

Morbid Obesity is an Adverse Risk Factor for Autologous Hematopoietic Progenitor Cell Collection

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Background

Obesity is a rising health issue in the US

- 20-30% US population is obese
- 3-6% morbidly obese
- Michigan: 29.4% obesity rate, 10th in US

Obesity, malignancy and BMT

- ? Obesity at young age & small ↑ risk NHL
- NHL and “fat genes”: leptin, ghrelin, neuropeptide Y
- Obesity and autologous HPC transplant
 - ↓ Risk transplant mortality BMI > 25
 - ↓ survival at BMI > 28 (2.2 vs > 5 yrs)

Background

Obesity is unknown factor for HPC collection

- Potential technical challenges
 - ↑ Weight and CD34 target yields
 - Venous access
 - Obesity-associated medical conditions

Methods

16 month retrospective review

- Adult autologous HPC collection
- Cobe Spectra, WBC kit
 - Excluded procedures: Plerixifor within 12 hours apheresis*

Patients classified by Body Mass Index (BMI)

- BMI = mass (kg)/ (height [m])²
- Normal (NL): 18.5-24.9
- Overweight (OW): 25-29.9
- Obese (OB): 30-34.9
- Severe Obese: 35-39.9
- Morbid Obese: >40

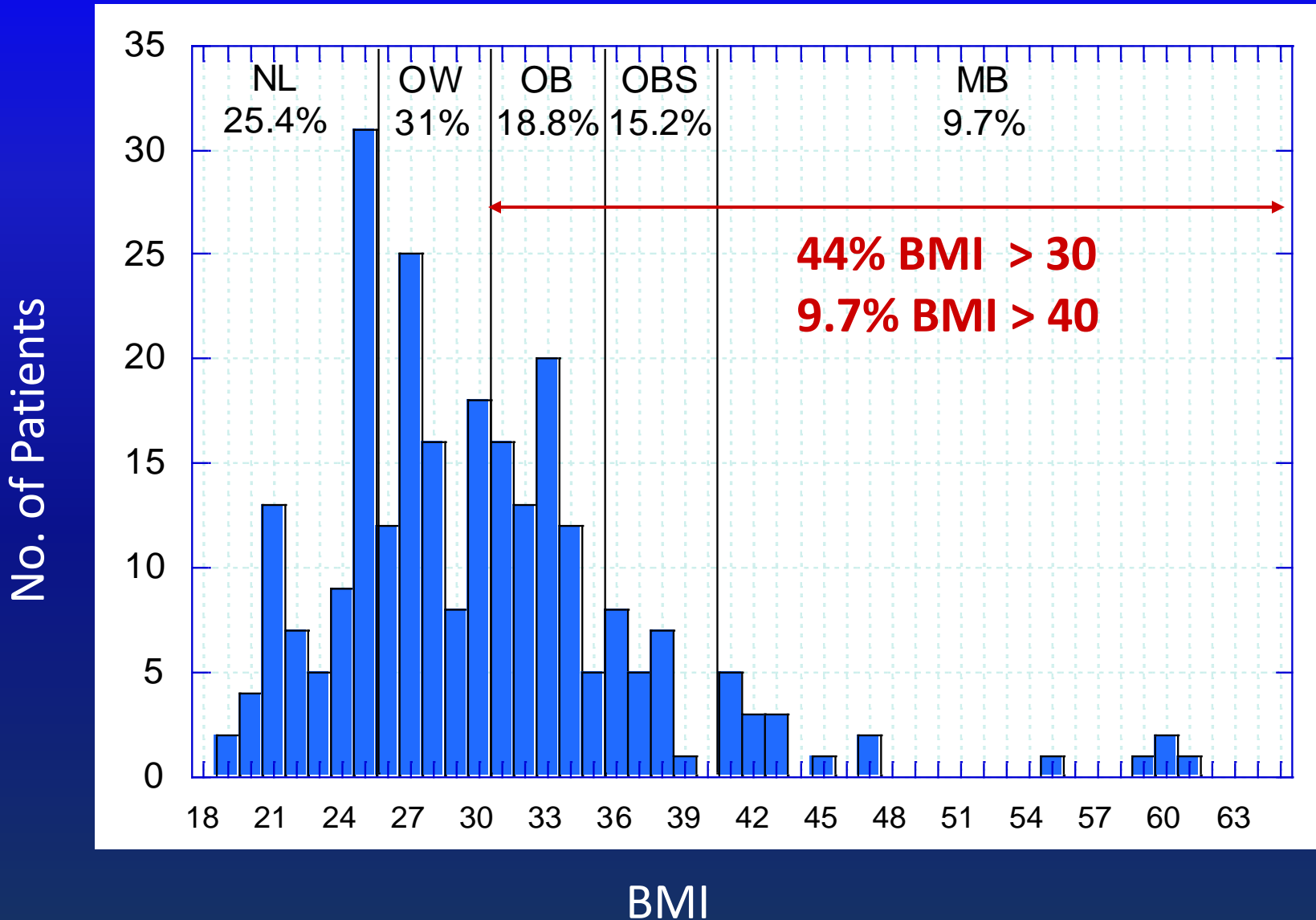
Methods: Analysis

- **Demographic data**
 - Age, Sex, Dx, prior therapy, TBV, HT, WT
- **Laboratories**
 - Peripheral blood counts (WBC, CD34, %MNC)
 - Chemistries (CRP, lipid profile, protein, Ig)
- **Procedure-related data**
 - Mobilization regimen
 - Cell yields, CD34 collection rate
 - Access
 - Procedure-related complications (technical, access)
- **Analysis**
 - T-test, chi-square, linear regression

Results: Demographics

	No. Patients	% (range)
Total Pts	164	100%
Procedures	299	
Age, yrs	58 ± 10.3	28 – 76
Male	114	69%
Female	51	31%
Diagnosis		
Myeloma	98	60%
Lymphoma	65	40%
Height, cm	173.8 ± 10.2	(151 - 193)
Weight, kg	87.4 ± 22.9	(46 - 207.5)
Total BV, L	5.3 ± 1.0	(2.9 - 9.5)
BMI	29.8 ± 7.2	(19.2 - 61.3)

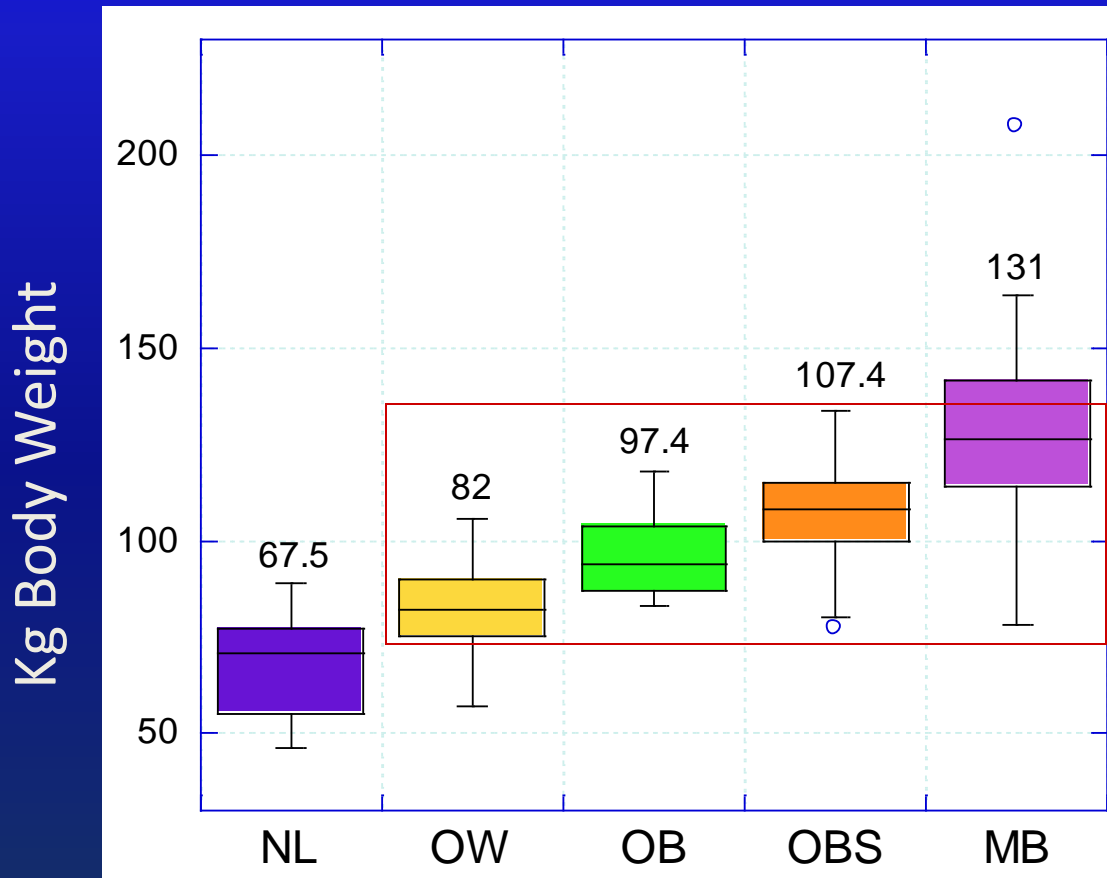
BMI Distribution



BMI by Kg Weight

Weight is poor measurement of obesity

Wide overlap in kg BW between OW and MB



Results: Demographics by BMI

Morbid Obese: ↑ females, dx lymphoma, radiation, 2nd and 3rd line salvage chemotherapy

	Normal (18.5-24.9)	Overweight (25-29.9)	Obese (OB) (30-34.9)	Severe OB (35-39.9)	Morbid OB (> 40)
Age	57.1 ± 10.6	57.4 ± 9.9	57.6 ± 10.0	55.2 ± 14.2	54.7 ± 11.7
Male	23 (55)	37 (72)	25 (81)	20 (80)	9 (56)
Female	19 (45)	14 (27)	6 (19)	4 (20)	7 (44)
BMI Male	24.4 ± 1.5	27.3 ± 1.6	31.9 ± 1.2	36.3 ± 1.5	47.5 ± 8.0
BMI Female	21.9 ± 1.8	27.8 ± 1.2	31.9 ± 3.2	35.7 ± 1.7	52.1 ± 6.8
Myeloma	20 (48)	34 (67)	21 (68)	16 (67)	7 (44)
Lymphoma	21 (50)	17 (33)	10 (32)	8 (33)	9 (56)
Steroids	93%	nd	97%	100%	100%
2 nd line Tx	40%	nd	29%	42%	75%
3 rd line Tx	9%	nd	6%	8%	18%
Radiation	7%	nd	19%	29%	31%

Peripheral Blood Counts

	Normal	Over Weight	Obese	Severe OB	Morbid OB
WBC (x 10 ⁹ /L)	33.7 ± 21.5	31.8 ± 17.4	33.5 ± 16.6	31.1 ± 17.1	33.1 ± 21.2
% MNC	10.8 ± 6.5	10.4 ± 7.8	10.8 ± 6.9	11.8 ± 1.4	11.4 ± 16.9
% CD34* (median)	0.18 ± 0.04 (0.12)	0.25 ± 0.04 (0.11)	0.23 ± 0.06 (0.09)	0.38 ± 0.14 (0.14)	0.16 ± 0.07 (0.06)
CD34/uL Median (range)	62.9 ± 14.9 24.2 (0-536.3)	80.3 ± 16.4 38.3 (0-736.5)	56.1 ± 11.9 28.6 (5.1-403.3)	51.4 ± 9.5 35.9 (0-243.8)	93.3 ± 71 7.2 (0 – 1644)

No Difference in total WBC by BMI

Morbid Obesity : lower median %CD34 and CD34/uL (p=NS)
over 50% had CD34/uL < 10/uL on day 1

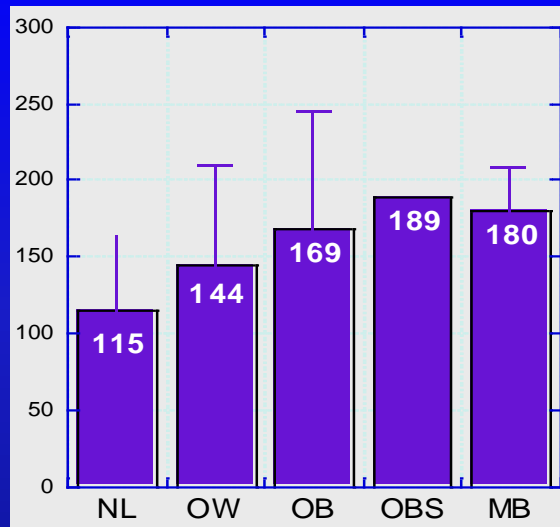
HPC Yield by BMI

↑ WBC yield

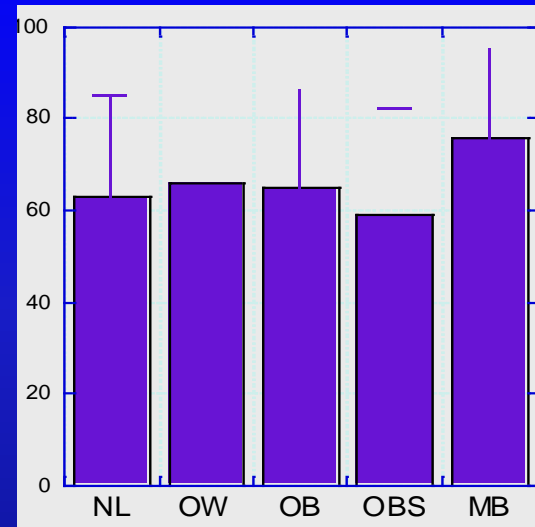
↓ MNC/kg

↓ CD34/kg

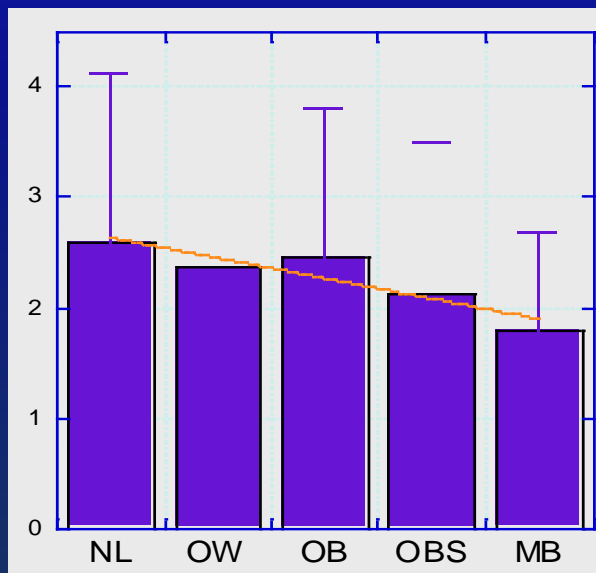
Total WBC (x 10⁹)



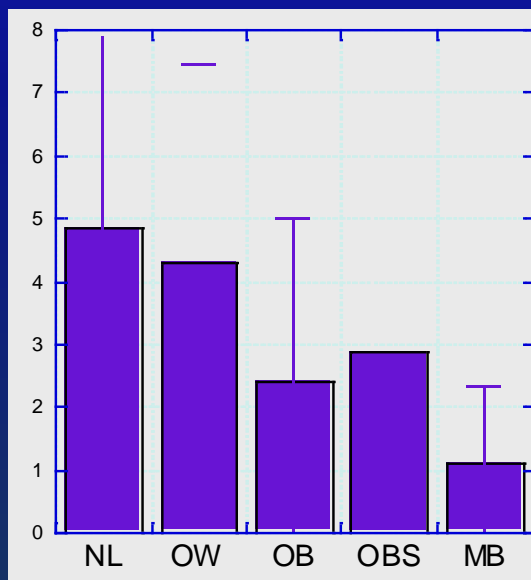
% MNC



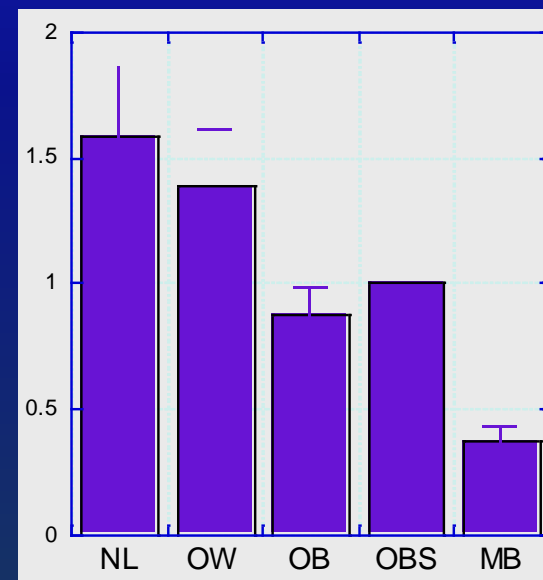
% MNC/kg



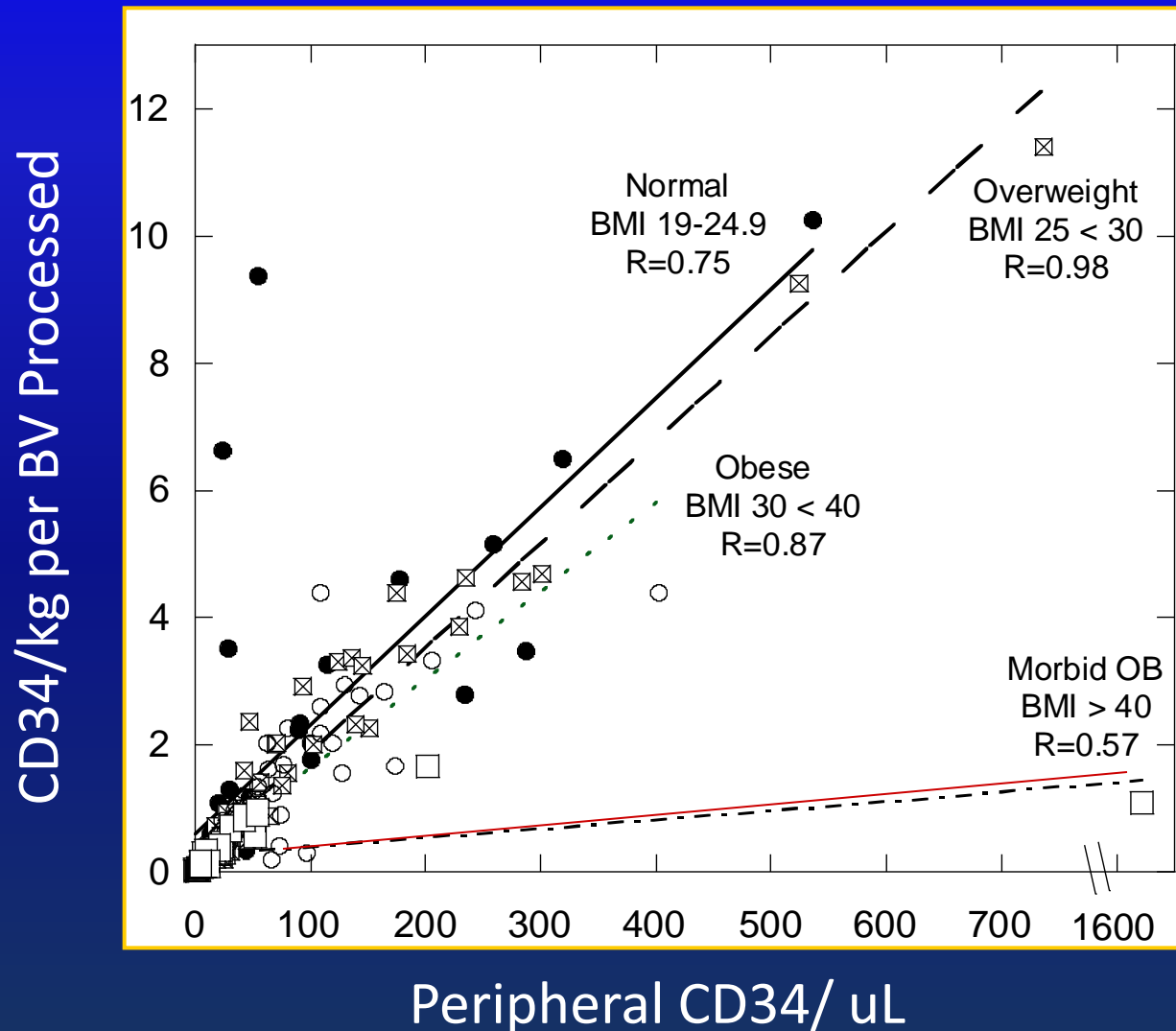
C34 /kg/ procedure



CD34 /kg/ BV processed



Morbid Obesity Associated with Decrease in CD34 Collection Rate



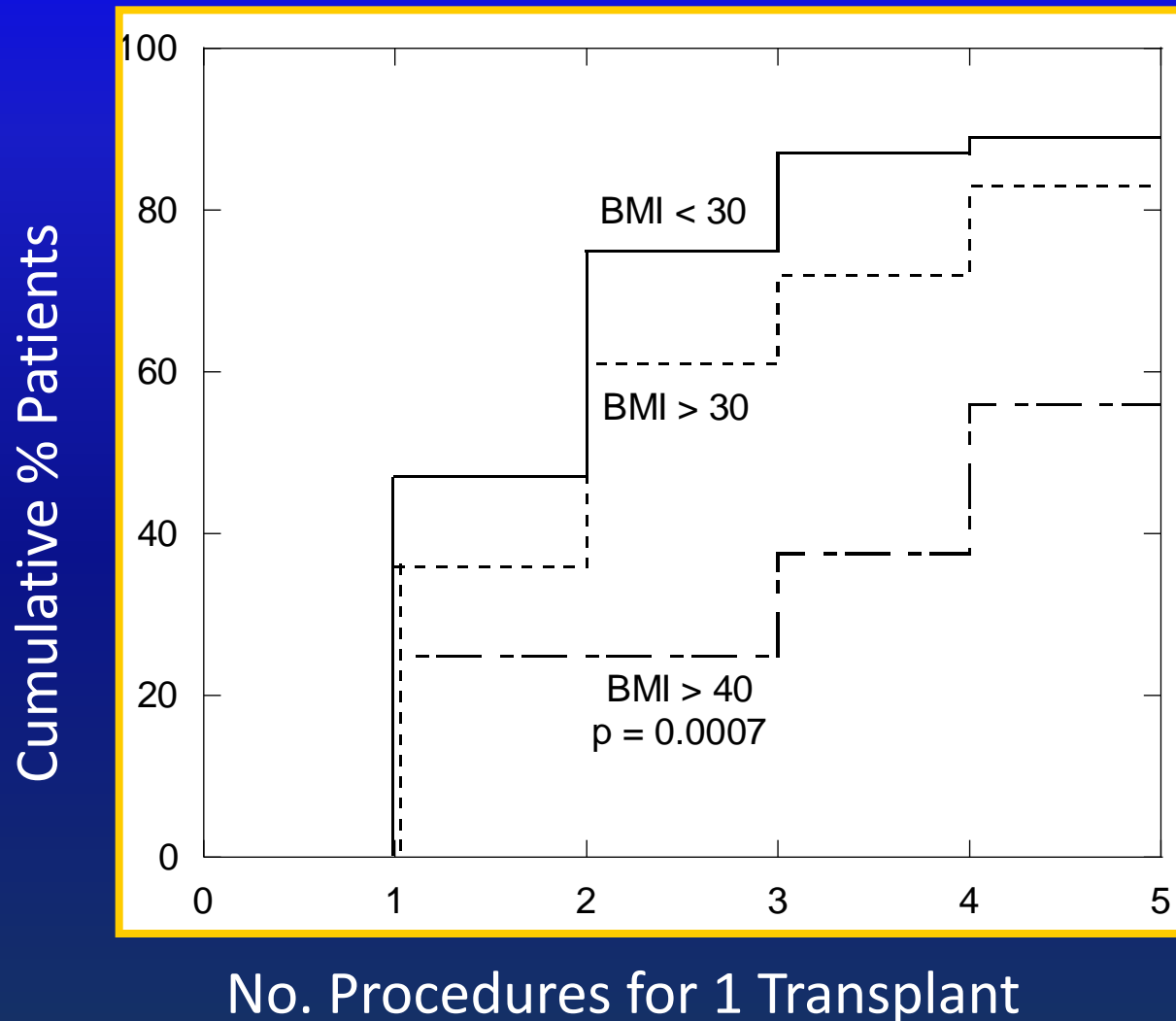
Potential Technical and Patient Factors

	Normal	Obese	OBS	MB
No. TBV processed	2.9 ± 0.4	3.0 ± 0.3	2.8 ± 0.6	2.8 ± 0.4
Access				
Peripheral	33%	27%	13%	25%
CVC	67%	73%	87%	75%
Complications				
Access	19%	19%	17%	6%
Technical	5%	3%	0%	6%
Mobilization				
G-CSF only	34%	32%	30%	29%
Chemo + GCSF	66%	68%	70%	71%
Inflammation (↑CRP)*	0/2	6/19 (24%)	4/20 (20%)	6/9 (40%)

*No difference in total protein, immunoglobulin, lipid levels within +/- 7 days.
No data available for ESR, fibrinogen.*

Collection Success Rate per Mobilization

** All collections including plerixafor-mobilized*



Summary

HPC Collection in Morbidly Obese

- ↓ CD34/kg yield/volume processed
- ↓ CD34/kg yield per collection
- ↓ CD34 collection rate
 - (CD34 yield per CD34/uL)
- ↓ collection success rate per mobilization