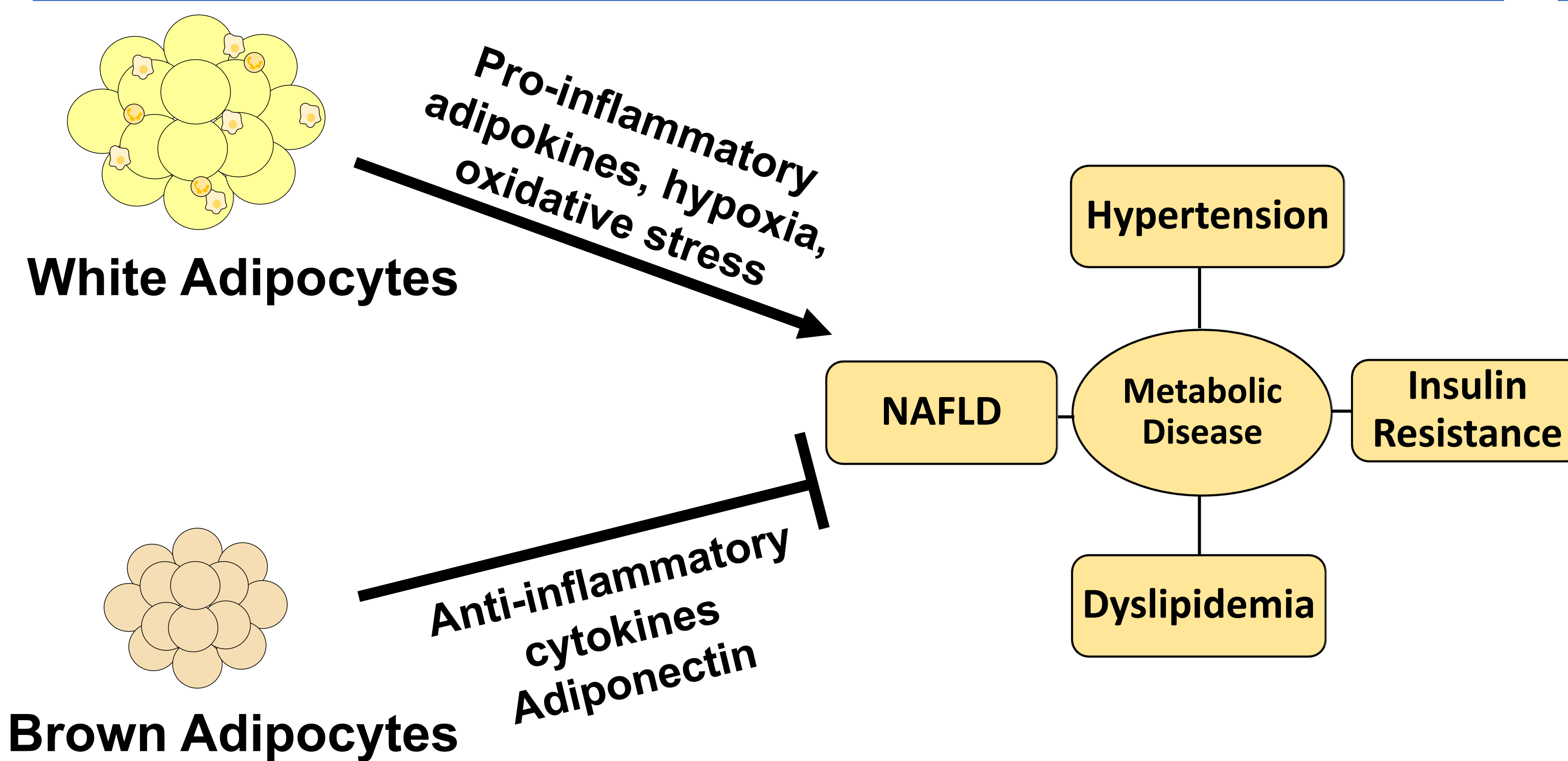


# PERIAORTIC FAT: A POTENTIAL BIOMARKER FOR METABOLIC DISEASE IN OVERWEIGHT CHILDREN

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## BACKGROUND



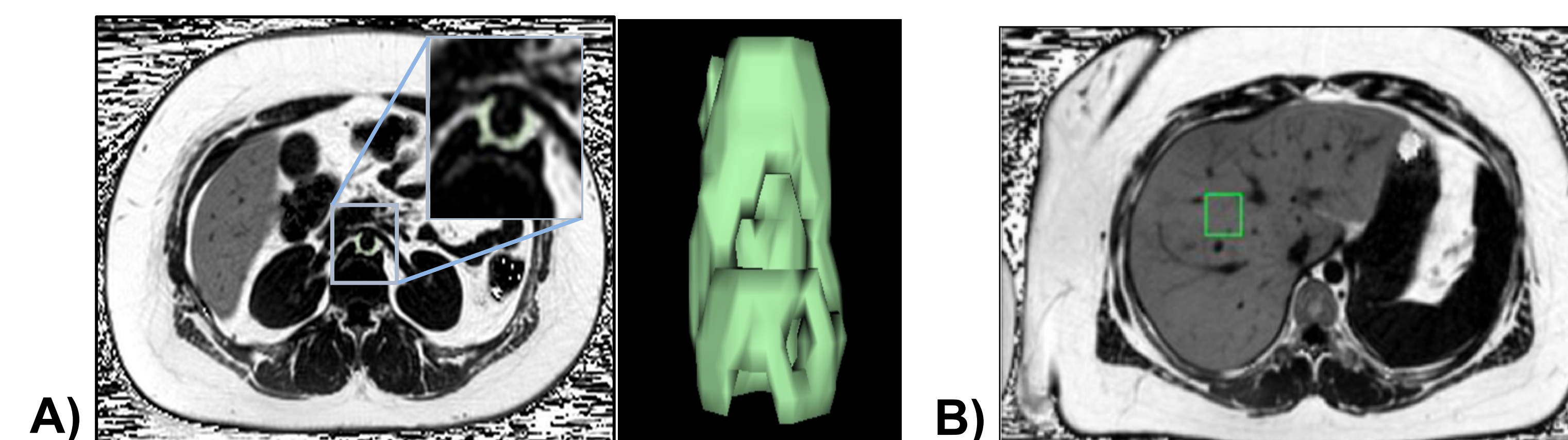
- The function of adipocytes is determined by location and content (*i.e.*, white vs. brown fat).
- In adults, periaortic and white fat promote metabolic disease.
- Brown fat protects against metabolic disease.
- Little is known about periaortic fat in children.
- Free-breathing MRI is a novel research tool that can quantify periaortic fat volume and content in children.

## OBJECTIVE

To quantify periaortic fat volume and content in healthy and overweight children and correlate these measurements with MRI and clinical measures of adiposity using free-breathing MRI.

## METHODS

- Inclusion Criteria:**
  - Healthy children: ages 6-17, BMI <85th percentile
  - Overweight children: ages 6-17, BMI ≥85th percentile
- Periaortic fat volume was measured along 40mm of the abdominal aorta.
- Periaortic fat proton-density fat fraction (PDFF), a biomarker for fat content was measured.
- Hepatic PDFF, a biomarker for hepatic steatosis, was measured.



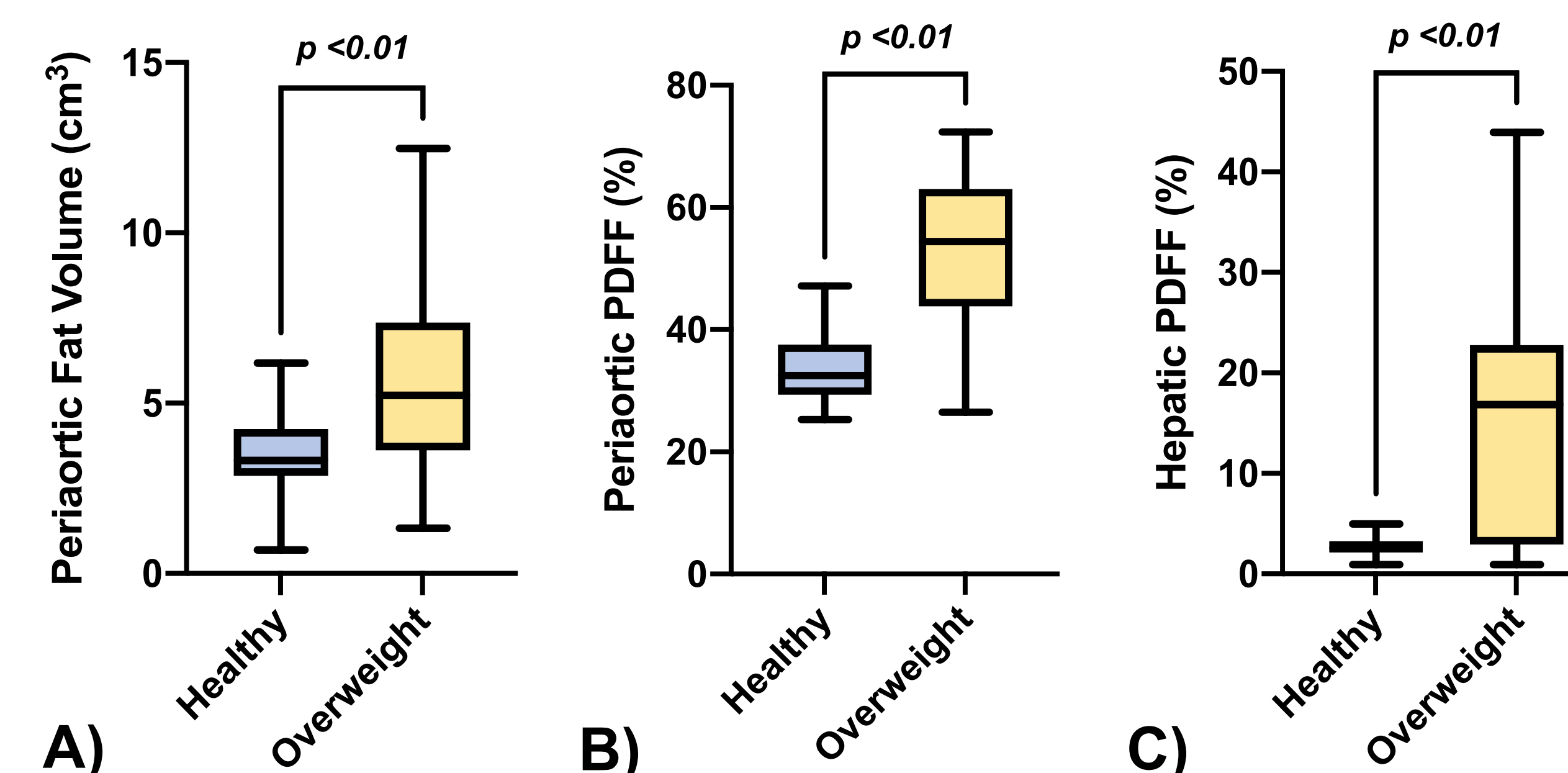
Representative A) periaortic fat segmentation and B) hepatic fat measurement in an overweight child.

## RESULTS

	Healthy Children n = 21	Overweight Children n = 26	P
Age, years	11.4 [9.9-14.1]	14.9 [11.9-16.2]	<0.01
Race – White	33%	85%	<0.01
Hispanic	14%	62%	<0.01
Male	57%	69%	0.54
Body Mass Index z-score	-0.3 [-0.7 – 0.3]	3.0 [0.8 – 4.0]	<0.01
Waist Circumference, cm	70.5 [61.2 – 76.3]	103 [85.9– 114.1]	<0.01
HgbA1C, %		5.7 [5.3 – 6.1]	
AST, IU/L		35.5 [23.8 – 56.5]	
ALT, IU/L		67.5 [29.8 – 125.0]	

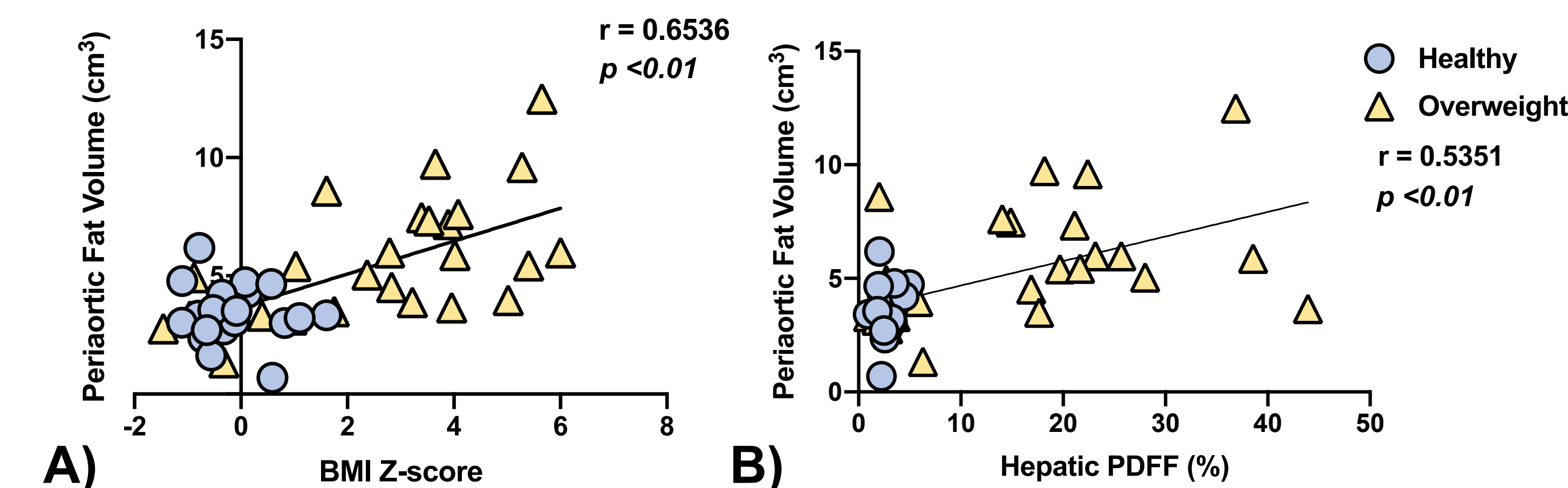
Data presented as median [IQR] or %.

### Overweight Children Have Greater Periaortic Fat Volume, PDFF and Hepatic PDFF

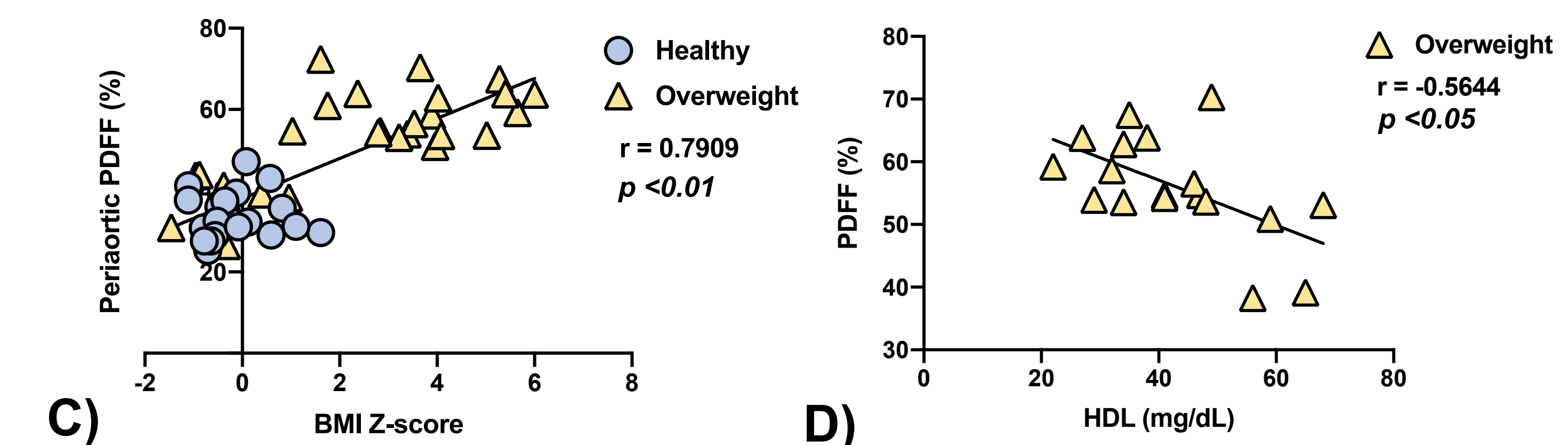


A) Periaortic fat volume, B) periaortic PDFF and C) hepatic PDFF of healthy and overweight children.

### BMI Z-score and Hepatic PDFF Positively Correlate with Periaortic Fat Volume



### BMI Z-score Positively Correlates and HDL Negatively Correlates with Periaortic Fat PDFF



Correlations between A) BMI Z-score and fat volume, B) Hepatic PDFF and fat volume, C) BMI Z-score and periaortic PDFF and D) HDL and periaortic PDFF.

## CONCLUSION

- In this study, overweight children had increased periaortic fat volume and PDFF compared to their healthy peers.
- Periaortic fat volume and content are associated with markers of metabolic dysfunction.
- A higher fat content (*i.e.*, PDFF) may indicate an increase in white-like fat and increased susceptibility to future metabolic disease.

## REFERENCES

- Armstrong T, Ly K V., Murthy S, et al (2018) Free-breathing quantification of hepatic fat in healthy children and children with nonalcoholic fatty liver disease using a multi-echo 3-D-stack-of-radial MRI technique. *Pediatr Radiol*. doi: 10.1007/s00247-018-4127-7
- Lee JJ, Pedley A, et al (2018) Visceral and Intrahepatic Fat are Associated with Cardiometabolic Risk Factors Above Other Ectopic Fat Depots: the Framingham Heart Study. *The American Journal of Medicine*. doi:10.1016/j.amjmed.2018.02.002