



Health claims and the immune stimulating effects of probiotics

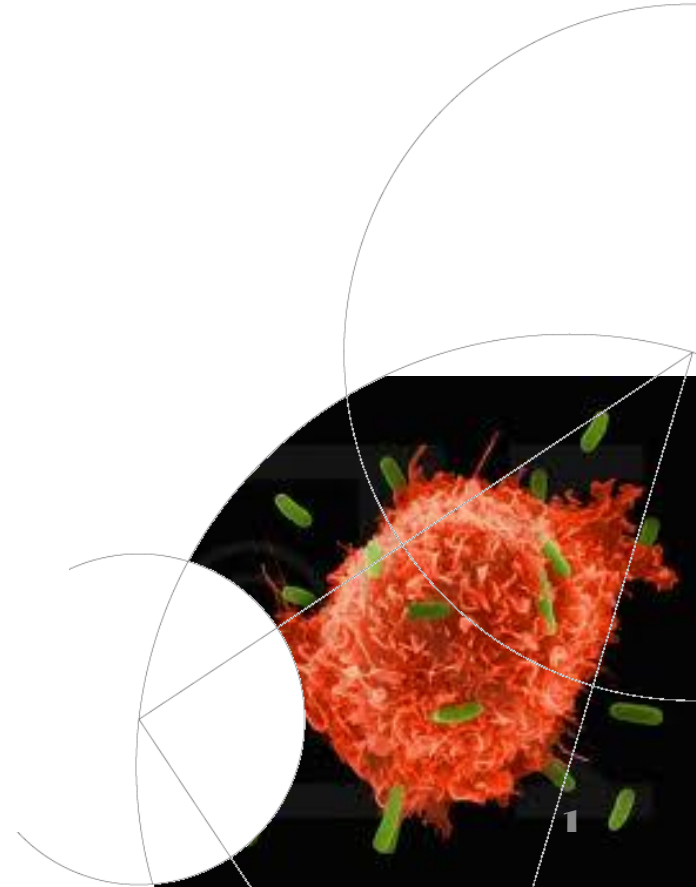
Hanne Frøkiær

Professor, PhD

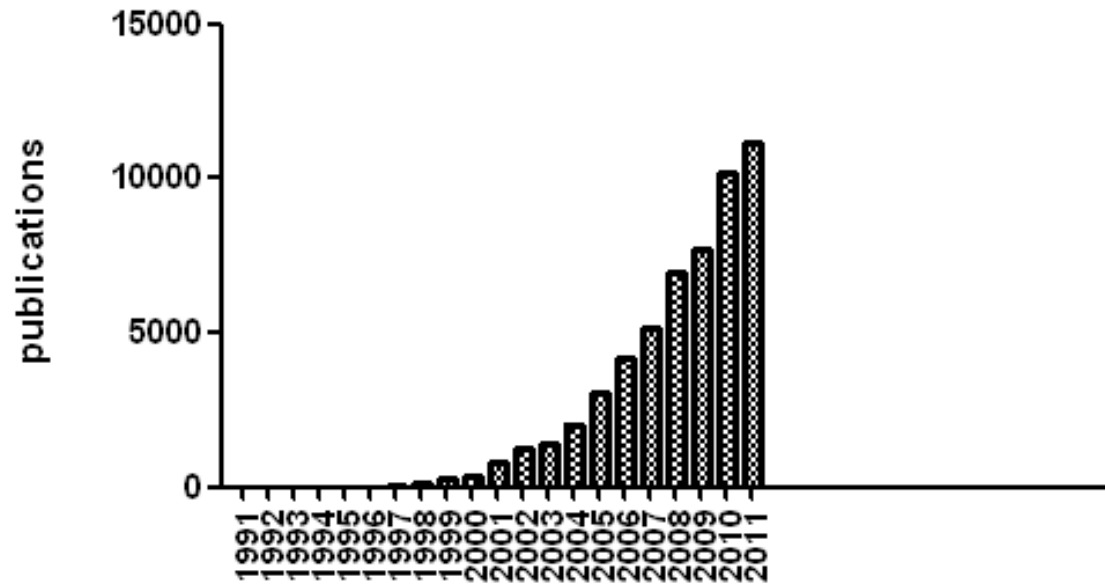
Dept. Vet. Disease Biology

Faculty of Health and Medical Sciences

Copenhagen University



Publications about probiotics and immune system



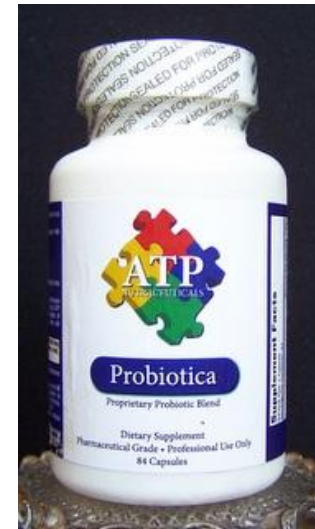
Place, date, unit, occasion etc.
Slide 2



Probiotics:

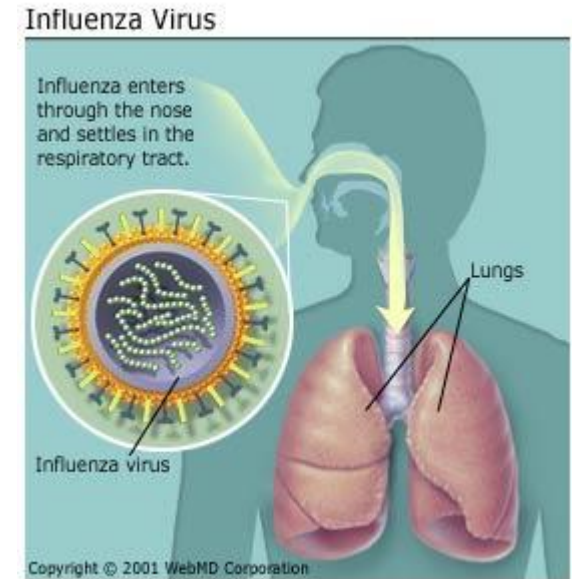
Immune stimulating claims

- ✓ Stimulates your immune system
- ✓ Boosts your immune defenses
- ✓ Helps preventing upper respiratory tract infections
- ✓ Enhances the response to influenza vaccine



Upper respiratory tract infections (URTI)

- Comprise influenza and common cold
- Affects all population groups
- Most individuals affected at least once a year
- Spread readily and world-wide
- Easily diagnosed
- Certain population groups are highly susceptible
- Of major impact world wide



Probiotic effects on cold and influenza-like symptom incidence and duration in children.

[Leyer GJ](#), [Li S](#), [Mubasher ME](#), [Reifer C](#), [Ouwehand AC](#).

Pediatrics, August 2009,124:172.

326 children (3-6 years)

L.acidophilus or *L.acidophilus* + Bifidobacterium (10 billion daily) in 6 months

Reduction in fever, Rhinorrhea, cough incidence and duration



Randomised, double-blind and placebo-controlled study using new probiotic lactobacilli for strengthening the body immune defence against viral infection

[Berggren A](#), Ahrén IL, Larsson N, Önning G.
Eur. J. Nutr., 2011, 50:203-210.

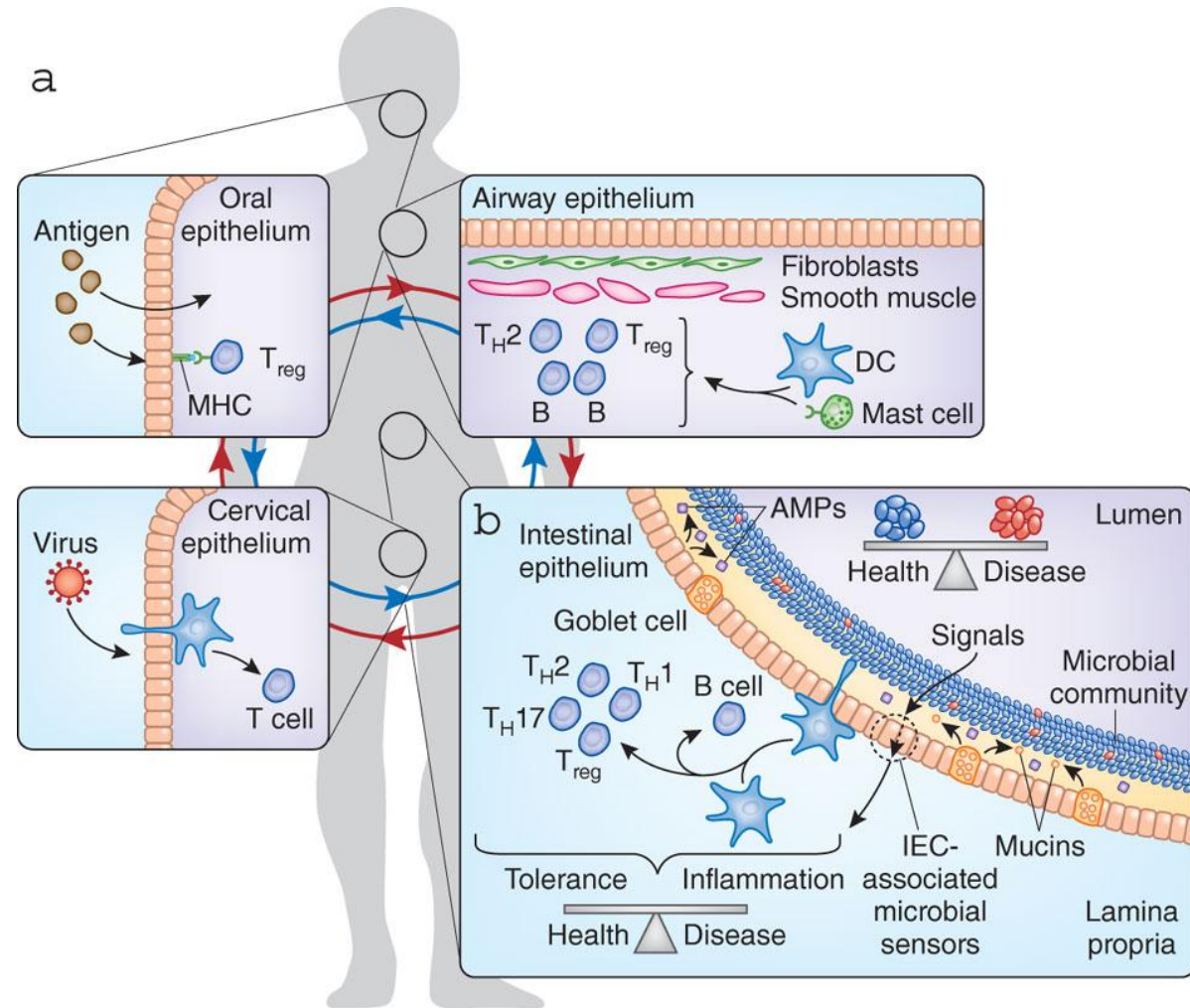


272 Healthy adults (18-65 years)

L.plantarum + *L.paracasei*, 1 billion CFU daily in
3 months

Reduction in number of common cold episodes,
duration and pharyngeal symptoms and fever.

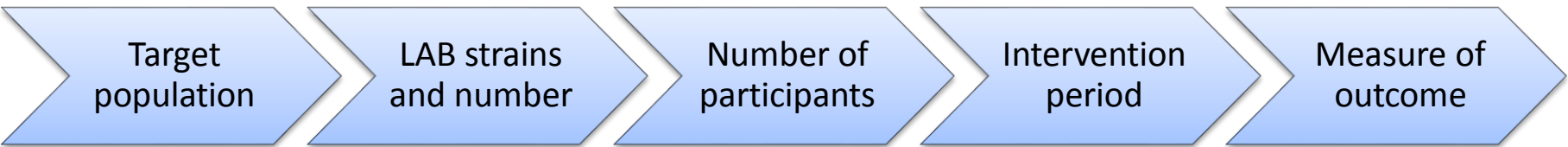
The different mucosal sites are inter-connected



Gill et al., Nature Immunol. 2010



Evidence for anti-viral effects



- Infants
- Children
- Elderly
- Athletes
- Healthy adults
- Shift hold workers

L. rhamnosus
L. acidophilus
L. casei
L. johnsonii
L. fermentum
L. plantarum
L. gasseri
B. animalis
B. longum
B. bifidum

24 – 2000 persons

3-28 weeks

(diagnosed/self reported)

- Absence from daycare
- Reduction in incidence
- Reduction in duration
- Reduction in episodes
- Reduction in diagnosed RTI

50 – 2000 million CFU per day



Assessment of the underlying mechanisms

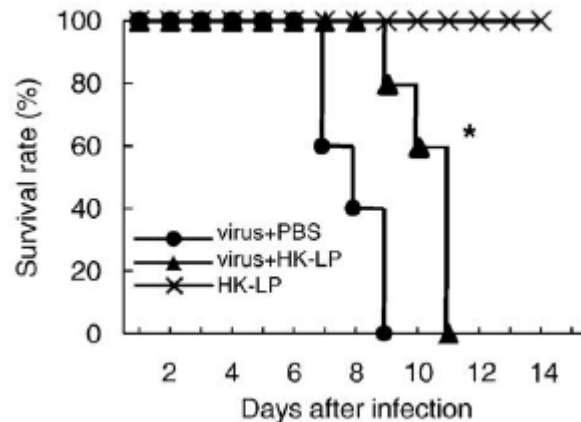
- ✓ Proliferation of blood cells
- ✓ Phagocytotic activity in blood
- ✓ Periferal blood mononuclear cells – distribution of cell types
- ✓ Antibody levels in blood and faeces
- ✓ Cytokine levels (TNF- α , IL-6) in blood
- ✓ Faeces samples – content of the probiotic bacteria



Dosis and viability?

- ✓ High number daily (above one billion)
- ✓ Live or dead - but intact

Heat killed L.plantarum reduces the severity of viral infection



Maeda et al., 2009

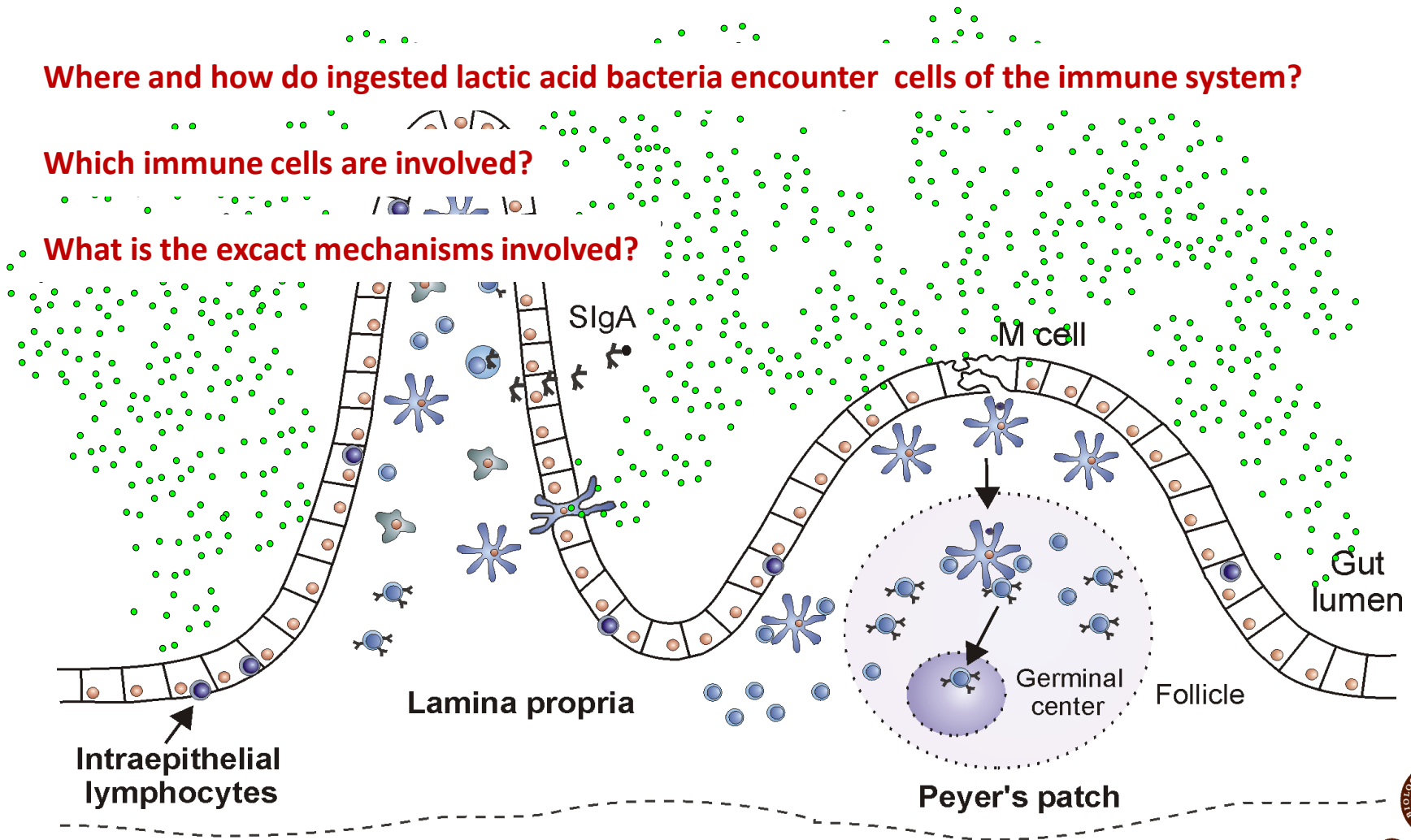


Remaining questions to address....

Where and how do ingested lactic acid bacteria encounter cells of the immune system?

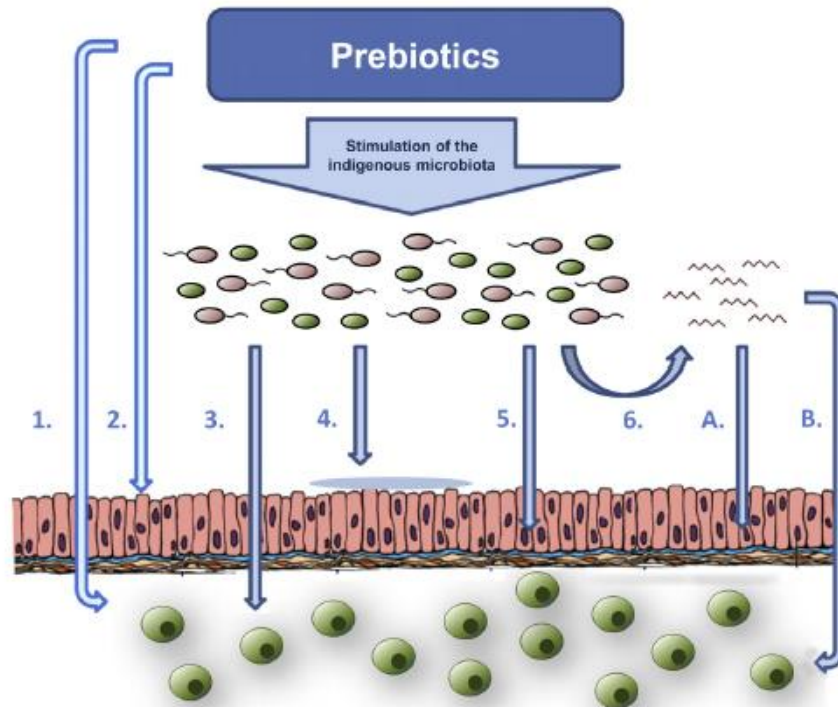
Which immune cells are involved?

What is the exact mechanisms involved?



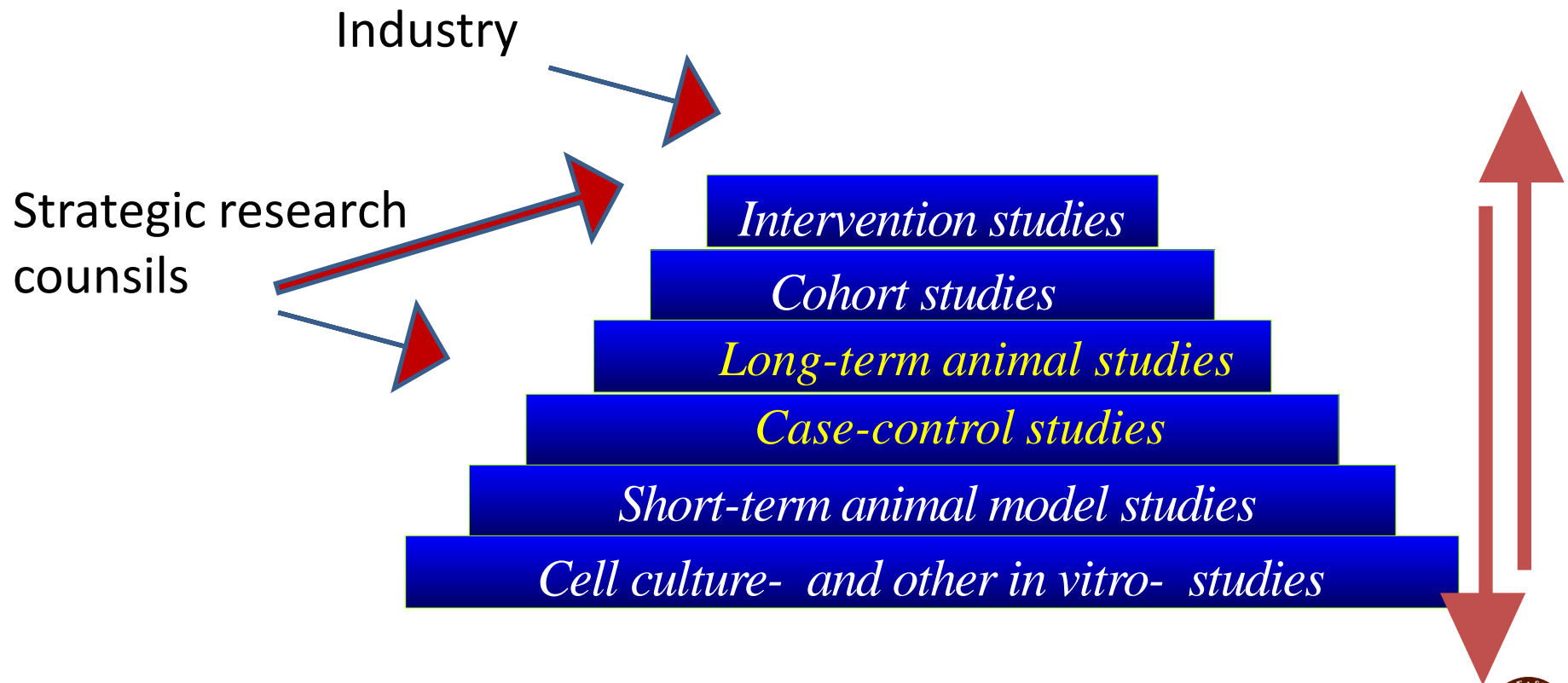
Possible actions of prebiotics

T.R. Licht et al. / Trends in Food Science & Technology xx (2011) 1–13



1. Stimulation of the immune cells directly by prebiotics
2. Irritation of the epithelial cells directly by the prebiotics
3. Stimulation of the immune cells by the indigenous microbiota
4. Stimulation of mucin production by the indigenous microbiota
5. Stimulation of tight junction genes/proteins by the indigenous microbiota
6. Stimulation of SCFA production leading to:
 - A. Regulation of tight junction formation and stimulation of growth and differentiation of epithelial cells
 - B. Regulation of pro-inflammatory cells

Establishment of the mechanisms behind immune stimulating effects of probiotics



Conclusion

Industry and public funding must accept that we need more basic knowledge about the immune system, and the interaction with microorganisms in the GI tract to accommodate the claim policy of EFSA.

