

POSTNATAL NUTRITION IN PRETERM-BORN INFANTS: COULD THIS DEVELOPMENTAL WINDOW BE A TARGET TO REDUCE LONG-TERM CHANGES IN CARDIAC STRUCTURE AND FUNCTION?

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Introduction: Preterm birth relates to long-term alterations in cardiac structure and function. Understanding whether preterm postnatal life is a tractable period of cardiovascular development that can be positively altered by nutrition is relevant to long term outcomes.

Purpose: To determine whether being fed human breastmilk during early postnatal life is beneficial to long-term cardiac structure and function in preterm-born individuals compared to infant formulae.

Methods: 926 preterm-born infants originally took part in a randomized controlled trial of postnatal milk feeding regimes between 1982–1985 across five different centres. Preterm-born individuals were randomly assigned to either breastmilk donated by unrelated lactating women or nutrient-enriched formulae. We followed up 102 individuals from this cohort; 30 of which had been randomized to being fed exclusively human milk and 16 to being fed exclusively formula. As a comparison group, we recruited an additional 102 individuals born term to uncomplicated pregnancies. Cardiac volumes and function were assessed by magnetic resonance imaging and creation of a 3D computational atlas of the left ventricle.

Results: Preterm-born individuals fed exclusively human milk as infants had an increased left and right ventricular end-diastolic volume index (+9.73%, $P=0.04$ and +18.2%, $P<0.001$), as well as left and right ventricular stroke volume index (+9.79%, $P=0.05$ and +22.1%, $P=0.01$) compared to preterm-born individuals who were exclusively formula fed as infants. In a multivariable regression model across the entire preterm group ($n=102$) with gestational age, sex, percentage of human milk in the diet, and postnatal weight gain as predictors, the percentage of human milk was positively related to both right ventricular end-diastolic volume index ($P=0.009$) and stroke volume index ($P=0.04$). Use of our computational atlas allowed us to confirm that cardiac differences between groups were proportional size changes, rather than alterations in geometric dimensions.

Conclusions: In summary, we provide the first evidence of a beneficial association between breast milk and cardiac shape in adult life in those born preterm. The findings implicate early preterm postnatal life as a potentially tractable period of cardiovascular development, relevant to long-term outcomes, and support promotion of human milk for the care of preterm infants to reduce long-term cardiovascular risk.