

# Pediatric hematopoietic cell transplantation: Longitudinal trends in body mass index and outcomes



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## Introduction

- Hematopoietic cell transplantation (HCT) is a well-established and widely utilized treatment for a variety of malignant and non-malignant conditions
- Recent studies demonstrate an association between obesity and reduced survival in adult and pediatric HCT recipients
- The growing interest on body habitus, a potentially modifiable risk factor, and its effects on HCT outcomes have prompted research on the converse—the influence of HCT on BMI
- The mixed literature has demonstrated that pediatric HCT recipients may experience a reduction in BMI after transplantation, as well as an increase
- In this study, we sought to characterize the relationship between pediatric BMI and HCT outcomes at our institution

## Methodology

### Patient characteristics and outcomes measured

- Retrospective analysis of HCT patients treated at Mattel Children's Hospital at the University of California, Los Angeles
- Inclusion criteria: all patients who received HCT over a 14-year period between 2005 and 2018
- Data on age at transplant, sex, ethnicity, malignant, donor relationship to recipient, transplant source, antigen mismatch, GVHD prophylaxis, year transplanted, and conditioning regimen with TBI were collected
- Post-transplant follow-up data included acute GVHD within the first 100 days, chronic GVHD after 100 days and use of steroids, rates of viral infection, time to platelet and neutrophil engraftment, and overall survival

### Anthropometry

- BMI was evaluated from baseline (time of transplant) to up to five years post-transplant
- BMI was converted to percentiles using age-appropriate scales
- Percentiles were stratified to weight groups according to the following: obese ( $\geq 95\%$ ), overweight (85%-94.9%), normal weight (5%-84.9%), and underweight ( $< 5\%$ )

## Results

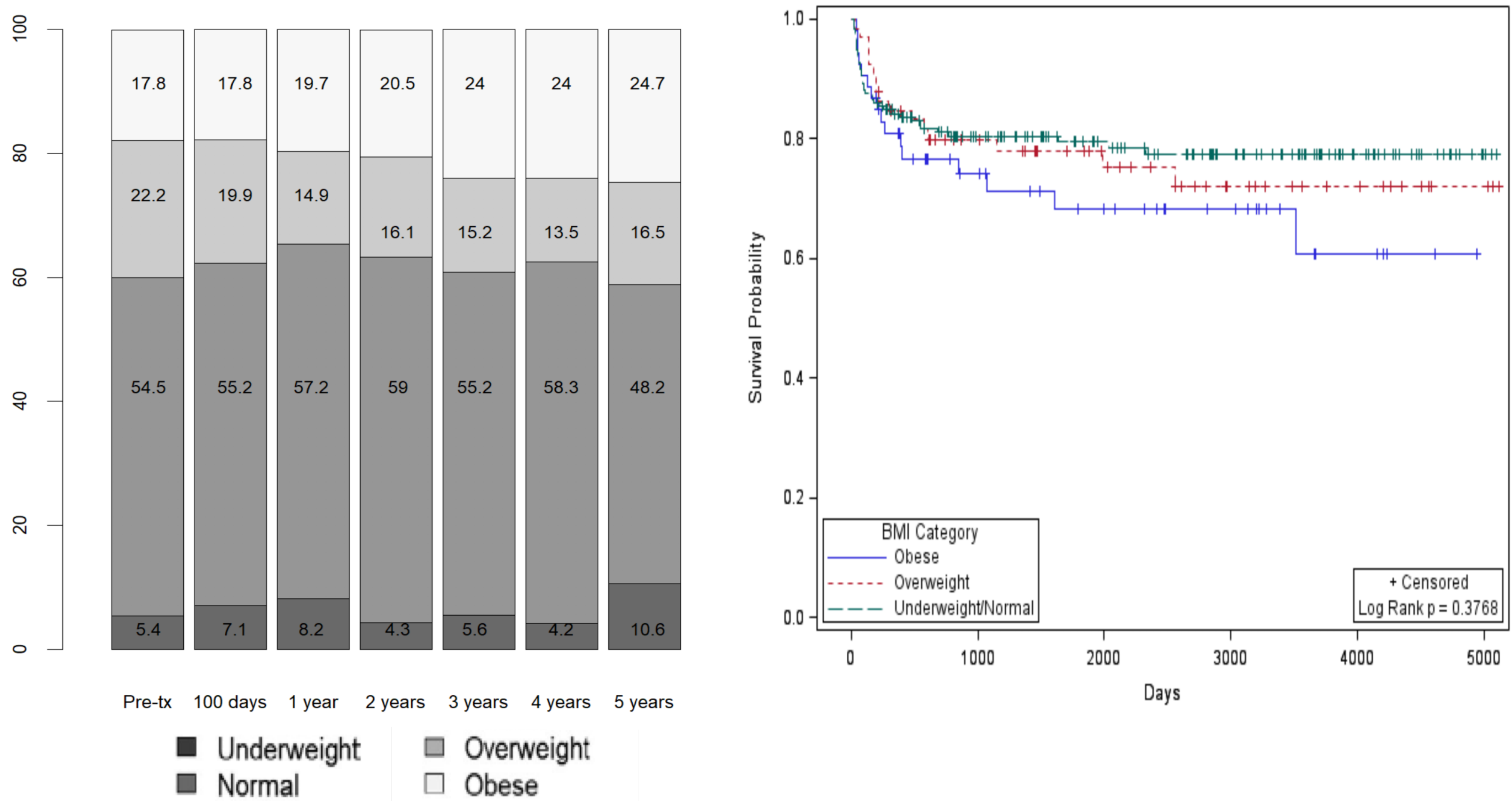


Figure 1 Weight Category Frequencies Over Time

Stacked bar graphs demonstrate the changes in relative frequencies of weight categories (N = 297) from the pretransplant period up to 5 years posttransplant

Figure 2 Survival Estimates

Kaplan-Meier plot of overall survival probability in HCT patients. Trends demonstrate worsened survival in OW and OB individuals compared with NW/UW individuals, though not significant

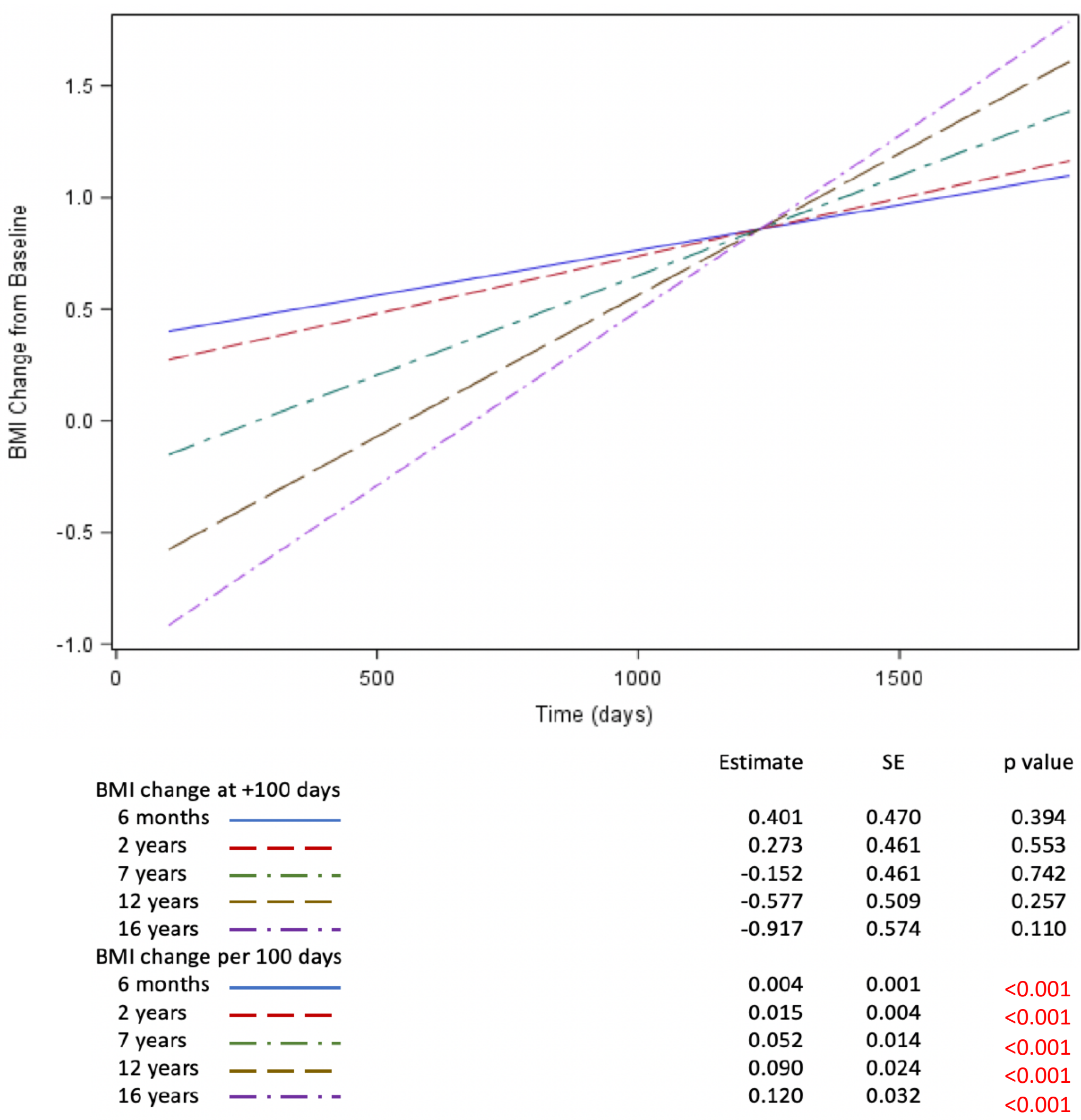


Figure 3 BMI Trends Over Time Stratified By Age

Plot of the BMI changes relative to baseline (pretransplant), starting from day 100 to 5 years posttransplant. Day 100 BMI was not significantly different from baseline BMI for any age. All ages demonstrated significant increases in BMI over time from day 100 to 5 years post-transplant

## Results (continued)

	Total	Pre-transplant Weight				p value
		Underweight	Normal Weight	Overweight	Obese	
Acute GVHD n (%)						
0-2	166 (81.8)	5 (83.3)	91 (83.5)	38 (84.4)	32 (74.4)	0.54
3-4	37 (18.2)	1 (16.7)	18 (16.5)	7 (15.6)	11 (25.6)	
Chronic GVHD n (%)						
0-Limited	170 (91.4)	5 (83.3)	94 (92.2)	37 (88.1)	34 (94.4)	0.48
Moderate-Severe	16 (3.3)	1 (16.7)	8 (7.8)	5 (11.9)	2 (5.6)	
Viral Infection n (%)						
Yes	73 (43.5)	2 (33.3)	46 (48.9)	14 (41.2)	11 (32.4)	0.37
No	95 (56.5)	4 (66.7)	48 (51.1)	20 (58.8)	23 (67.6)	
5-year survival %	76.6	93.75	78.5	78.2	69.3	0.32
Platelet engraftment, days, median (95% CI)	30.5 (26, 33)	39.5 (17, 55)	31 (25, 36)	30.5 (23, 42)	29 (23, 32)	0.99
Neutrophil engraftment, days, median (95% CI)	18 (16, 20)	14.5 (10, 39)	18 (16, 20)	16.5 (14, 21)	20 (16, 24)	0.88
	Total	100-days Post-transplant Weight				p value
		Underweight	Normal Weight	Overweight	Obese	
Chronic GVHD n (%)						
0-Limited	150 (90.4)	10 (100)	83 (92.2)	27 (81.8)	30 (90.9)	0.30
Moderate-Severe	16 (9.6)	0 (0)	7 (7.8)	6 (18.2)	3 (9.1)	
5-year survival %*	85.0	100	90.2	78.7	73.8	0.02

Table 1 Post-transplant Outcomes

Note: Weight categories classified according to age-adjusted body mass index scales  
\*Subset of patients who had a 100-day post-transplant visit (N = 241)

## Conclusion

- An increased prevalence for obesity was observed in our pediatric post-transplant population, with adolescents and young adults at highest risk
- Overweight and obese individuals had worsened 5-year survival estimates based on 100-day post-transplant BMI
- Due to the well-documented negative effects of excess adiposity on health, it is critical to optimize body composition during the pretreatment, treatment, and post-treatment periods to mitigate the risk of catastrophic adverse events later in life
- Additional studies characterizing the interaction between body composition and hematopoietic cell transplant outcomes are warranted
- Greater insight into this field will undoubtedly provide guidance on the identification of at-risk populations and the development of interventions to treat and prevent obesity