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Abstract

Milk as a Biological System †

Donna T. Geddes

School of Molecular Sciences, The University of Western Australia, Crawley, WA 6009, Australia; donna.geddes@uwa.edu.au

† Presented at the More Than Just Milk Lactation Science Symposium, Perth, Australia, 25 November 2022.

Abstract: The benefits of breastfeeding and human milk are unequivocal for both the lactating woman and breastfeeding infant. Emerging evidence suggests that environmental factors impact milk composition and subsequently the rapidly developing infants. Indeed, human milk can be considered a biological system accentuating the need for holistic analyses where multiple milk components are considered in contrast to the common reductionist approach. This systems' biology approach is further supported by the evolution of milk to include components that provide both nutrition and protection. Contemporary human lactation research is beginning to design studies to understand the programming effects of human milk in the context of the environment, genetics, and lifestyle. These studies are also engaging analyses that address the complexity of milk composition in an attempt to understand milk as a biological system. To date, maternal factors such as birth mode, infant sex, breastfeeding mode, body mass index, pregnancy complications, and maternal age and diet have been related to differences in milk composition. Furthermore, components within in the milk also display relationships such as milk bacteria and human milk oligosaccharides suggesting the possibility of modulation within the mammary gland. In conclusion, human milk is highly dynamic and responsive to environmental factors and as such may be amenable to interventions designed to improve infant health.

Keywords: human milk; breastfeeding; lactation; milk

Funding: This research was funded by an unrestricted research grant from Medela AG (Switzerland).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data sharing is not applicable.

Conflicts of Interest: D.T.G. declares that she receives a salary from a research grant from Medela AG and declares participation in the Scientific Advisory Board of Medela AG. All other authors receive a salary from an unrestricted research grant from Medela AG.

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Citation: Geddes, D.T. Milk as a Biological System. *Proceedings* **2023**, *84*, 10. https://doi.org/10.3390/proceedings2023084010

Academic Editors: Lisa F. Stinson and Sharon L. Perrella

Published: 20 February 2023

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