Longitudinal Study of Anthropometry in Fontan Survivors: PHN Fontan Study

Linda Lambert, Brian McCrindle, Danielle Hollenbeck-Pringle,
Victoria Pemberton, Andrew Atz, Chitra Ravishankar, Jay Campbell,
Carolyn Dunbar-Masterson, Karen Uzark, Martha Rolland,
Nicholas Dagincourt, Felicia Trachtenberg, Shaji Menon

On behalf of the PHN Nursing Research Committee

For the Pediatric Heart Network Investigators

Disclosures

o This study was funded by the Pediatric Heart Network (NHLBI)

o This work is solely the responsibility of the authors and does not necessarily represent the official views of NHLBI or NIH

o No other disclosures or COI

Background

o Infants with single ventricle typically have abnormal growth

o Growth abnormalities adversely influence QOL and exercise performance

o Knowledge gaps

   o No robust longitudinal data on anthropometric changes in Fontan survivors

   o Effects of anthropometric abnormalities on QOL and exercise performance

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Purposes

o Evaluate longitudinal changes in height and BMI in Fontan survivors and compare them to population norms

o Examine changes in height and BMI by survival and ventricular morphology

o Examine the relationship of height and BMI with QOL and exercise capacity

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Study Design

- o Multicenter, longitudinal analysis
  - o PHN Fontan Databases
    - o Longitudinal studies
    - o PHN Core Centers (7)

- o Definitions
  - o Ventricular morphology: RV, LV, or mixed
  - o QOL: Patient reported PedsQL
  - o Exercise capacity: VO_2 max

- o Vital status was assessed either by contact or search of the Social Security Death Index

Statistical Analysis

o Height and BMI compared to gender specific population norms (CDC)
   o LOESS non-linear curve fitting

o Differences in height and BMI between survivors vs. non-survivors and among ventricular morphologies
   o Linear regression for repeated measures

o The relationship of height and BMI to QOL
   o Repeated measures multivariable regression

o Impact of BMI and change in height on exercise capacity
   o Repeated measures mixed model with visit included as a random effect

Results: Demographics

	Fontan 1 2003	Fontan 2 2009	Fontan 3 2013
N	546	427	362
Males (n,%)	329 (60%)	249 (58%)	221 (61%)
Mean age yrs (SD)	12 (3.4)	19 (3.4)	21 (3.4)
Dead (n)	NA	18	9
Ventricular Morphology			
RV (n,%)	184 (34%)	140 (33%)	112 (31%)
LV (n,%)	265 (48%)	214 (50)%	186 (51%)
Mixed (n,%)	97 (18%)	73 (17%)	64 (18%)

Results: Comparisons with Normal Population for Height
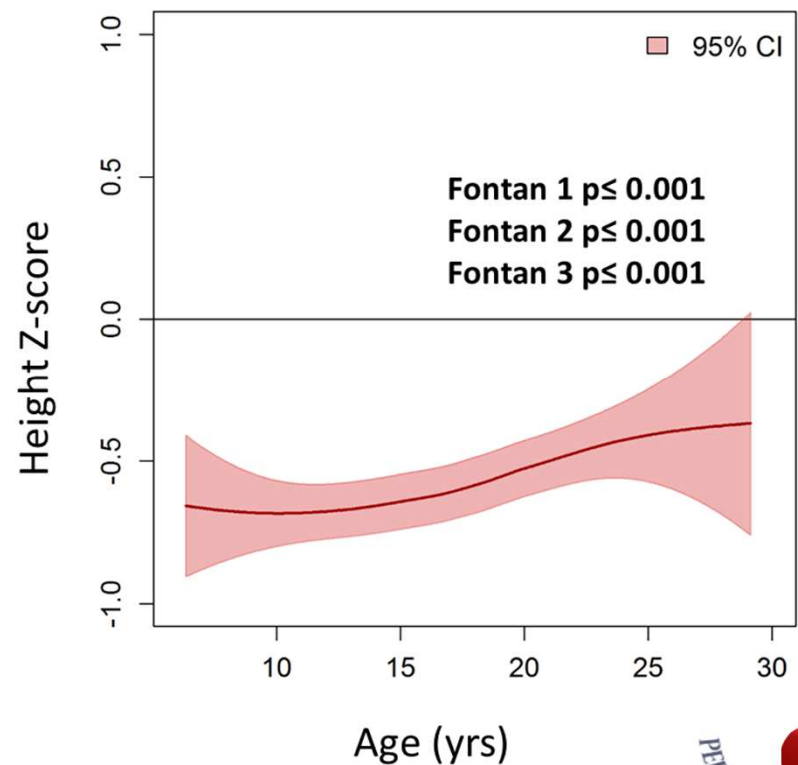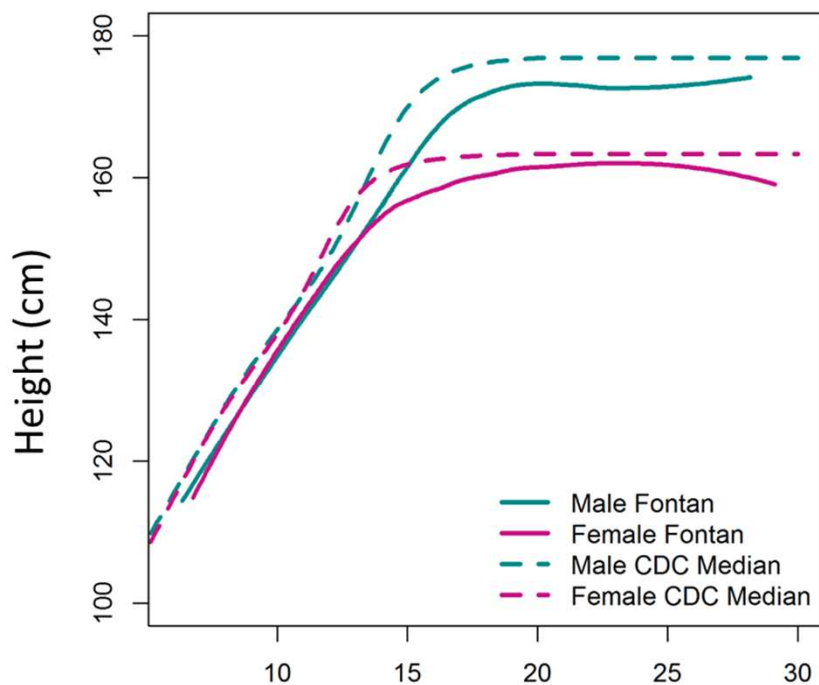
Results: Comparisons with Normal Population for BMI
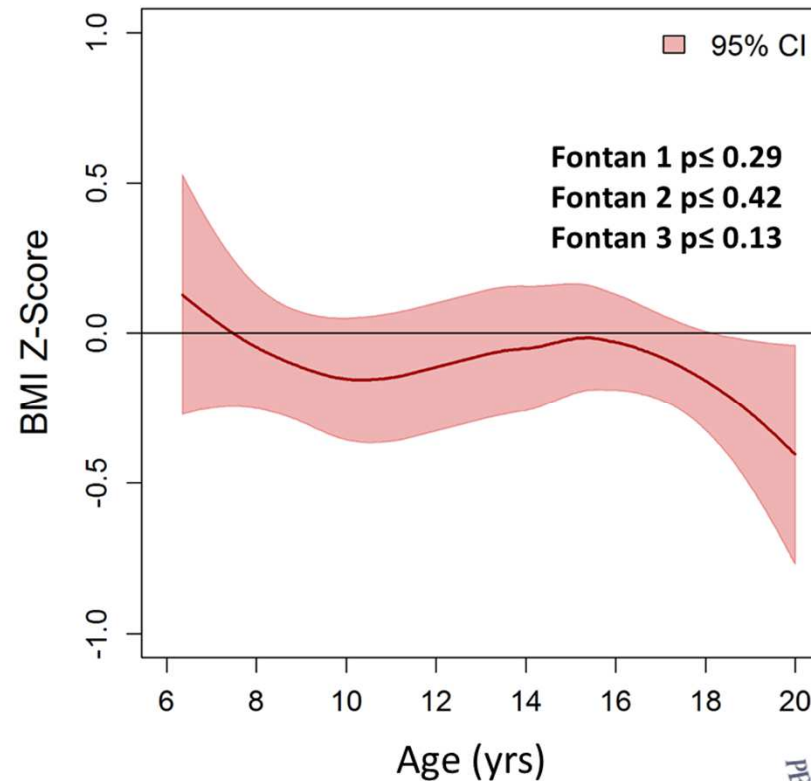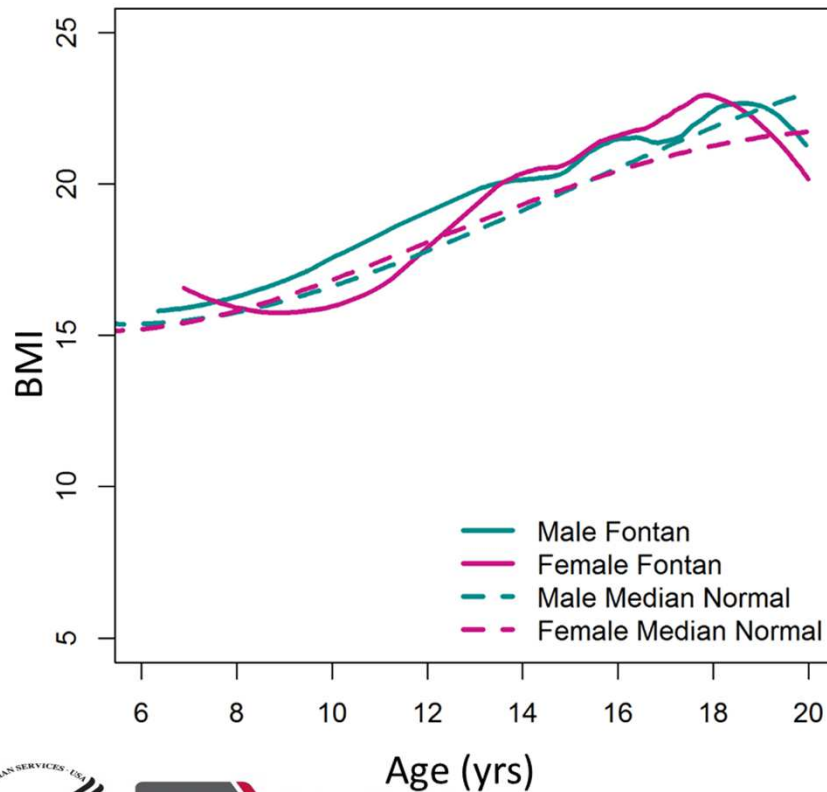
Results: Comparisons for Survivors vs. Non-survivors (n=27)
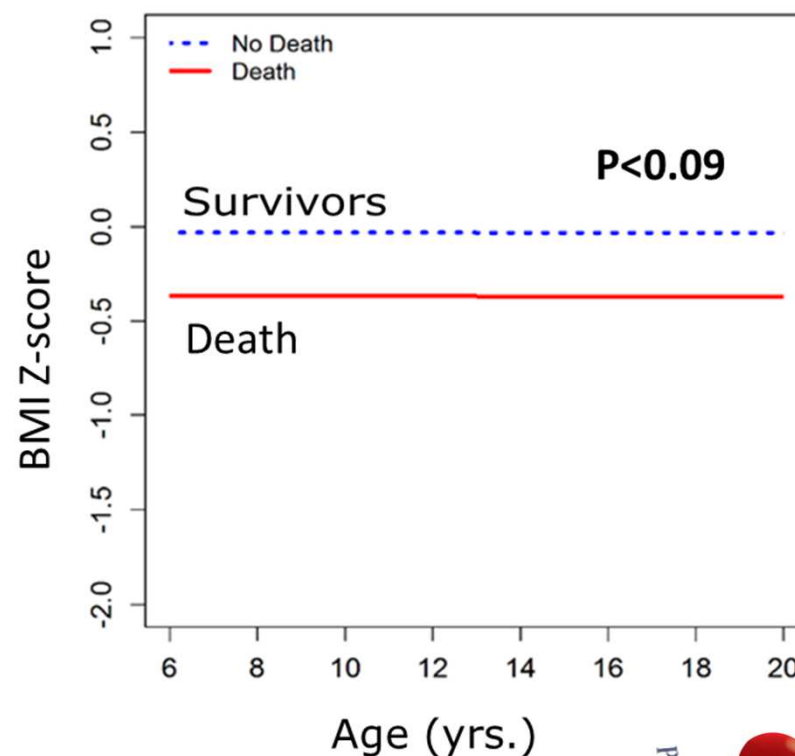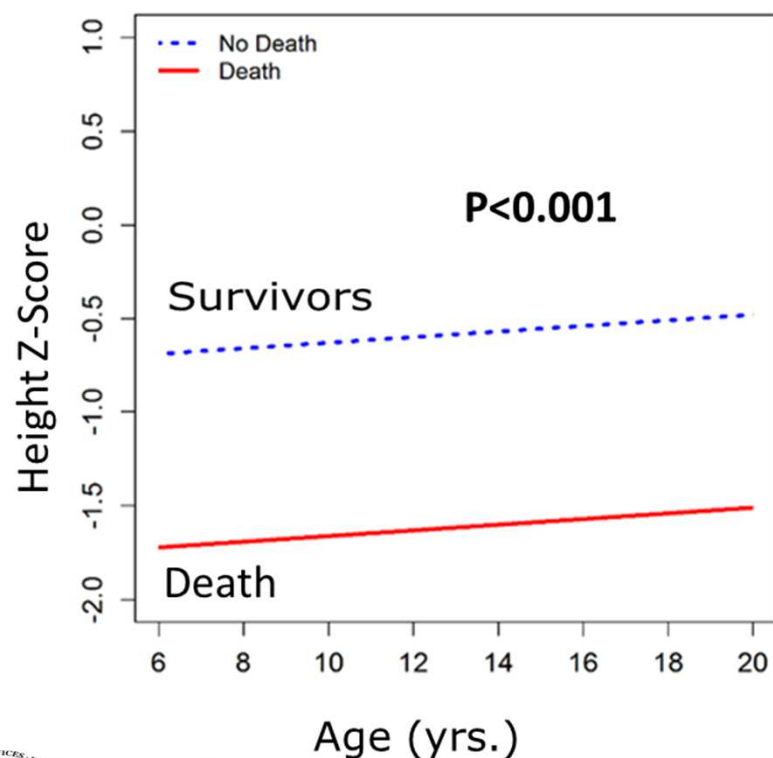
Results: Comparisons by Ventricular Morphology
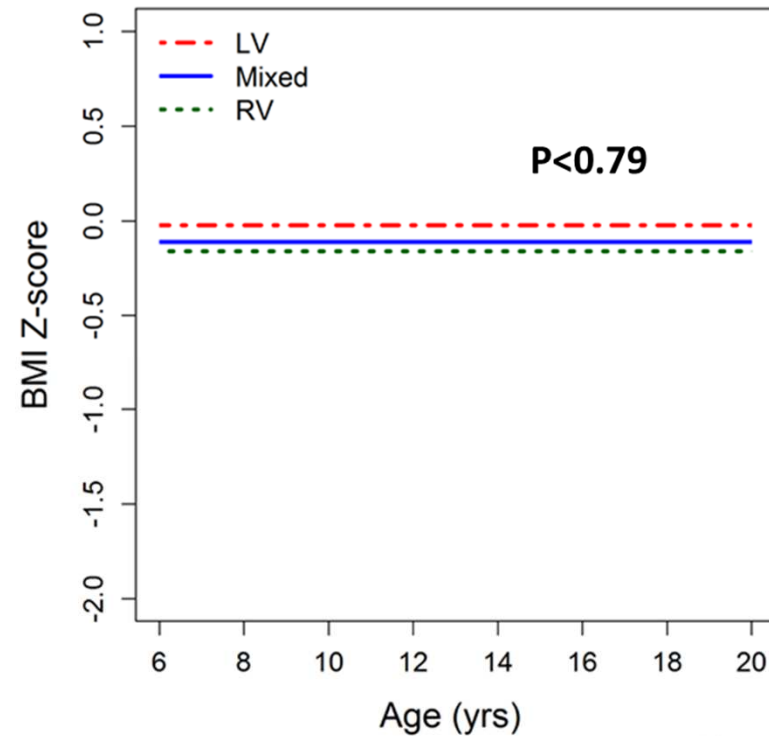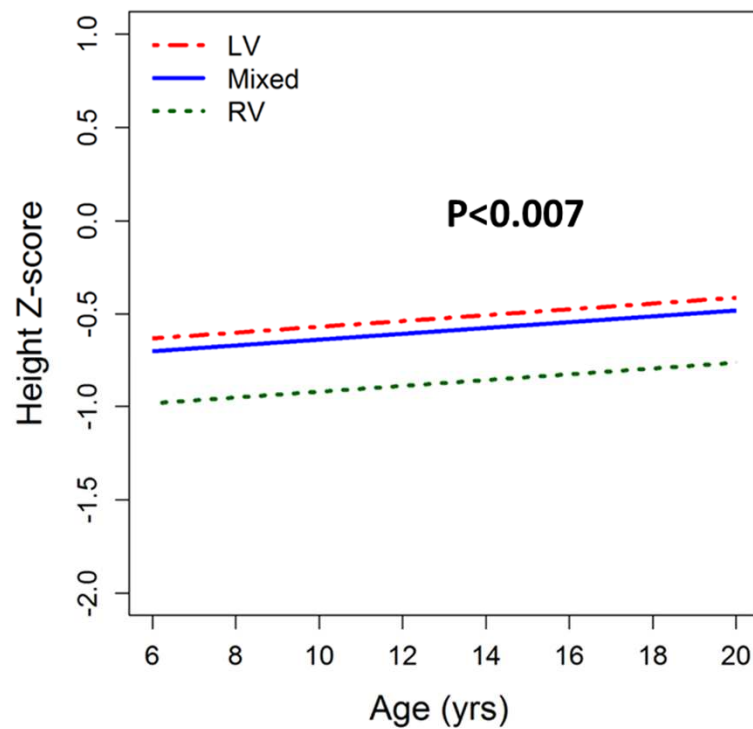
Results: Relationship between anthropometry and QOL

- **PedsQL total score**
  - ⬆ Height z-score was associated with ⬆ PedsQL
    (SE-0.35±0.14, **p<0.001**)
  - ⬆ BMI z-score was associated with ⬇ PedsQL
    (SE 2.83±0.51, **p<0.001**)
- **Physical function scores**
  - ⬆ Height z-score was associated with ⬆ Phys Fxn
    (SE -0.49±0.16, **p<0.003**)
  - ⬆ BMI z-score was associated with ⬇ Phys Fxn
    (SE 2.82±0.52, **p<0.001**)

Results: Relationship between Anthropometry and Exercise Capacity

o ⬆ Height z-score is associated with ⬆ VO_2 max

  (SE 2.61±1.08, **p<0.02**)

o ⬆ in BMI z-score is associated with ⬇ VO_2 max

  (SE-1.28±0.28, **p<0.001**)

Conclusions

o Compared to the population norms, Fontan survivors are shorter but have similar BMI

o Height is most severely affected in Fontan survivors with RV morphology

o Survivors were taller than non-survivors

o Being taller was associated with better QOL and exercise capacity but having a higher BMI was associated with the opposite effects