



**HAL**  
open science

## Two human milk synthetic bacterial community (SynCom) exhibited contrasted impacts in vitro on intestinal barrier and immune function

Charles Le Bras

► **To cite this version:**

Charles Le Bras. Two human milk synthetic bacterial community (SynCom) exhibited contrasted impacts in vitro on intestinal barrier and immune function. NutrEvent : l'innovation de l'alimentation et de nutrition humaine et animale, Oct 2023, Rennes, France. hal-04330558

**HAL Id: hal-04330558**

**<https://hal.inrae.fr/hal-04330558>**


Submitted on 8 Dec 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License



# Two human milk synthetic bacterial community (SynCom) exhibited contrasted impacts *in vitro* on intestinal barrier and immune function

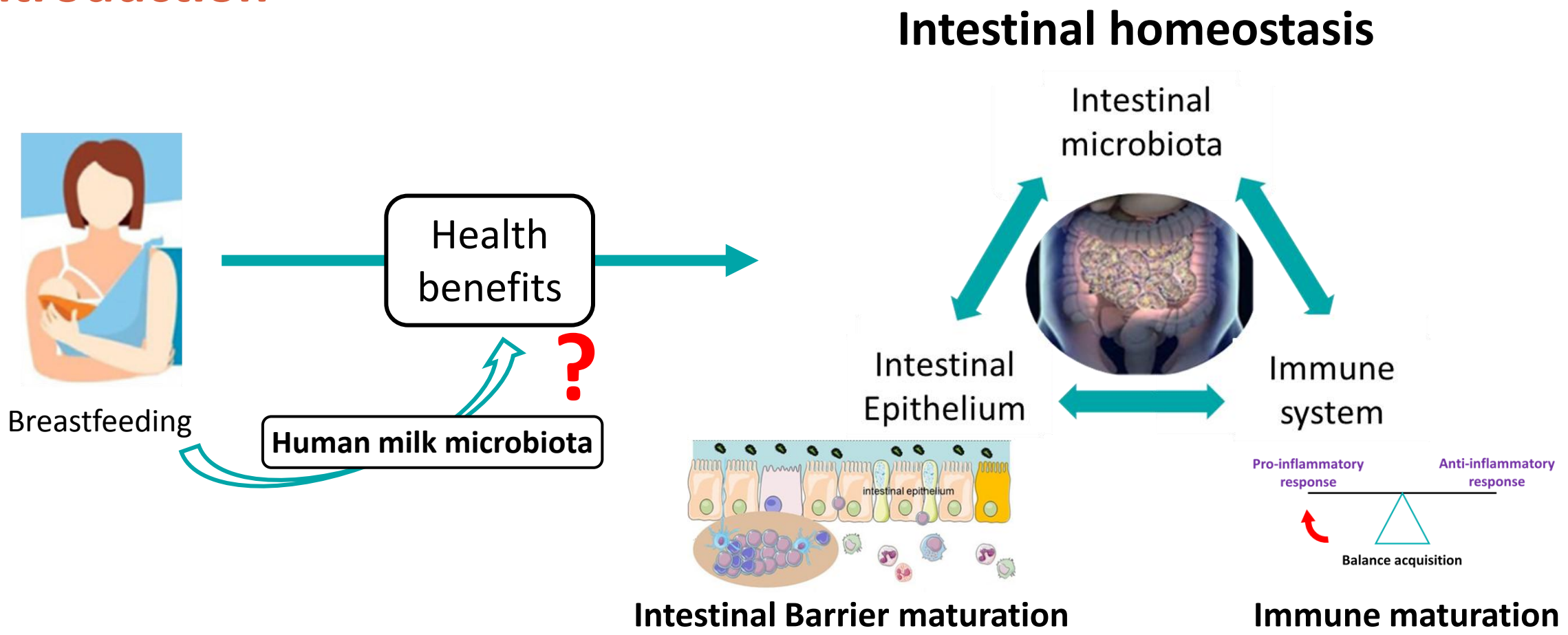
---

Charles LE BRAS

STLO & NuMeCan



# ➤ Introduction

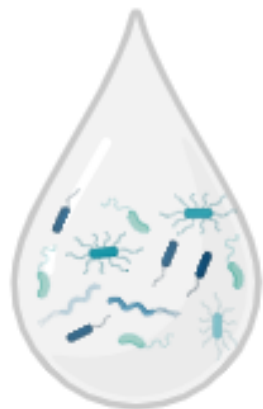


**Our hypothesis is that the microbiota of human breast milk contributes to the health benefits of breast milk**

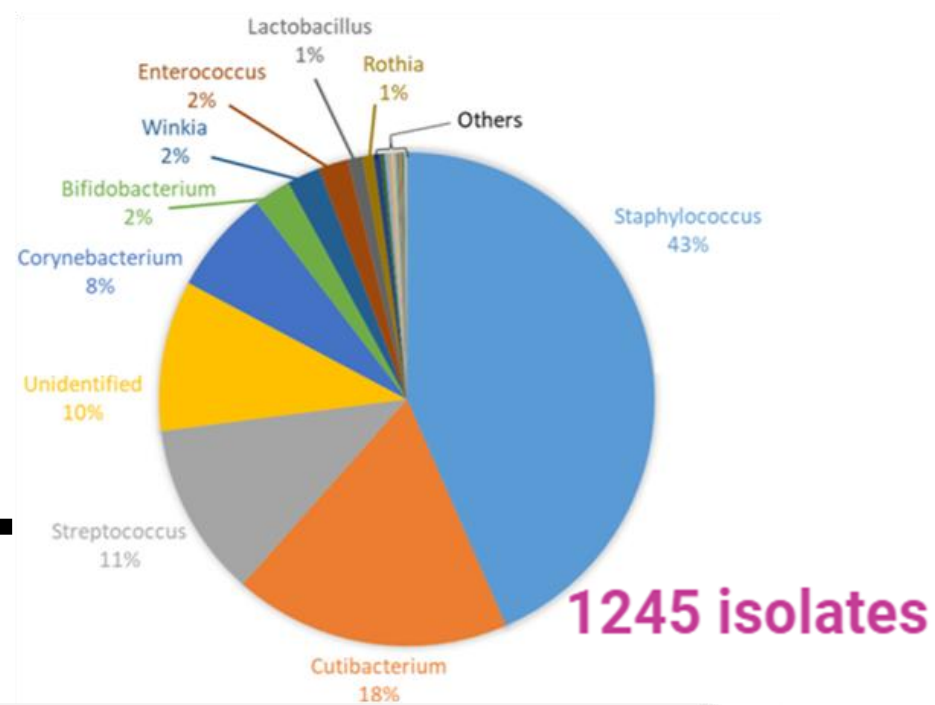


# Strategy

28 Donors

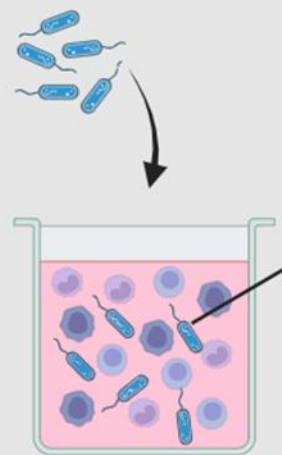


Bacterial collection



Preselection

Human PBMC model  
84 isolates



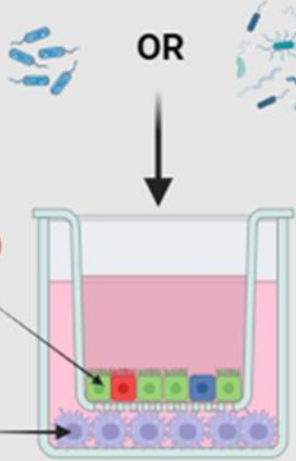
IL-10 and TNF- $\alpha$

Quadricellular model

29 isolates OR 2 SynComs

Enterocytes (Caco-2)  
Globlet cells (HT29-MTX)  
M cells

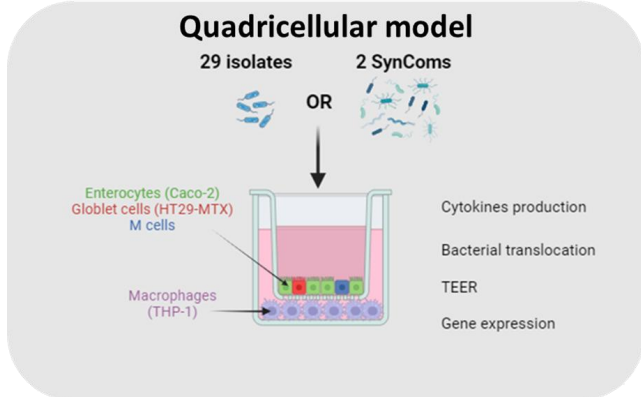
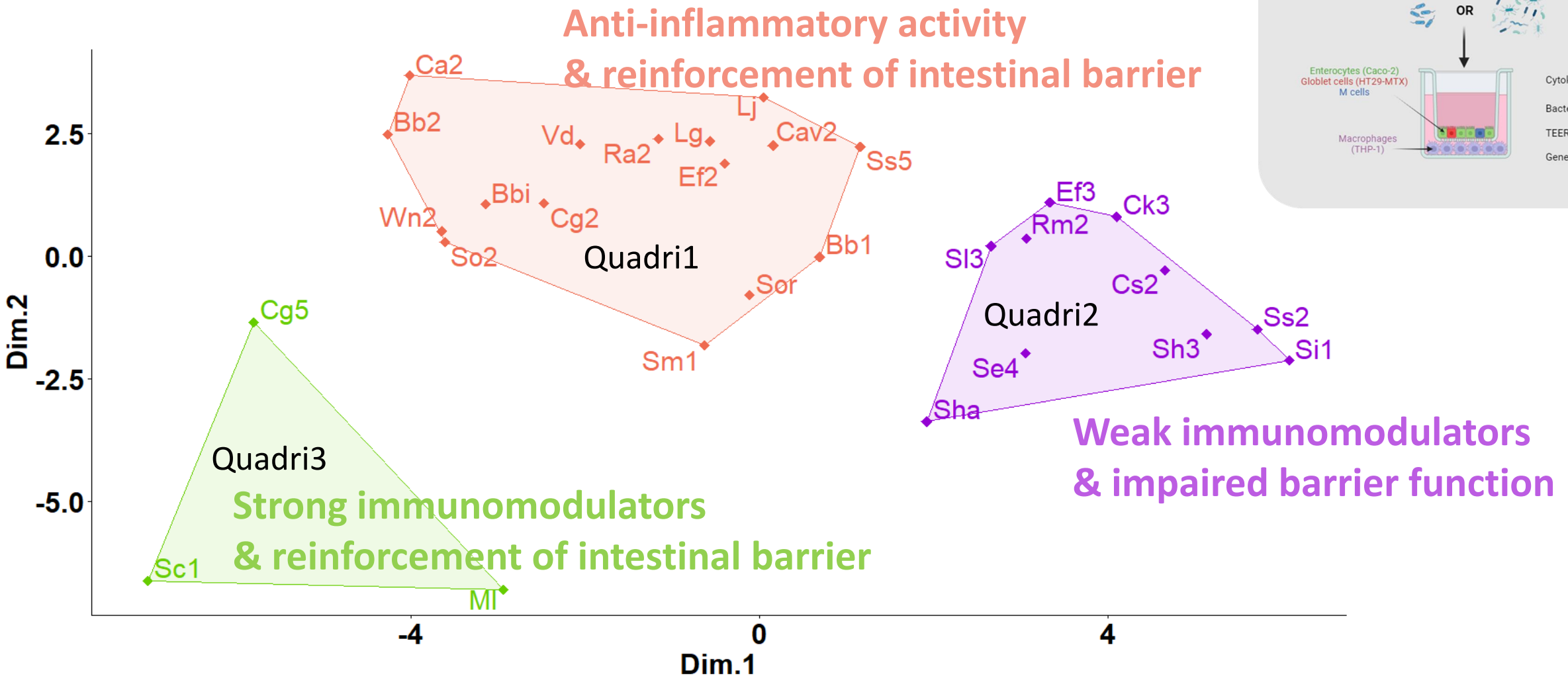
Macrophages (THP-1)



- Cytokines production
- Bacterial translocation
- TEER
- Gene expression

# ➤ Individual impact of HM bacteria on immune and barrier functions

Classification by *MultiDimensionate Scaling*



**Great variability of functional profiles of HM bacteria**



# ➤ Immune and barrier properties of the 2 SynComs

*sPLS-DA analysis*

- Design of 2 Synthetic Communities :**
- ➔ **Mimicking HM microbiota**
  - ➔ **With different functional properties**

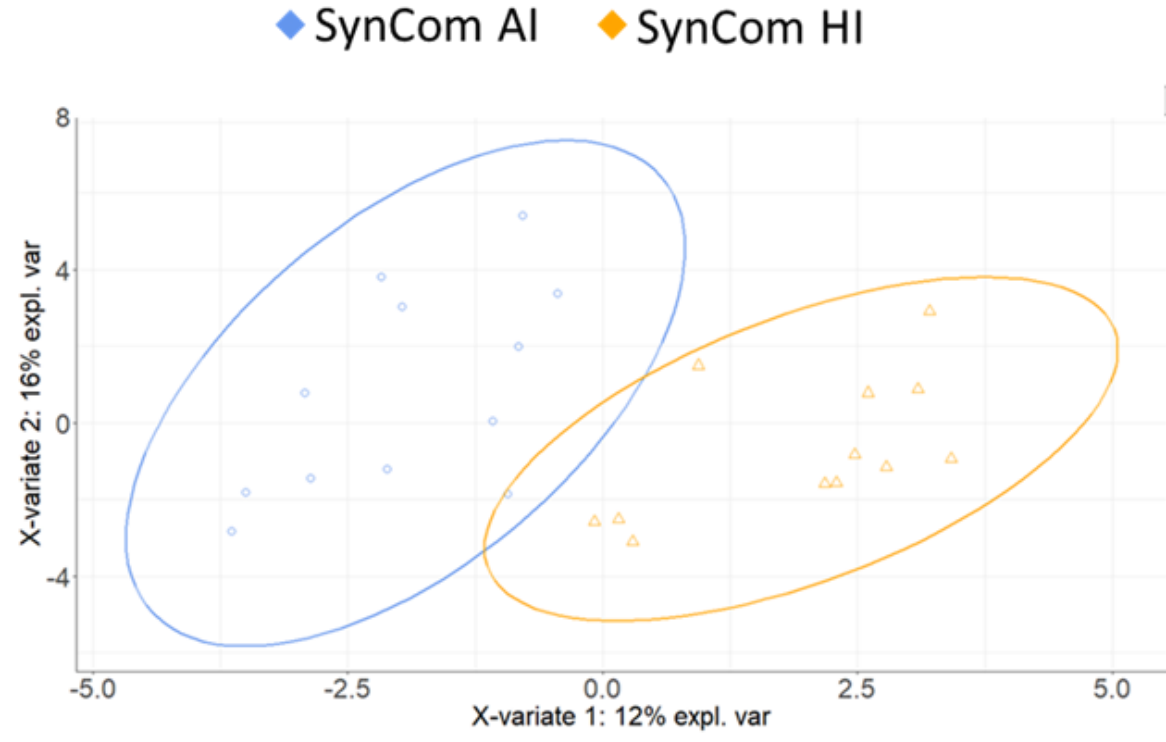
## SynCom AI

- Anti-inflammatory {
  - Cutibacterium granulosum (Cg2)
  - Staphylococcus haemolyticus (Sha)
  - Winkia neuui (Wn2)
  - Streptococcus infantis (Si1)
  - Cutibacterium acnes (Ca2)
  - Corynebacterium simulans (Cs2)
  - Bifidobacterium breve (Bb1)
  - Lactobacillus gasseri (Lg)

## SynCom HI

- Strong immunomodulatory {
  - Cutibacterium granulosum (Cg5)
  - Staphylococcus capitis (Sc1)
  - Micrococcus luteus (Ml)
- Anti-inflammatory {
  - Staphylococcus epidermidis (Se4)
  - Streptococcus salivarius (Ss2)
  - Corynebacterium kroppenstedtii (Ck3)
  - Bifidobacterium breve (Bb2)
  - Lactobacillus jensenii (Lj)

- Common strains {
- Rothia mucilaginosa (Rm2)
  - Veillonella dispar (Vd)
  - Bifidobacterium bifidum (Bbi)



- **Contrasted immunomodulatory properties as expected from the assembly**
- **New properties that differed from those of the individual bacteria**





## ➤ Conclusion

- The profile of HM bacterial SynComs reflected the coexistence of specific bacterial profiles that comprise the HM microbiota, leading to its role in driving gut homeostasis
- The functional properties of the HM bacterial community relied on a combination of strain-specific features rather than on the taxonomic composition itself



# Questions & Answers

