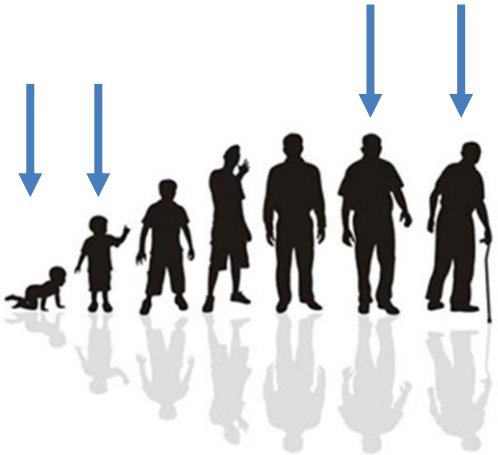
Inserm U1235, UMR TENS — *(gut-brain axis)*

Bba MILK VALLEY

For which target populations?

The first **1000** days of life (0-6 months and 6 months-3 years)

The **seniors**



PROLIFIC « May your diet be your first medicine »

For which functionalities ?

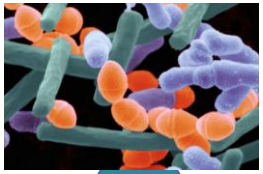
Colonisation and homeostasis of gut microbiota

Cognitive development /
Neurodegeneration

Inflammation
Tolerance / Allergy

PROLIFIC « May your diet be your first medicine »

Bacteria



Fermentation
Fermentation products

Preservation
Interactions with biological activities

Health Effect

Milk

Dairy fractions / fermented dairy products
Infant milk powder

Process

Structure of PROLIFIC project

Project Management

Conception and characterization of bacterial consortia

***In vitro- in vivo* efficiency / Health effects**

Implementation in model dairy products / target populations

Cognitive / 1000 days

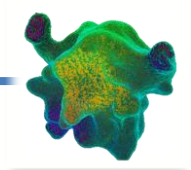
Cognitive / seniors

Immuno / 1000 days

Immuno / seniors

In silico screening platform

In vitro screening platform



Dairy technololgy plateform

Industrial implementation

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PROLIFIC in figures

Human ressources

5 PhD projects (*180 months*)

4 post-docs (*60 months*)

5 Contracts Technicians and Engineers (*90 months*)

Funding

13,9 M€ Full cost

7,55 M€ funded by Bba Milk Valley

1,86 M€ funded by Regions BZH and PDL

Research Projects

PhD project 1: Development of an IF with a complex bacterial component (based on breast milk microbiota): impact on intestinal homeostasis

PhD project 2: Fermentation as a lever for improving IFs: design of a fermented formula improving brain development in newborns.

PhD project 3: Combined effects of propionic acid bacteria and n-6 polyunsaturated fatty acids on the intestinal barrier.

PhD project 4: Com2Brain: Combination of Microbes to Boost Brain functionality. Effects of bacterial metabolites on the Gut-Brain Axis during normal and pathological ageing.

PhD project 5: In silico modeling of host-lactic acid bacteria interactions at the EIB

Post-doc1: Benefit of a microbial component similar to breast milk in IF / prevention of food allergies (*12 months*)
Post-Doc2: Immunomodulation by the Bacterial Surface: towards fermented dairy products as a remedy against allergies (*12 months*)
Post-doc3: Optimizing the health effect of the bacterial component of dairy products (OptiBac) (*24 months*)
Engineer 4: Ability of fermented dairy products to modulate the activation of the gut-brain axis during axis activation stress (*18 months*)

Experimentation / screening on organoids (*Engineer; 18 months*)
Assembly of bacterial consortia for targeted functionalities *(Engineer; 18 months)*
IF and FDP preparation, implementation in model dairy products, scale-up (T*echnician; 24 months*)

Thank you for your attention