

# **Adipose Tissue, Body Mass Index and Fat Distribution**

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# Disclosures

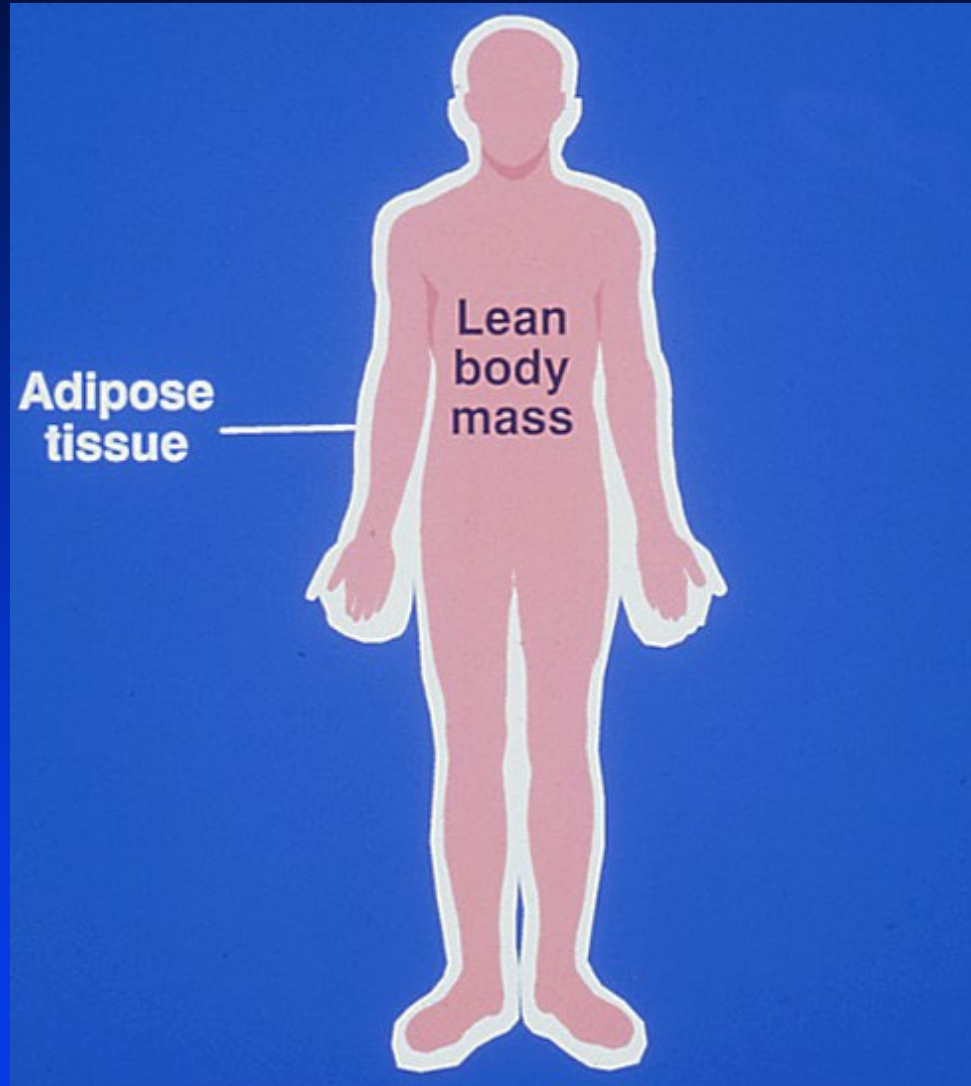
- **SEATTLE GUMMY COMPANY - Advisor**
- **Biohaven Pharmaceuticals, Inc. – Advisor**
- **Jensen Obesity Enterprise, LLC – partner with Mayo Clinic to pursue a patent application for "abdominal measurement apparatuses and related methods"**



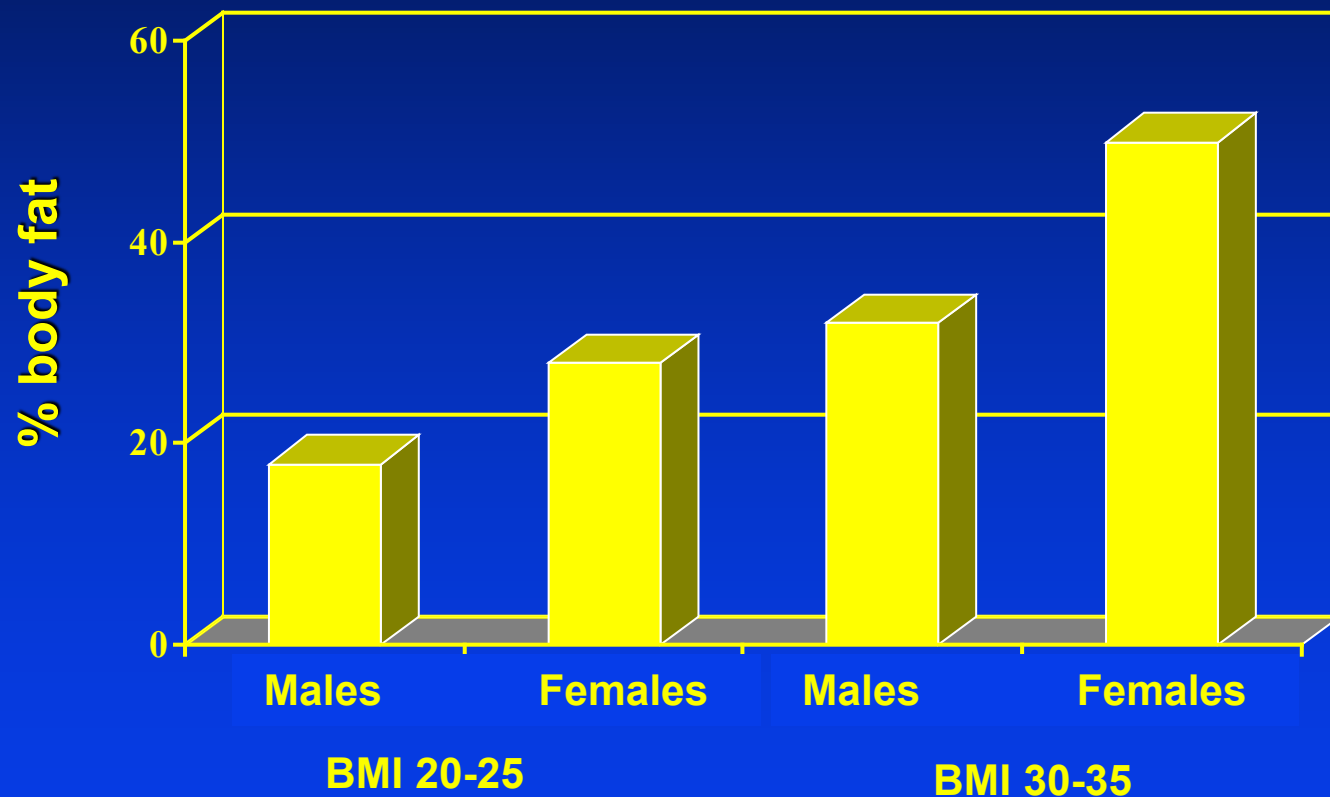
# BMI – Surrogate for Body Fat

**Why do we care about body fat?**

# Body Composition

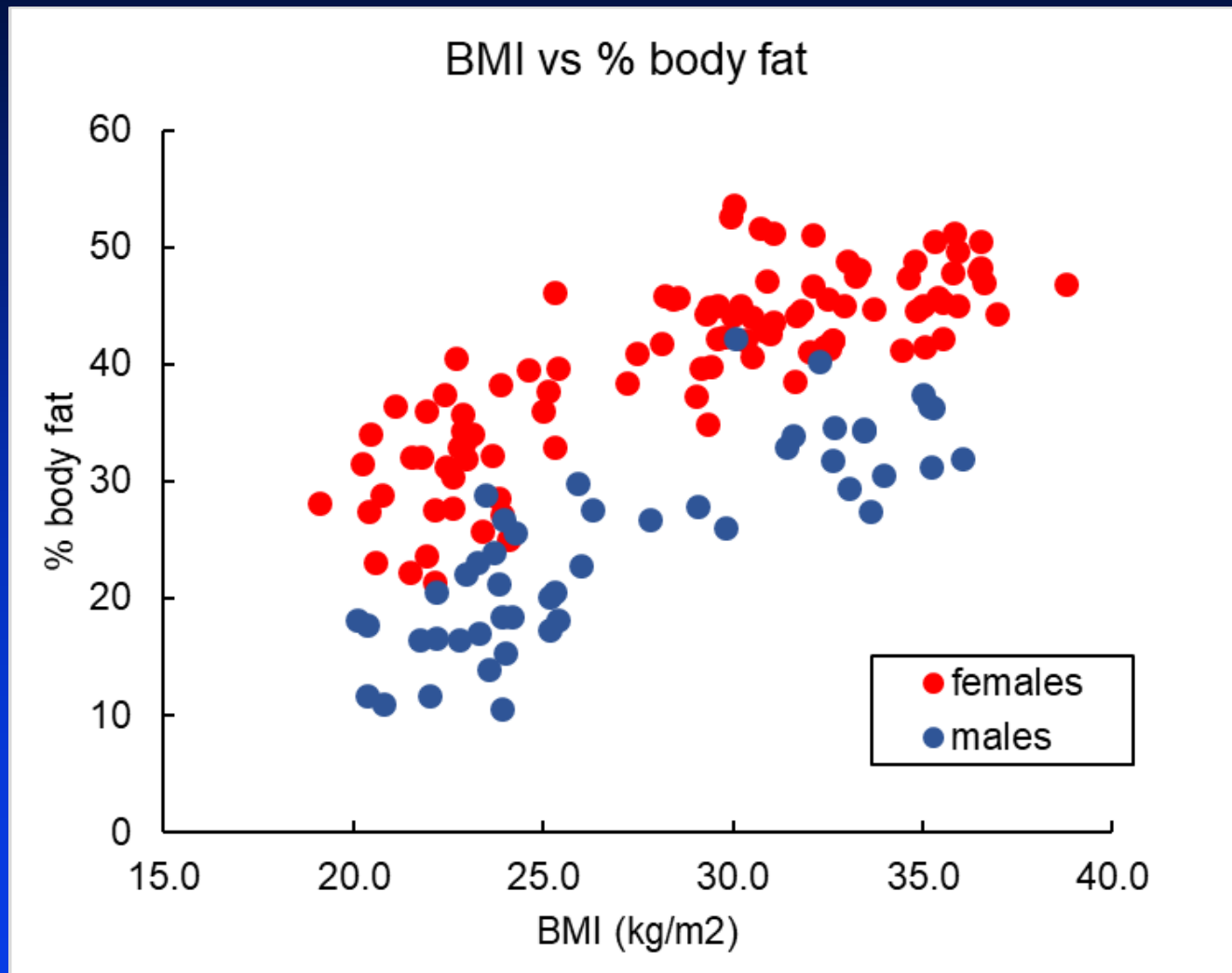


# Body Fat in Humans



Jensen, unpublished data

# BMI and Body Fat



Jensen, unpublished data

# BMI – Surrogate for Body Fat

- Why do we care about body fat?
- What are the major roles of body fat?
- What happens when body fat is dysfunctional?
- Why does body fat become dysfunctional?
- How can we best predict that body fat is dysfunctional?

# BMI – Surrogate for Body Fat

**What are the major roles of body fat?**



# What is the Main Function of Adipose Tissue?



**energy bank**

# How Much Food Does This Equal?

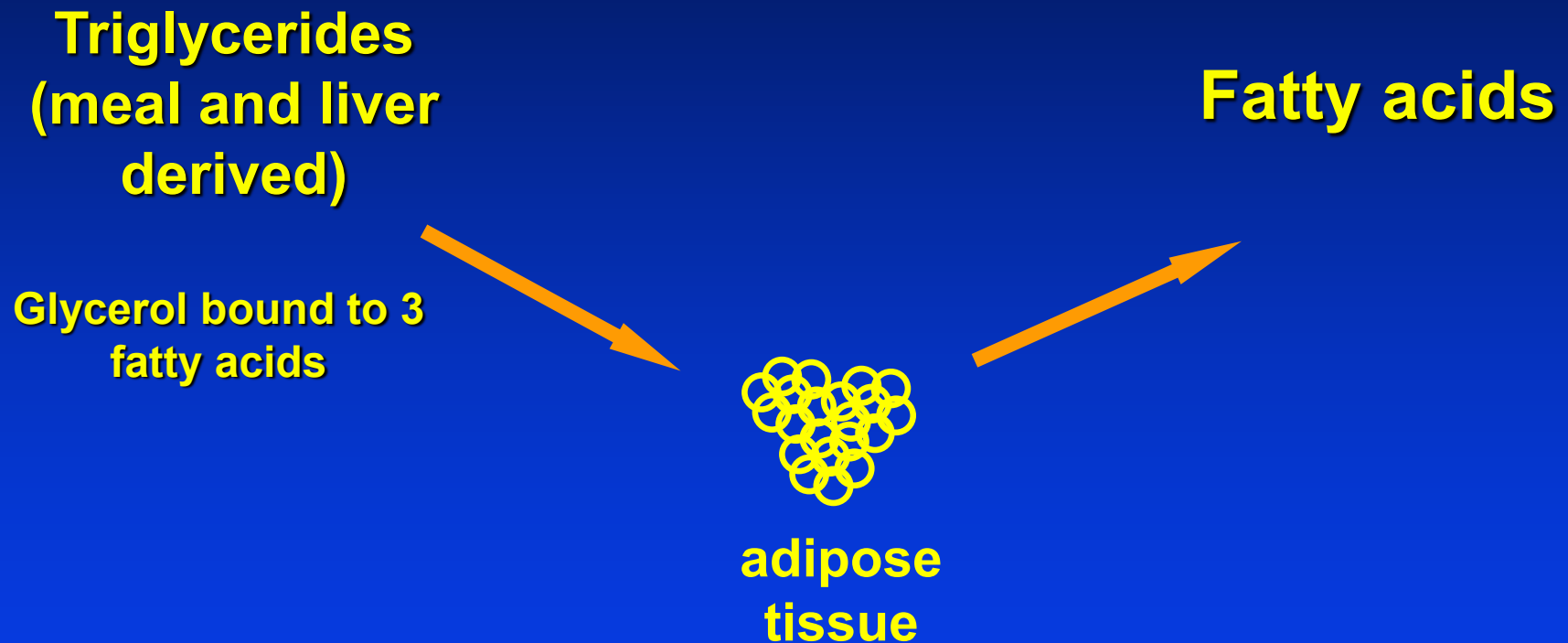


**1 week's food**



**3 month's food**

# Adipose Fuel Function – The Simple View



# Fat Metabolism in Humans

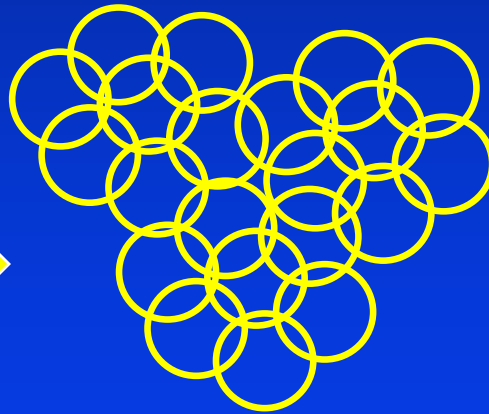


**TG fatty acids**



**Chylomicron TG**

**100 gm**

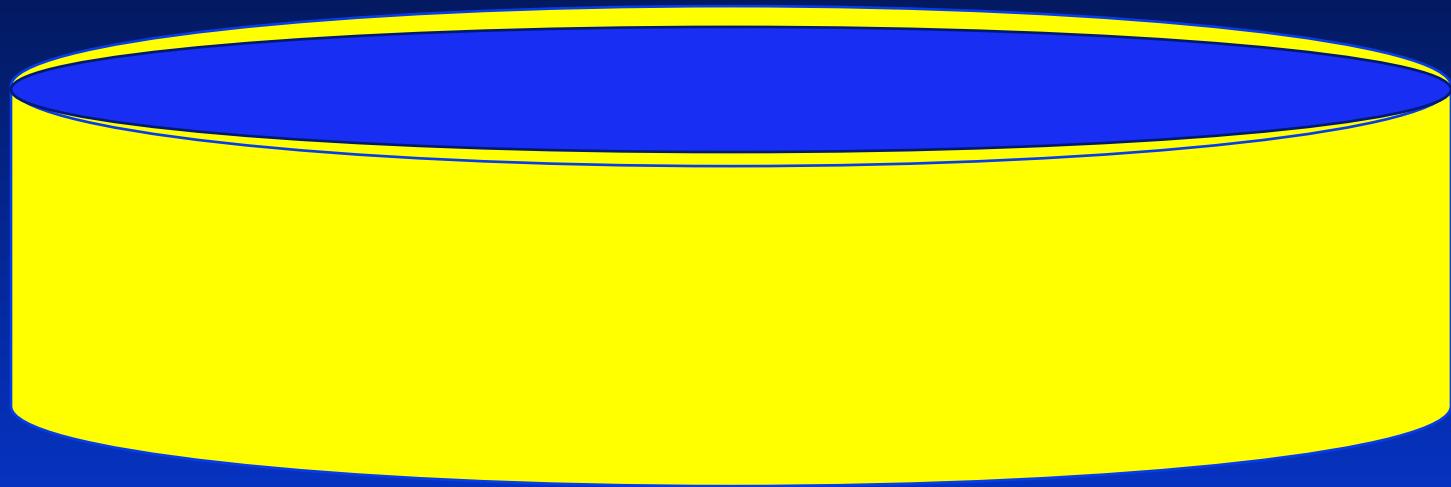


**Adipose tissue**



**oxidation**

**100 gm**



1 teaspoon/min – body works normally





# BMI – Surrogate for Body Fat

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# Fatty Acid Metabolism in Humans

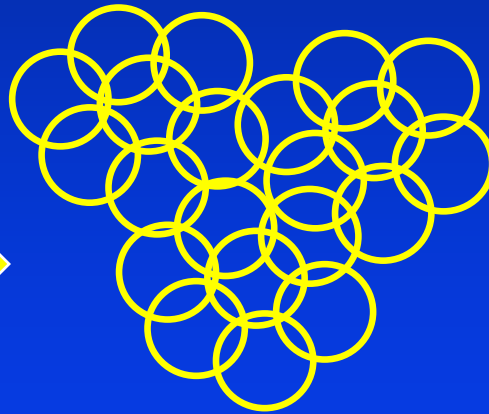


**TG fatty acids**



**Chylomicron TG**

**100 gm**

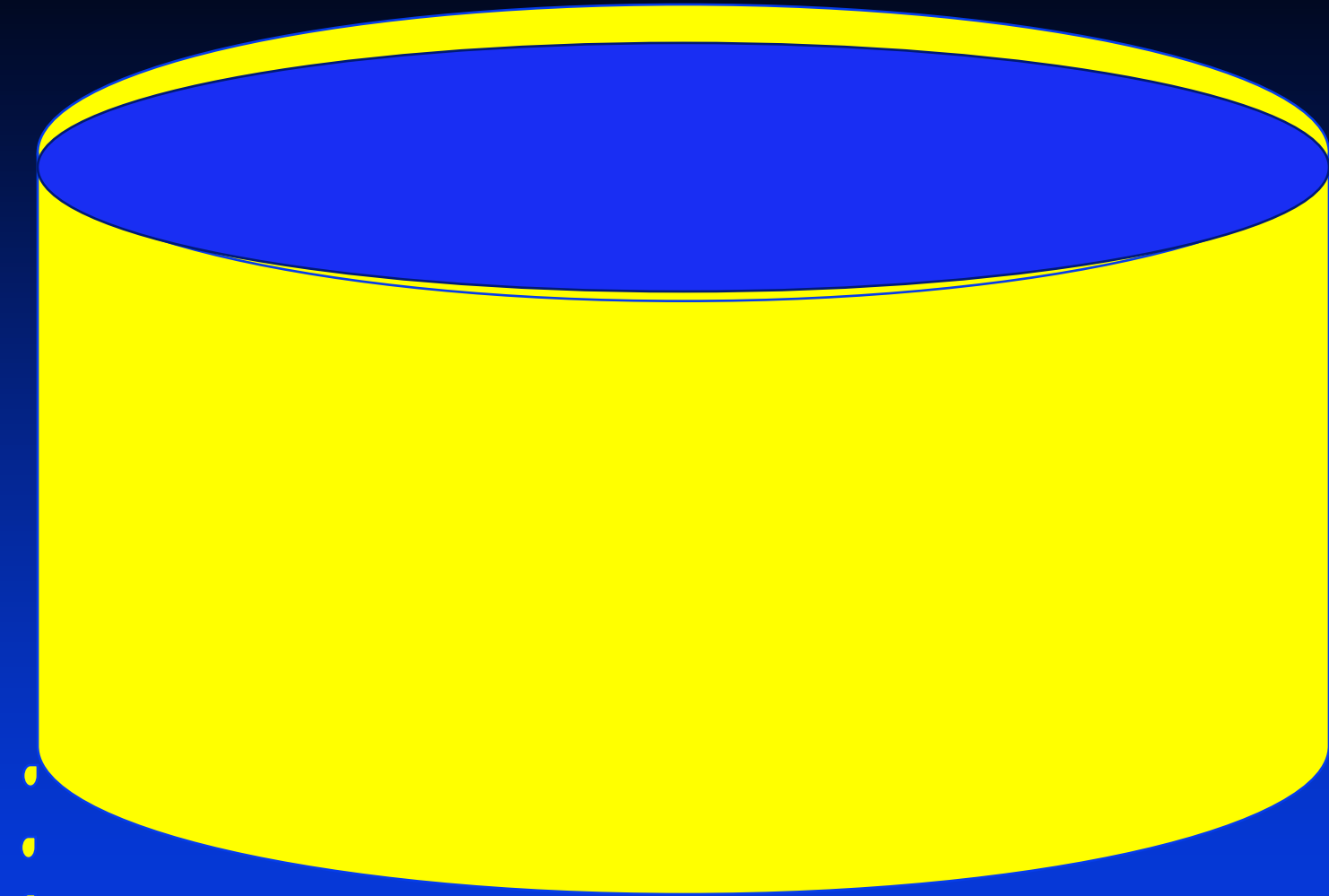


**Adipose tissue**



**oxidation**

**100 gm**

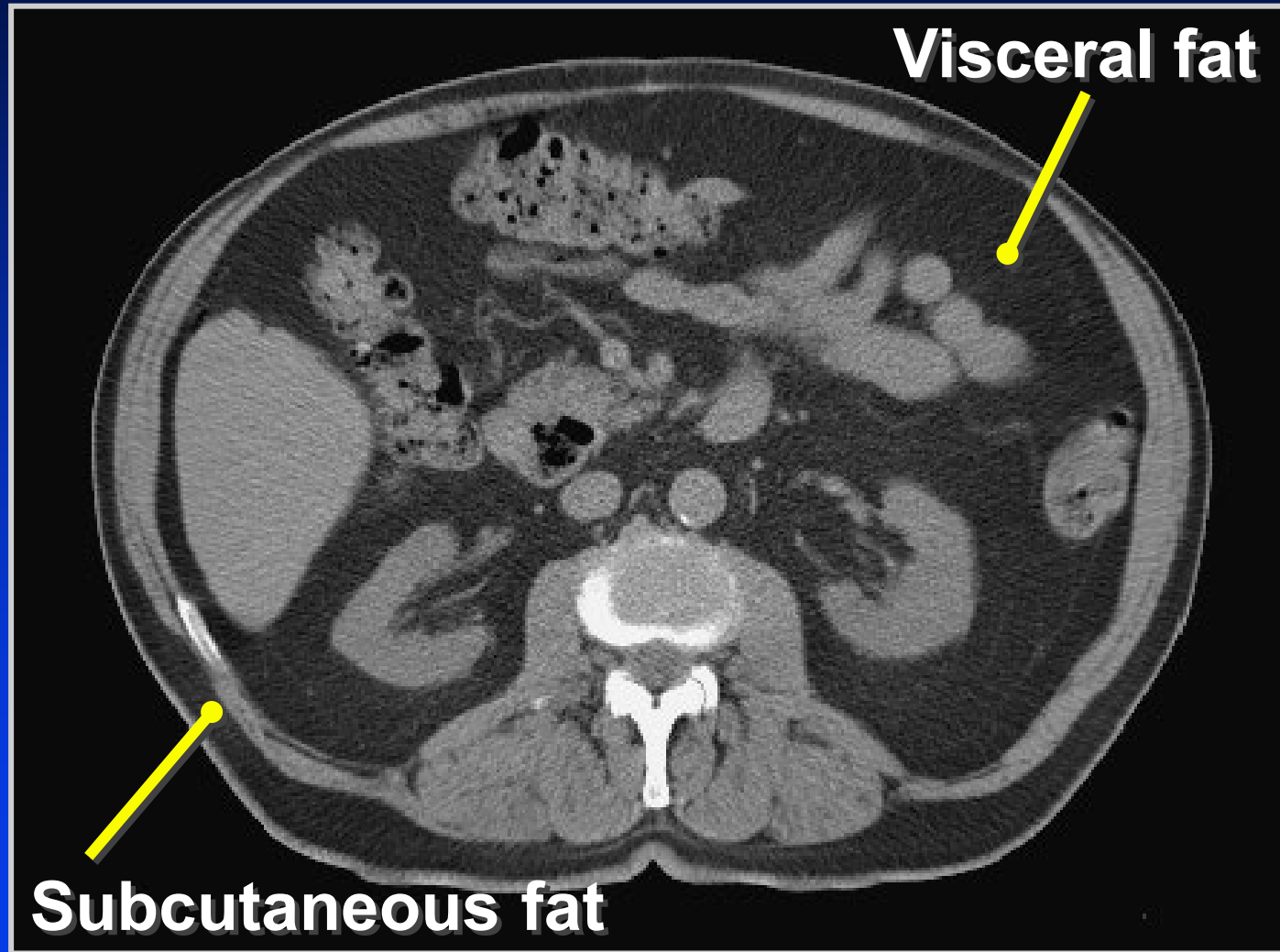


1.4 teaspoon/min – diabetes, high lipids

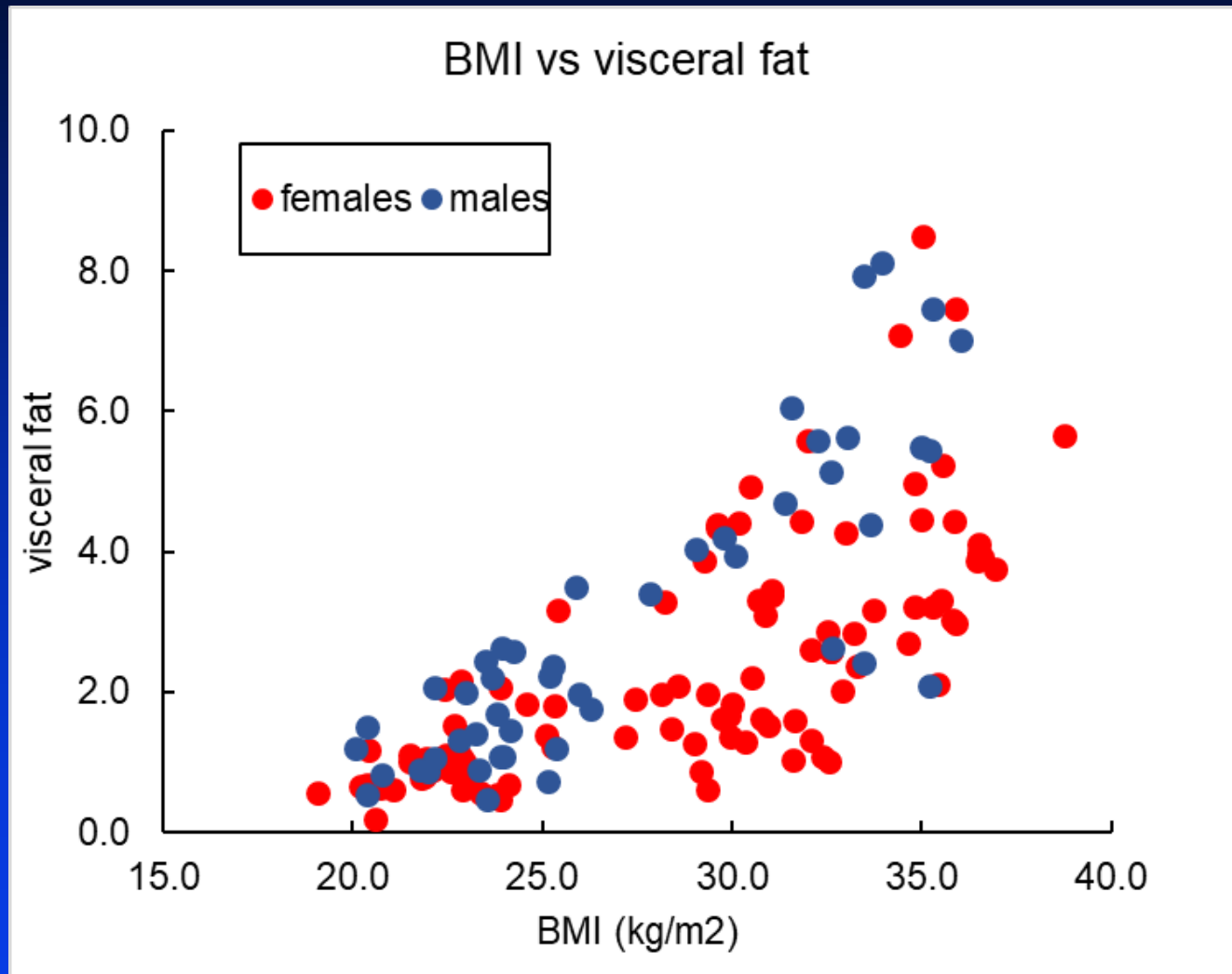




# Visceral Fat Predicts Metabolic Complications

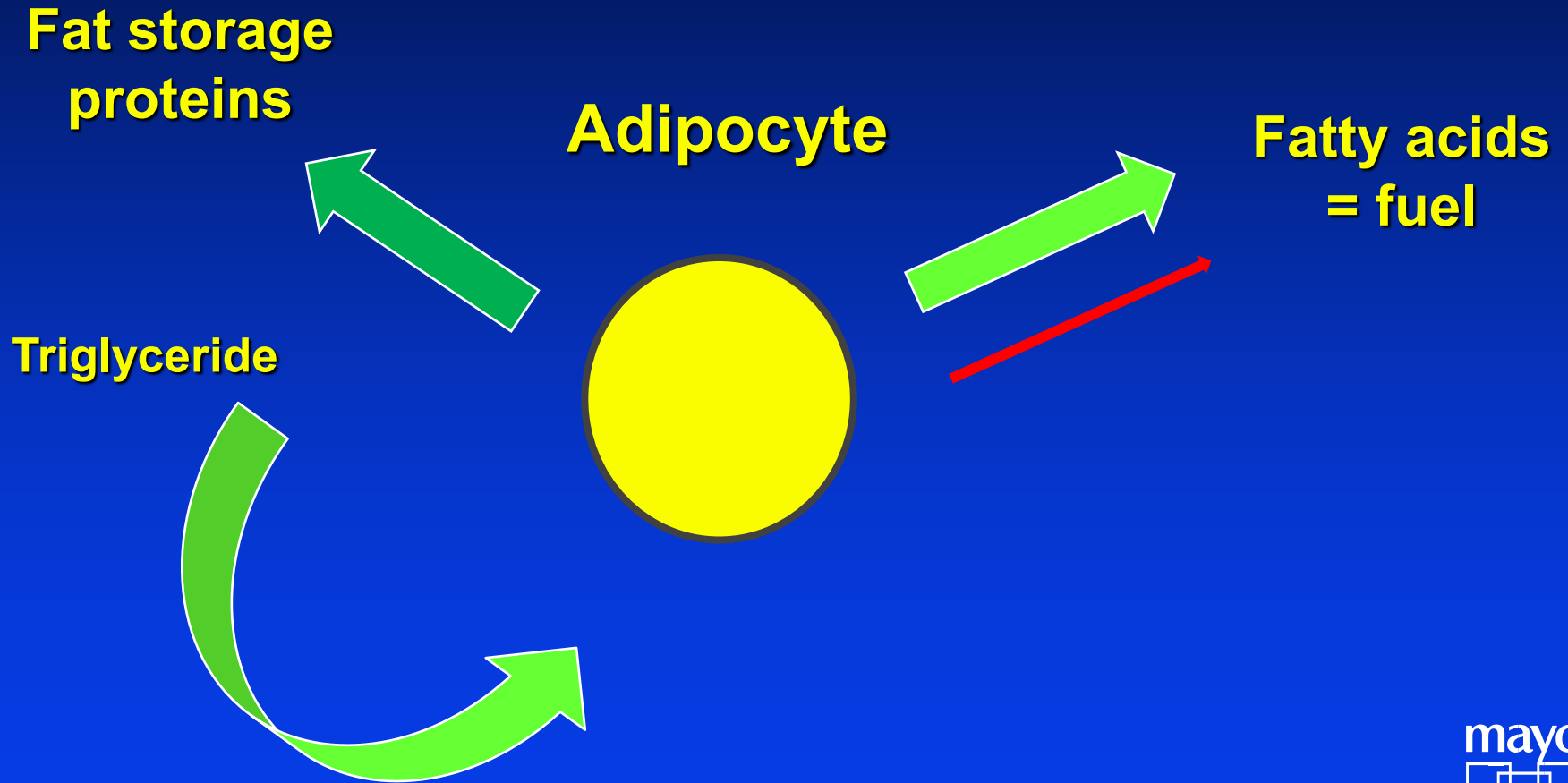


# BMI and Visceral Fat

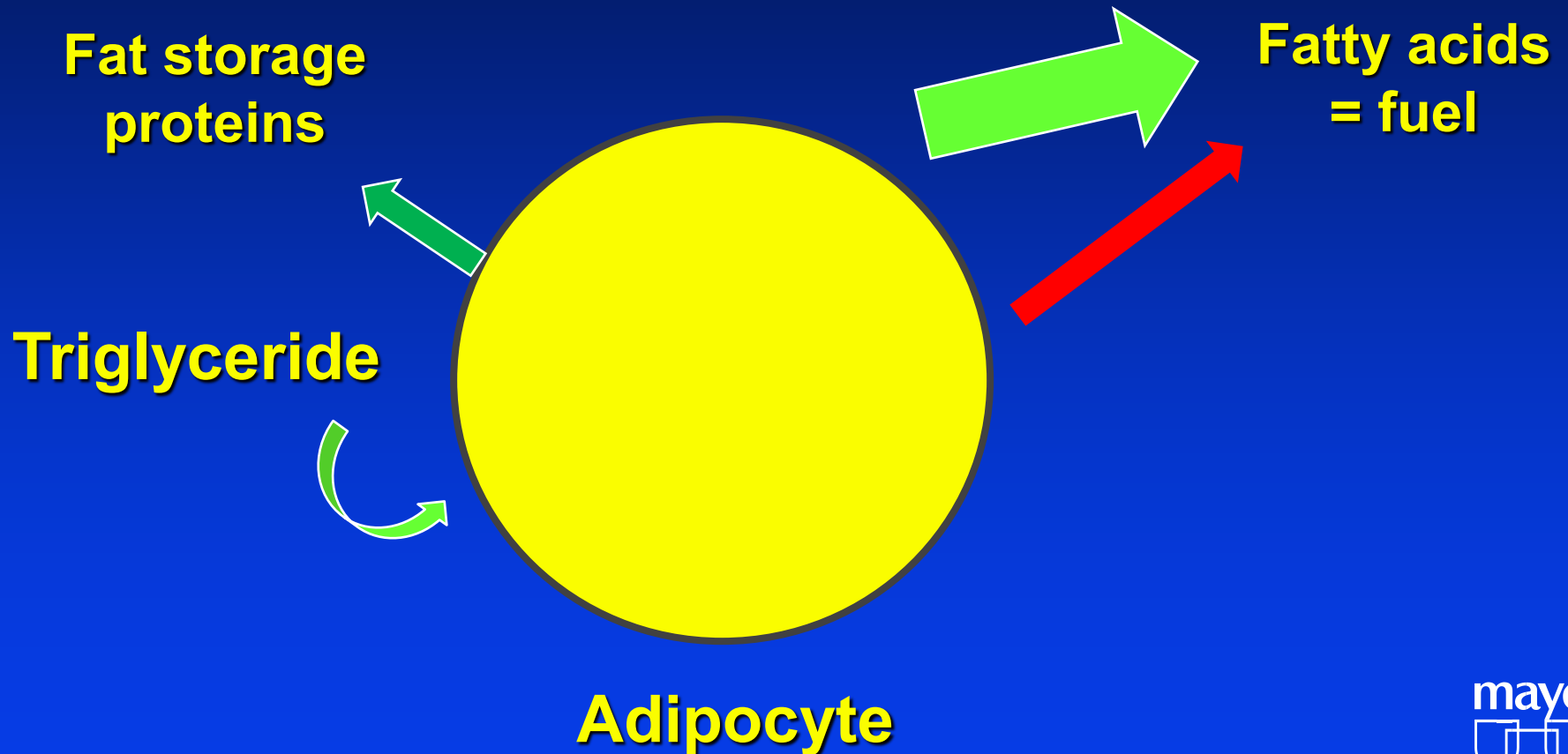


**OK – But Not Great**  
Jensen, unpublished data

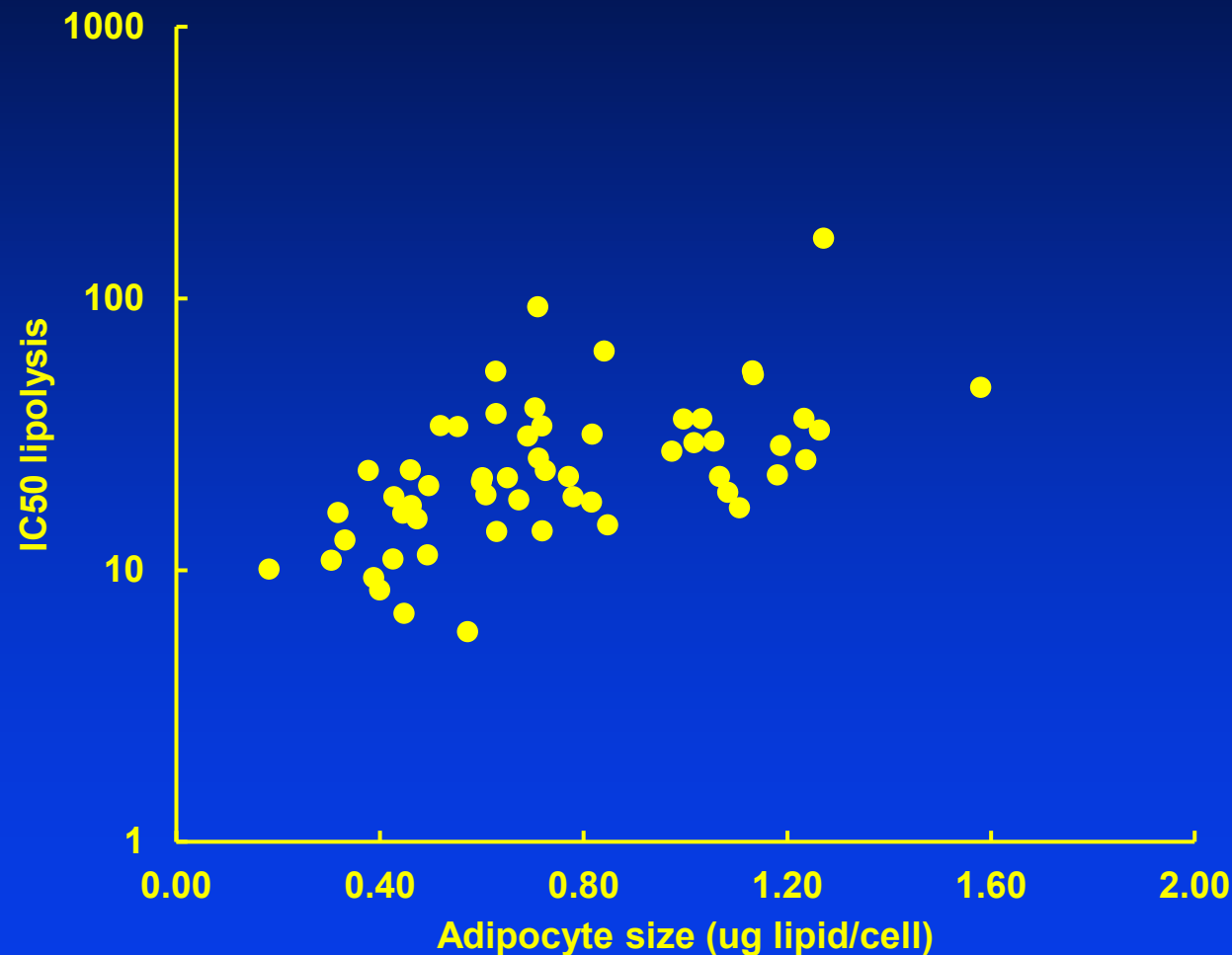
# Fat Cells (Adipocytes)



# Fat Cells (Adipocytes)

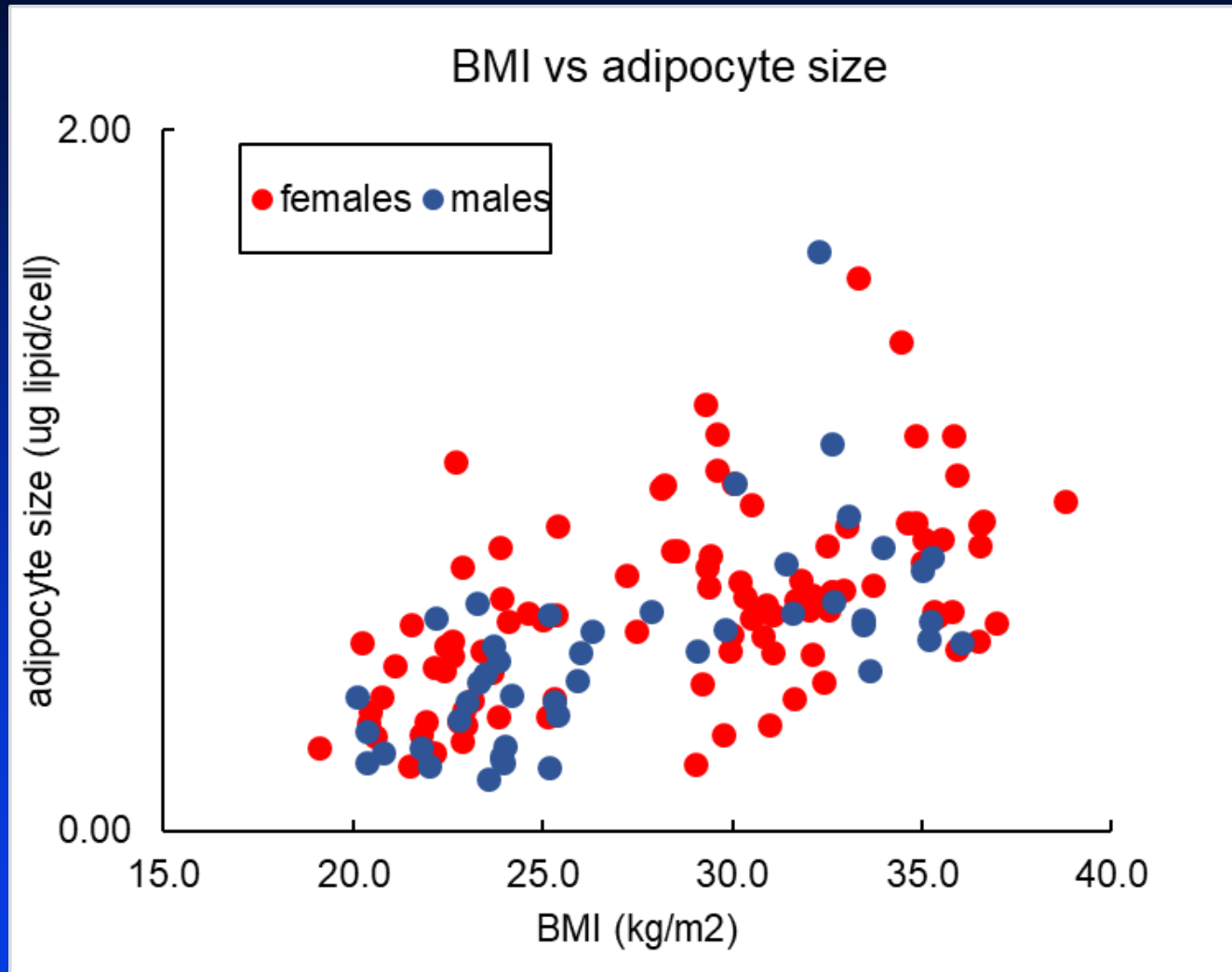


# Adipocyte Size vs. Adipocyte Dysfunction



Diabetes. 2022 Mar 1;71(3):381-393

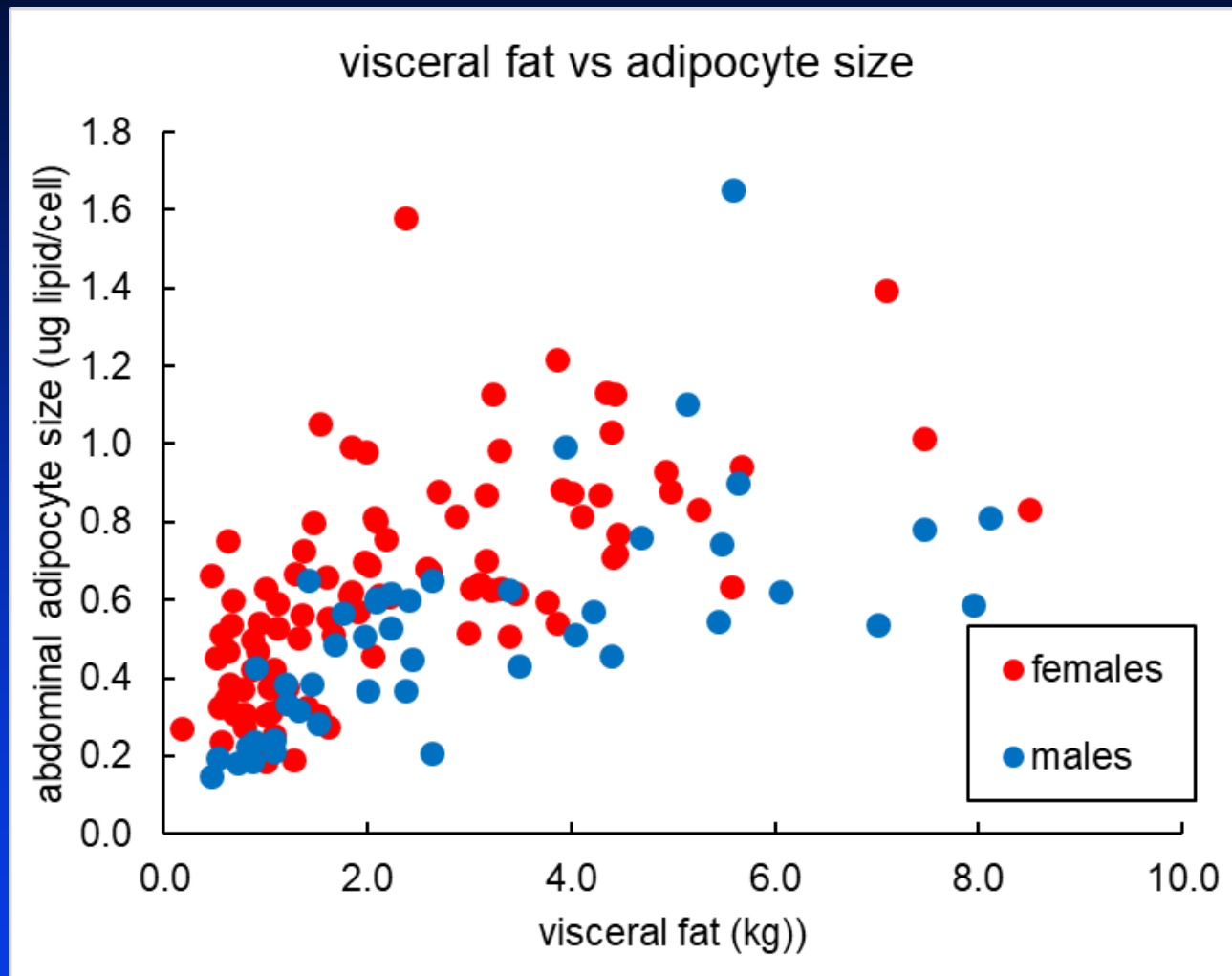
# BMI and Adipocyte Size



**Positive, but Weak Relationship**

Jensen, unpublished data

# Visceral Fat and Adipocyte Size



**Somewhat Better Relationship**

Jensen, unpublished data

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# BMI, Body Shape and Adipose Dysfunction

- Centralized fat distribution predicts larger abdominal adipocytes
- Visceral fat is statistically linked with metabolic dysfunction
- Larger abdominal adipocytes are dysfunctional and seem to cause metabolic abnormalities (independent of BMI)
- Fasting hypertriglyceridemia is an early warning sign of adipocyte dysfunction

# Take Home Messages

- **A central fat distribution is a better predictor of metabolic dysfunction than BMI**
- **Adipocyte dysfunction appears to be central to the development of many metabolic derangements**
- **Large adipocytes are most likely to be dysfunctional**