

Unique cardiac remodeling in young adults born Small for Gestational Age with subsequent central obesity

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Background: Being born small-for-gestational age (SGA, 10 percent of all births) is associated with increased risk of cardiovascular mortality (1,2) in adulthood together with lower exercise tolerance (3), but mechanistic pathways are unclear. Central obesity is known to worsen cardiovascular outcomes, but it is uncertain how it affects the heart in adults born SGA.

Purpose: We aimed to assess whether central obesity makes young adults born SGA more susceptible to cardiac remodelling and dysfunction.

Methods: A perinatal cohort study including 80 young adults born SGA (birth weight below 10th centile) and 75 adults with normal birth weight (controls). Current waist-to-hip ratio was used as a surrogate of central obesity. Cardiac structure and function were assessed by cardiac magnetic resonance. Statistical shape analysis was used to study the regional geometric variability of the biventricular surfaces produced by central obesity and SGA, and synthetic surfaces representative of obese and non obese were generated for both SGA and controls.

Results: Figure 1 shows the superimposed representative surfaces of obese and non-obese according to our model, for controls (right column) and SGA (left column). Both SGA and waist-to-hip were highly associated to cardiac shape (F=3.94 p<0.001; F=5.18 p<0.001 respectively) with a statistically significant interaction (F=2.29, p=0.02), indicating a different cardiac remodelling due to obesity in SGA. While controls tend to increase left ventricular end-diastolic volumes, mass and stroke volume with increasing waist-to-hip ratio, young adults born SGA showed unique response with inability to increase cardiac dimensions or mass resulting in reduced stroke volume (both in absolute values and indexed by body surface area) and increased heart rate.

Conclusions: SGA young adults show unique cardiac adaptation to central obesity, which is associated with a decrease in stroke volume. Preventive strategies aiming to reduce cardiometabolic risk in SGA population may be warranted.

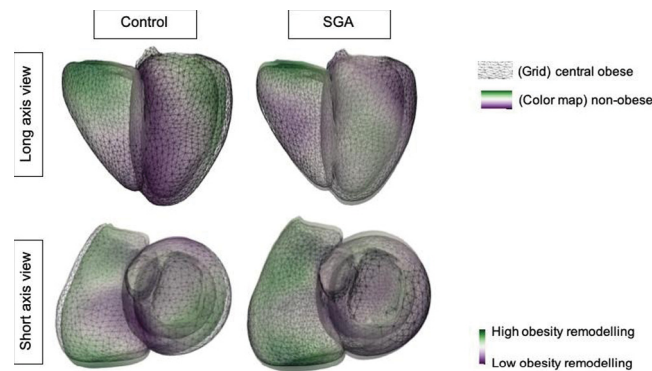


Figure 1