Protective action of maternal milk in gastrointestinal physiology

Summary / Zusammenfassung

Milk, and especially human milk, is one of the richest biological fluids. It is designed by evolution to optimally fulfill nutritional requirements for the suckling neonate. Thereby, milk does not only provide nutrients for optimal growth and development, but it also helps the neonates coping with the new extra-uterine environment. Several milk components contribute to the maturation of mucosal immunity and to the intestinal colonization by commensal microbiota. Recent works have shown that the composition of the intestinal flora influences various features of adult physiology, such as energy balance and the susceptibility to allergies and bowel diseases.

The nature of the milk components that contribute to the proper development of gastrointestinal physiology is still largely unknown. Milk is a rich source of antibodies and bioactive proteins like IGF-1, adiponectin and leptin have been detected. Glucocorticoids and bioactive lipids like eicosanoids have also been reported. Furthermore, human milk contains a tremendous diversity of complex oligosaccharides making up to 5 g per liter.

The present project aims at identifying bioactive milk components, such lipid mediators and oligosaccharides. The effect of the bioactive compounds on parameters such as the composition of the intestinal flora, the status of the mucosal immune system and the integrity of the intestinal epithelium will be investigated. The project will combine the application of high-sensitivity analytic procedures, mouse models, human cell culture systems and clinical material such as primary intestinal epithelium and human milk.

The identification and functional assignment of milk components is important for the definition of nutritional supplementations that contribute to optimal neonate development and to the prevention of allergies and gastrointestinal diseases. The knowledge gained will also help refining the formula of milk substitutes for infants.

Project Leadership and Contacts / Projektleitung und Kontakte

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