Impact of the development of the pulmonary microbiota on neonatal immunity

Aude Remot, Alix Penel, Mathilde Bauducel, Chantal C. Bridonneau, Delphyne Descamps, Sabine Riffault, Philippe P. Langella, Hamida Hammad, Muriel M. Thomas

ABSTRACT FORM

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Abstract category [1]	- Immune tolerance in allergy and asthma - Hygiene hypothesis in immune regulation

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- T and B cell memory and immune regulation
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- Apoptosis in the regulation of immune responses
- Mechanisms of immune privilege
- The role of microRNAs in immune regulation and effector functions
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- Metabolism and immunity

Focus on clinical application, drug discovery and novel biotechnological developments
- Hygiene hypothesis in immune regulation
- Regulatory and effector T cell subsets and cytokines: from bench to bedside
- Immune response to parasites
- Tumor antigen-specific immune regulation
- Immune tolerance and autoimmunity
- Immune tolerance and neuroimmunology
- Immune tolerance in allergy and asthma
- Immune regulation in organ transplantation tolerance
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Impact of the development of the pulmonary microbiota on neonatal immunity

Aude Remot[1,2], Alix Penel[1], Mathilde Bauducel[1], Chantal Bridonneau[1], Delphyne Descamps[3], Sabine Riffault[3], Philippe Langella[1], Hamida Hammad[2] and Muriel Thomas[1].

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While the healthy lungs had been thought of as sterile, the concept and the description of a commensal lung flora recently emerged. It has been described a bacterial community in the healthy Human lung, with Pseudomonas, Streptococcus, Prevotella, Fusobacteria, and Veillonella as dominant members. As it is now admitted for intestinal tract, the pattern of colonization in respiratory tract influences the health. Indeed, bacterial colonization is critical for the development of mucosa and the balance of the immune system.
The exploration of the impact of the development of the pulmonary microbiota on neonatal immunity is a new and promising area which will impact the management of newborn health. We combined *ex vivo* and *in vivo* strategies to put in evidence how lung bacteria shape the innate and acquired respiratory immunity in mice.
First, we isolated and characterized the primocolonizing bacteria arriving early in the lung of newborn specific pathogen free (SPF) BALB/c mice, using both molecular approaches and *in vitro* cultures. We were able to isolated lung bacteria (mainly facultative anaerobes bacteria) as soon as 3 days after birth. Their number was significantly increased after 3 weeks.
Then, the effects of the establishment of the flora on lung epithelium and immunity were assessed with naive lung explants from SPF or germ-free animals. Co-culture of explants with lung bacteria revealed differences in the cytokine secretion pattern according to age, microbial status and the type of bacteria used.
Finally, the influence of the microbiota on the lung protection will be investigated *in vivo* by induction of asthma with House Dust Mite in SPF, gnotobiotic (inoculated with primocolonizing bacteria) or germ-free newborn mice.
To better understand how the microbial factors influence the immune defenses at early age should improve fundamental knowledge and led to envisage innovative pediatric treatments for respiratory diseases.

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