A 25-year journey in human lactation from discovery to translation

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In the past 25 years there has been an increasing push to translate the findings of basic scientific research into tangible outcomes and as such our research program has grown over this time to firmly keep translation in view. Indeed, the foundation of this focus on the pathway from discovery to translation comes from establishing a holistic research base. Our research spans the whole lactation cycle from breast development to secretory activation and milk production. Research programmes often begin at the basic level, gradually incorporating more subject areas and disciplines, and ultimately morphing into clinical studies and trials. For example, milk composition research, itself a basic research undertaking, has been woven into all studies often as biomarkers of physiological changes or milk removal as well as endeavouring to understand the impact of milk components on infant growth and development.

The ability to design multidimensional studies has increased the translation value of our research outcomes. For example, the landmark ultrasound research programme investigating the lactating breast [1] was the genesis for the reinvestigation of breastfeeding infants sucking dynamics which, in turn directly impacted our understanding of milk removal. In our lab the effectiveness of milk removal of the breastfeeding infant has been measured using multiple modalities such as real time ultrasound imaging, infant intra-oral measurement, milk composition and test weighing [2] to define both the 'normal' breastfeeding parameters as well aberrations from the norm that subsequently impact the effectiveness of feeding. In this context both strong and weak levels of intra-oral vacuum [3, 4] impact milk removal with a potential negative effect on milk production. In addition, tongue movements that differ from the norm during sucking are linked to pain experienced during breastfeeding. Studies following on from this work now inform clinicians of the infant's effectiveness of milk removal and the reduction of maternal pain during breastfeeding [5].

Another area of international focus is understanding the mechanisms by which breastfeeding, and breast milk composition influence infant health. Our program has ubiquitously integrated measures of milk production, that provide information on breastfeeding patterns and the milk intake of the infant, into clinical studies [6]. This has enabled us to understand how the mother influences particular components in the milk [7] and how this impacts the development of infant body composition, which we measure with ultrasound and bioimpedance. Although, in the past few years, researchers have largely failed to detect any relationship of breast milk composition and infant body composition. However, we have found that the intake of components is related to the regulation of infant adiposity and lean tissue [8]. This research now opens opportunities to influence infant health via breastfeeding in an evidence-based manner.

These examples exemplify the importance of basic science in generating a strong foundation for the evolution of systems-based research which in itself demands focus and drives translation of research results. The work from our laboratory over the past 25 years serves to underscore the importance of this process in human lactation research with the ultimate goal of improving the health and wellbeing of breastfeeding women and their infants.

References

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