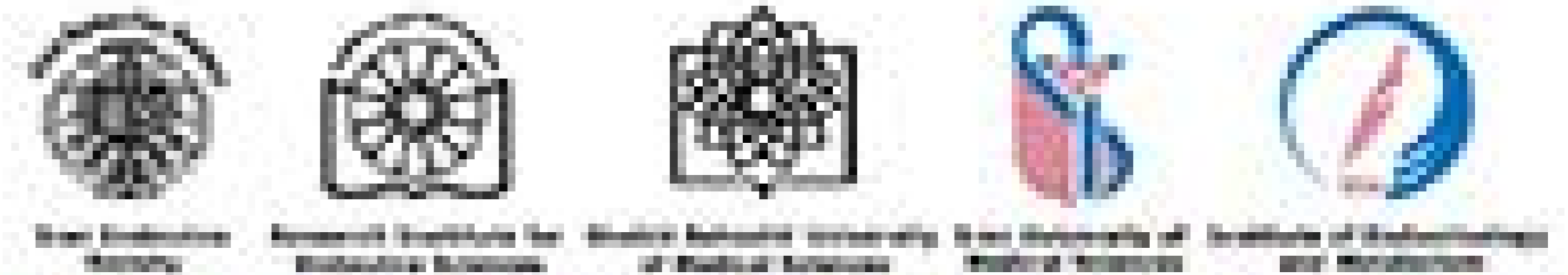


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**Investigating the impact of substituting clarified butter or ghee with
canola oil on liver steatosis and enzymes, fasting blood glucose, and
insulin resistance in individuals suffering from non-alcoholic fatty
liver disease**

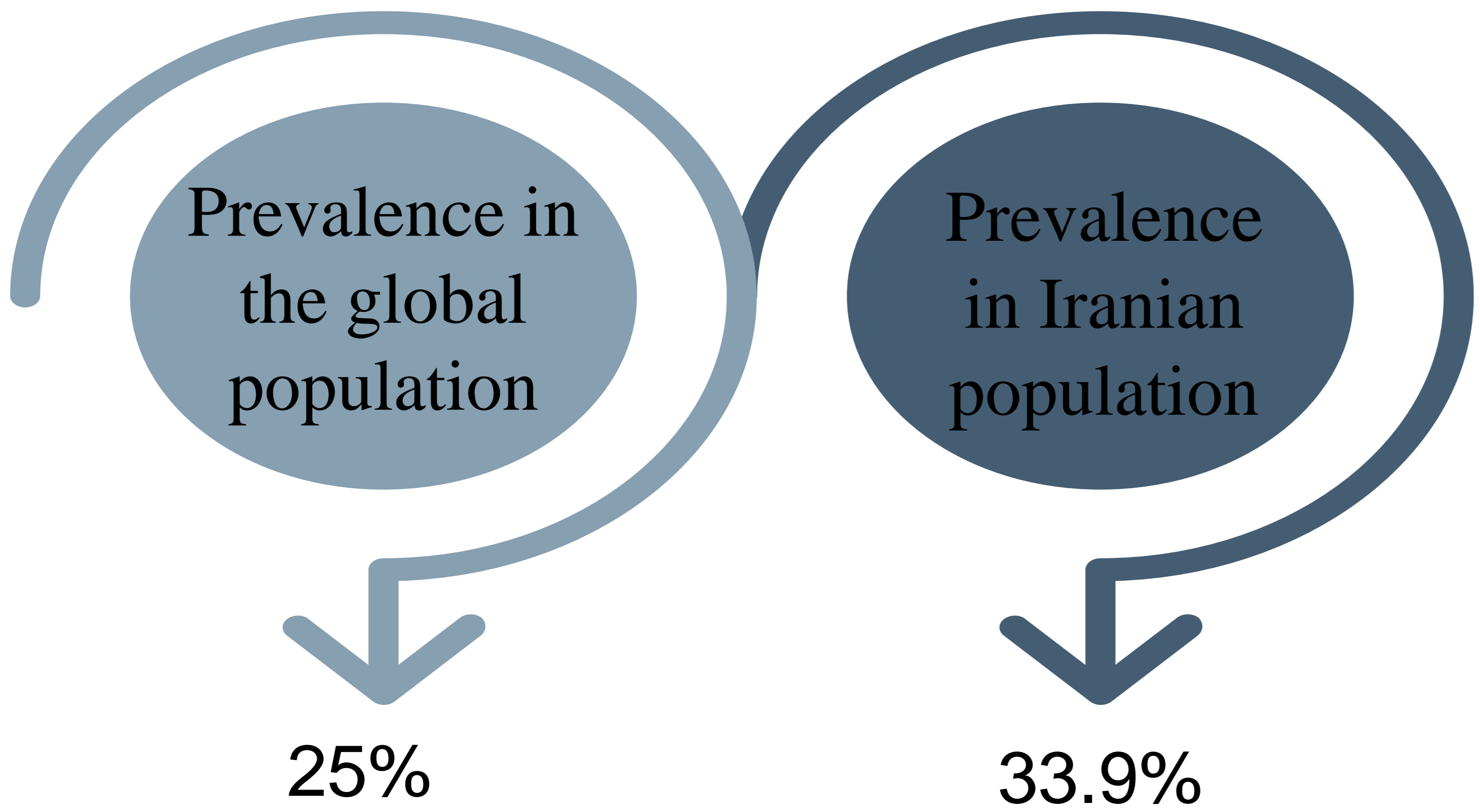
Fatemeh Maleki Sedgi, Mohammadreza Mohammad Hosseiniazar, Mohammad Alizadeh*

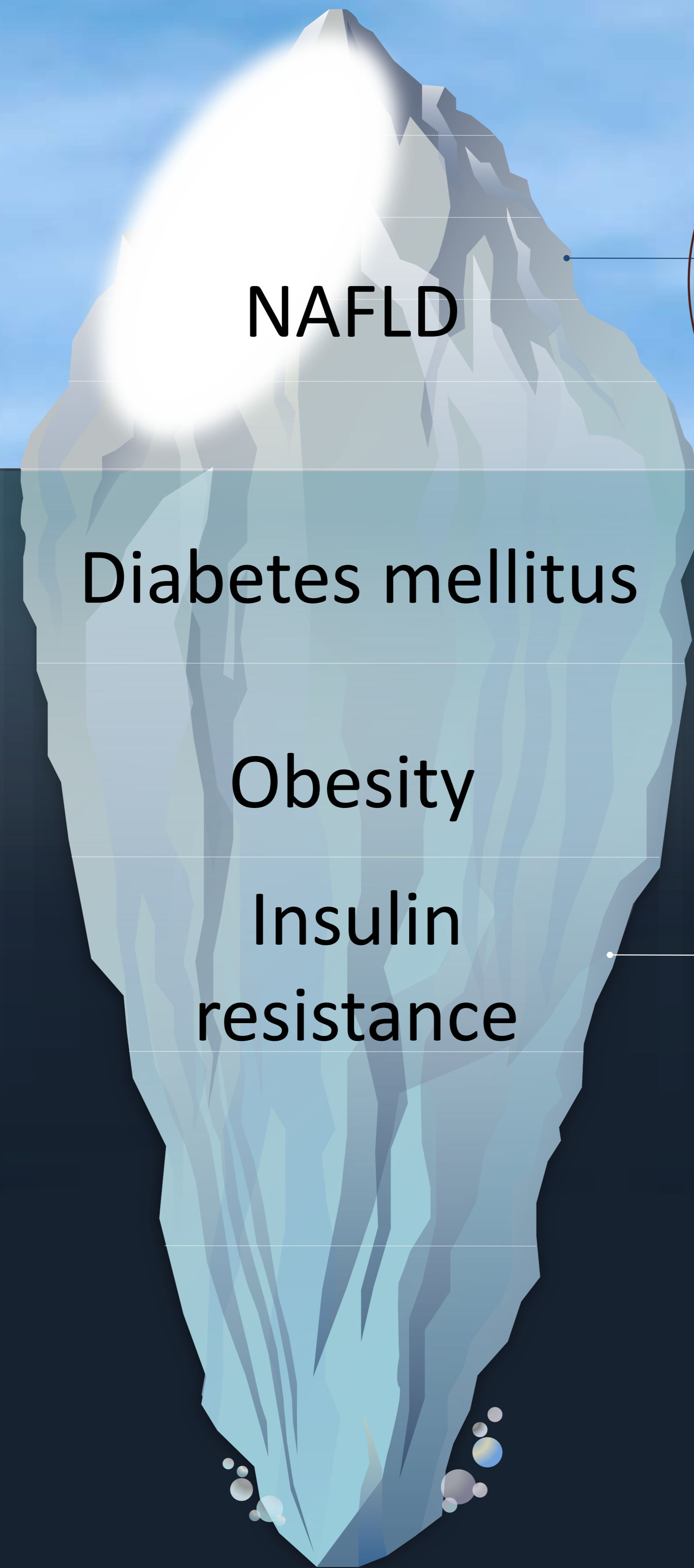


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Introduction:

- Non-alcoholic fatty liver disease:
 - ✓ A clinical diagnosis
 - ✓ at least 5% liver steatosis
 - ✓ probably presents with elevated liver enzymes



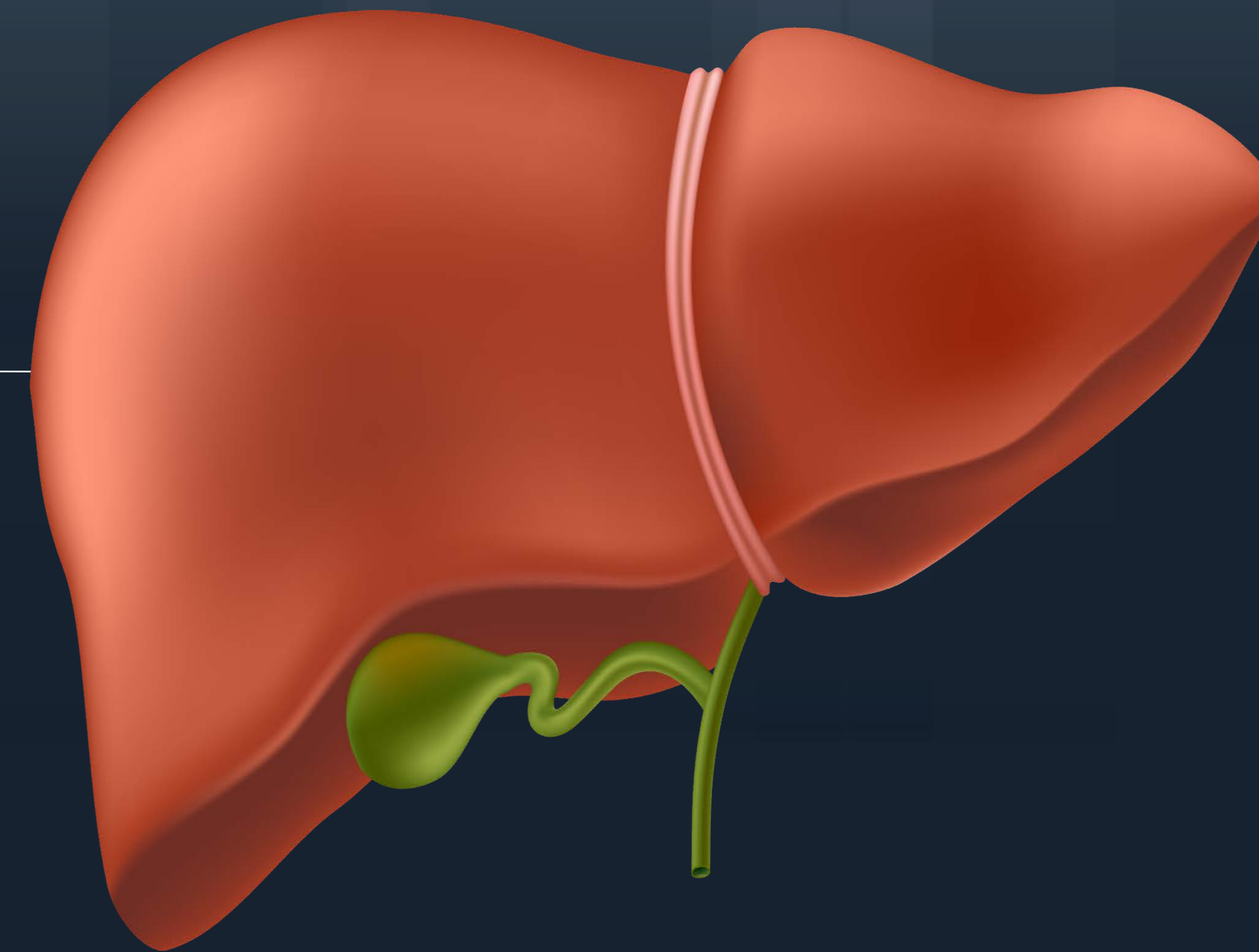


NAFLD

Diabetes mellitus

Obesity

Insulin
resistance

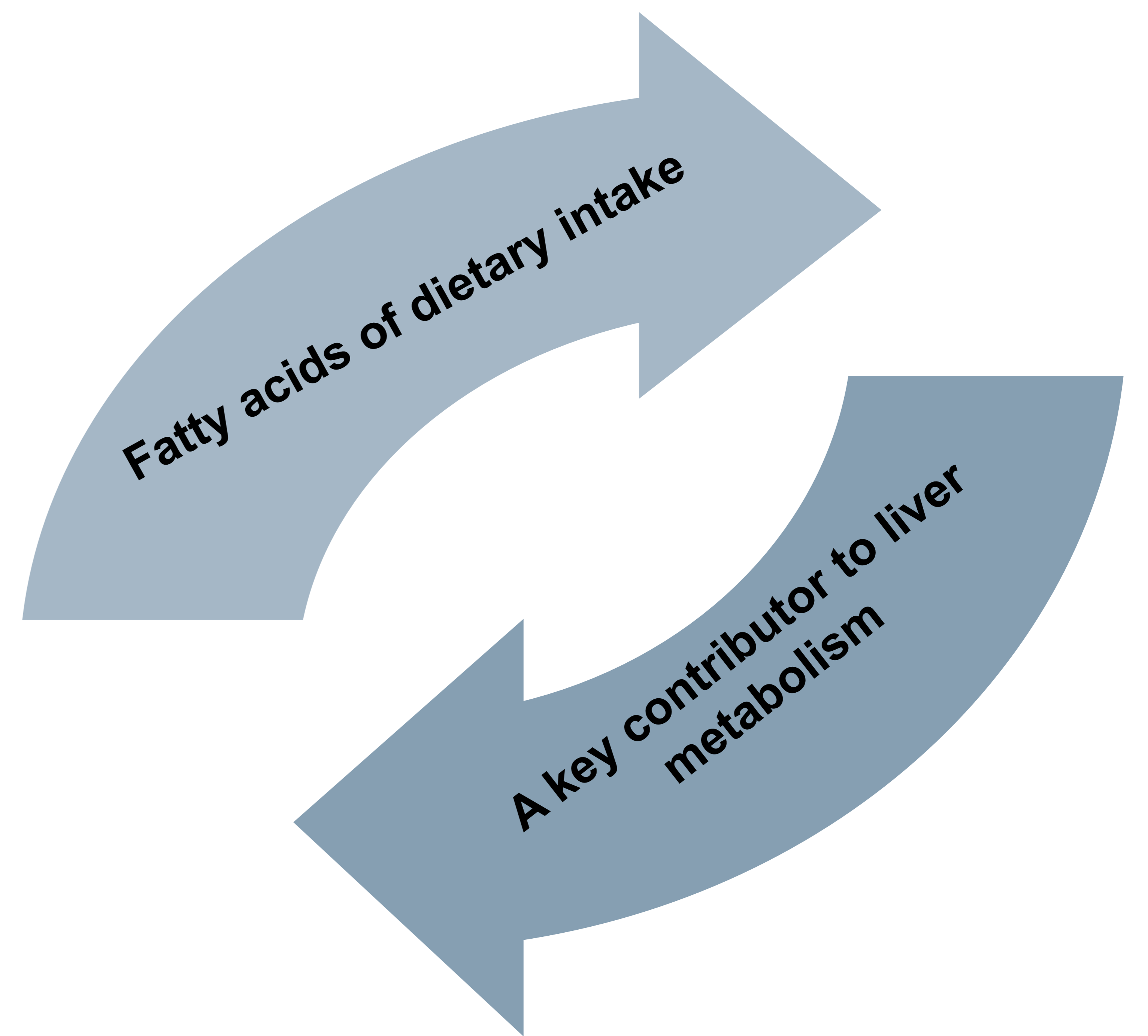
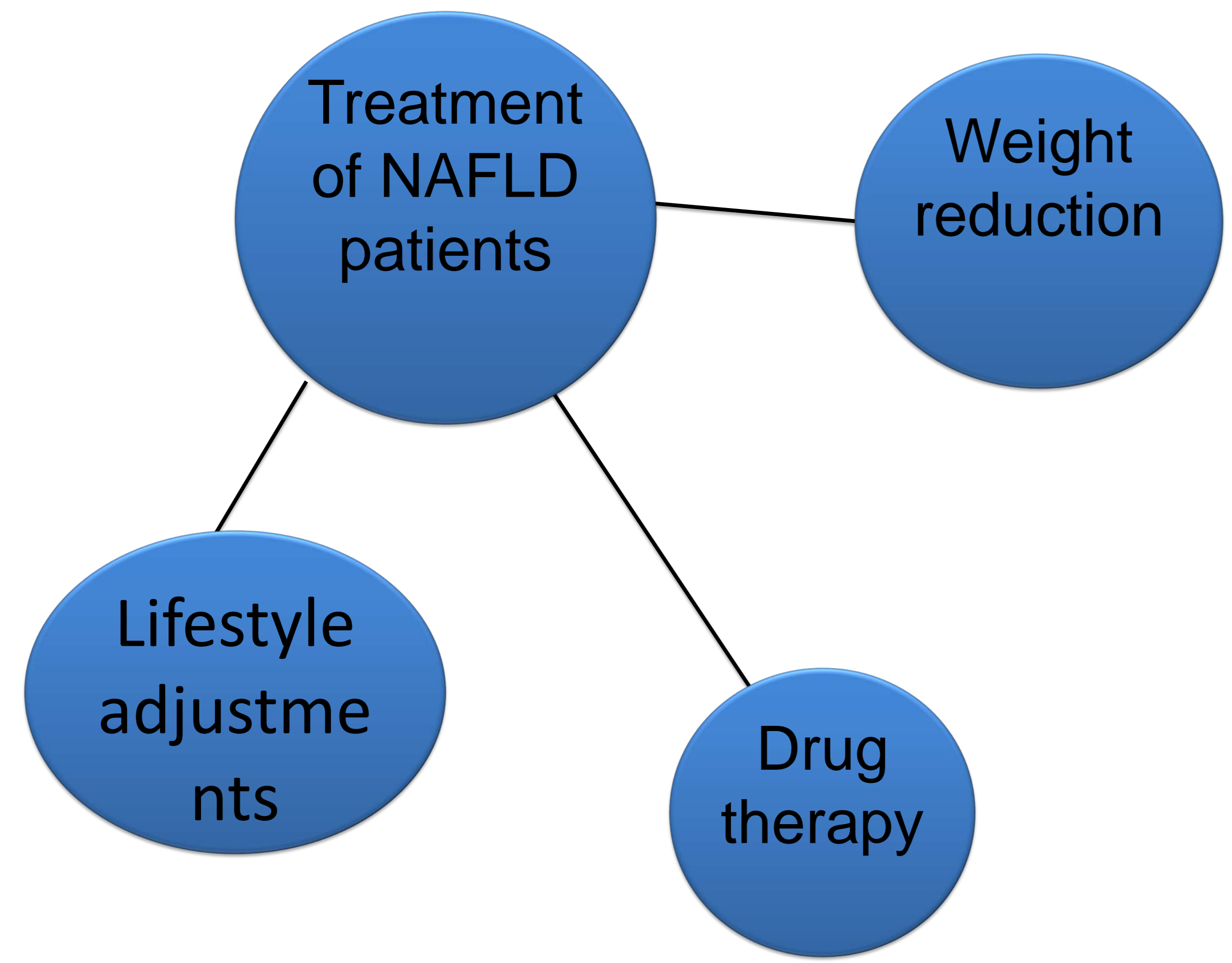


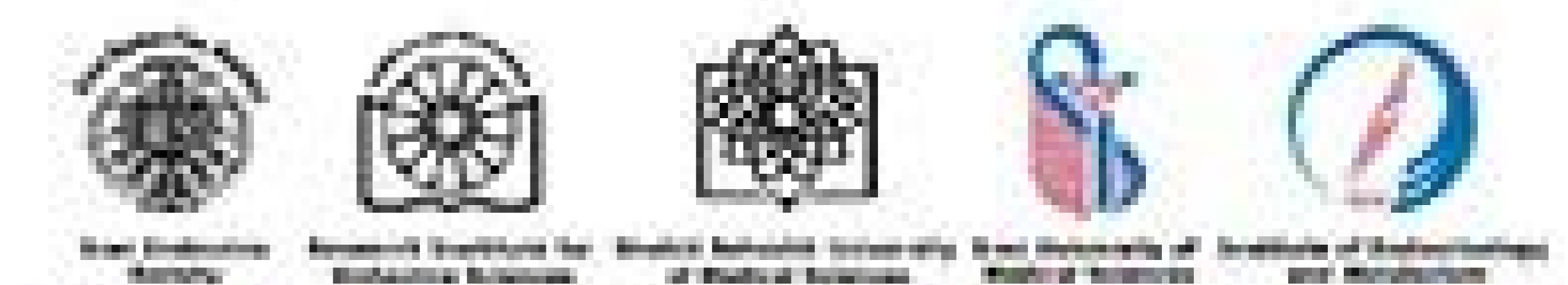


Introduction:



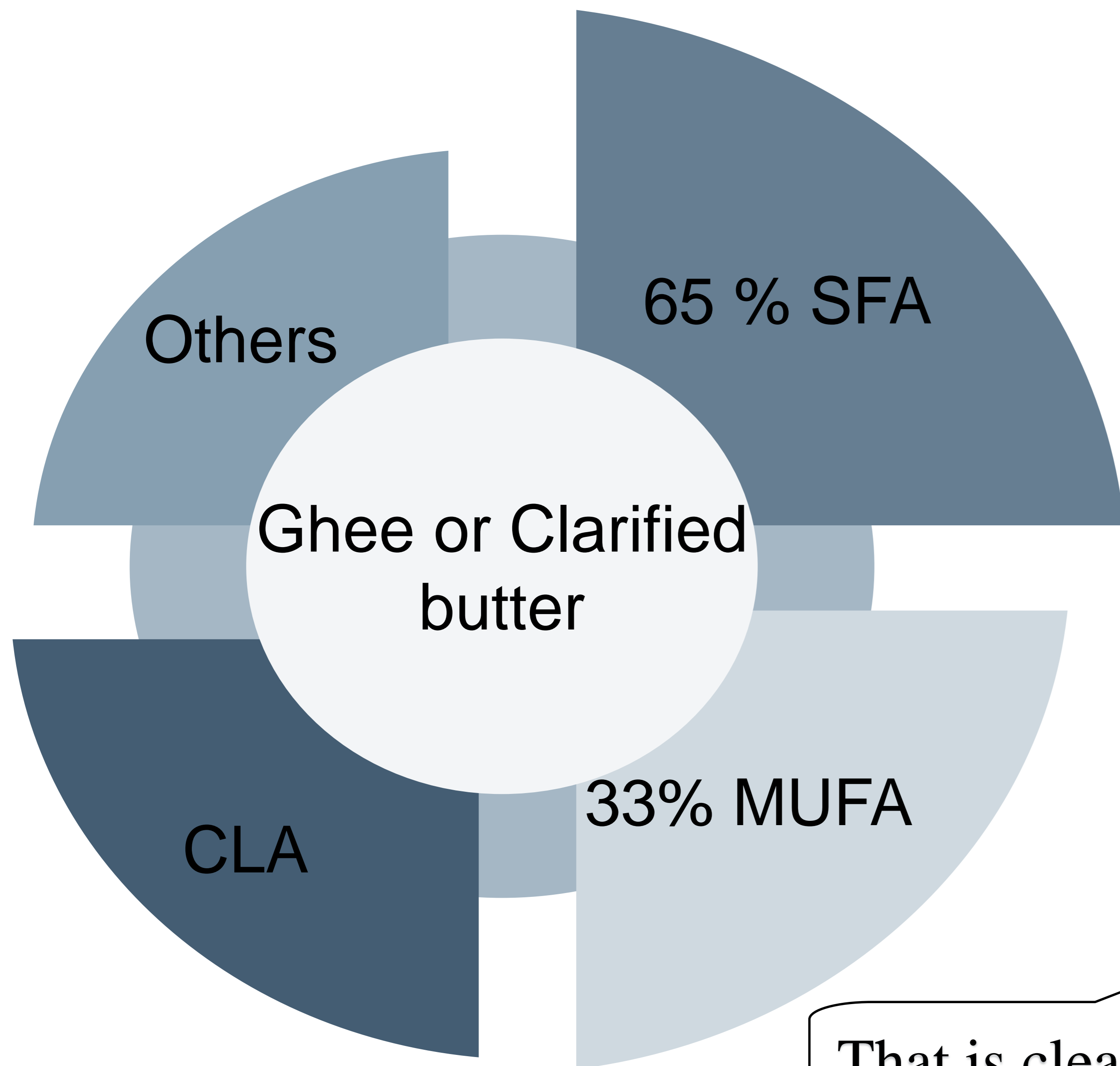
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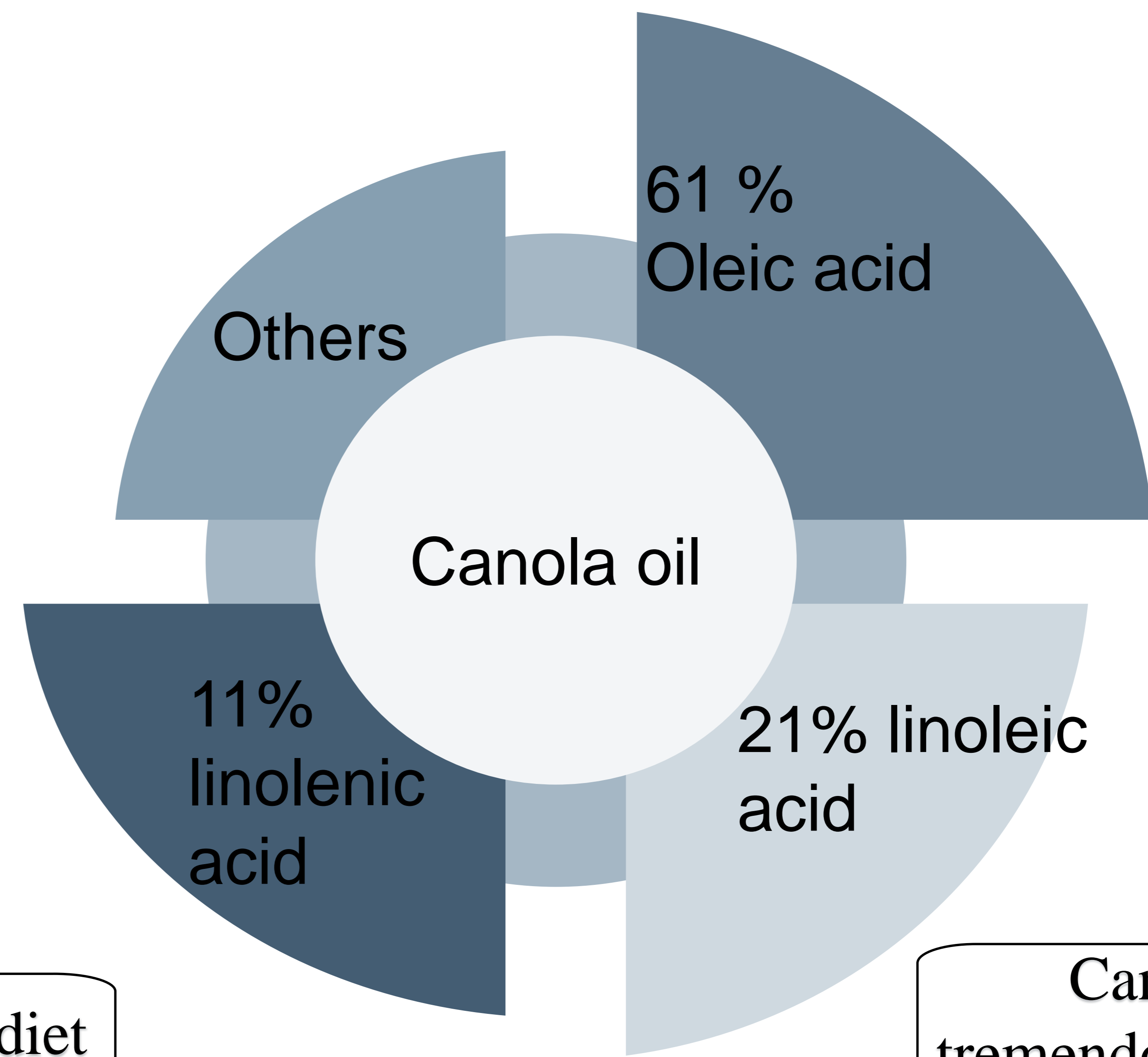


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Introduction:



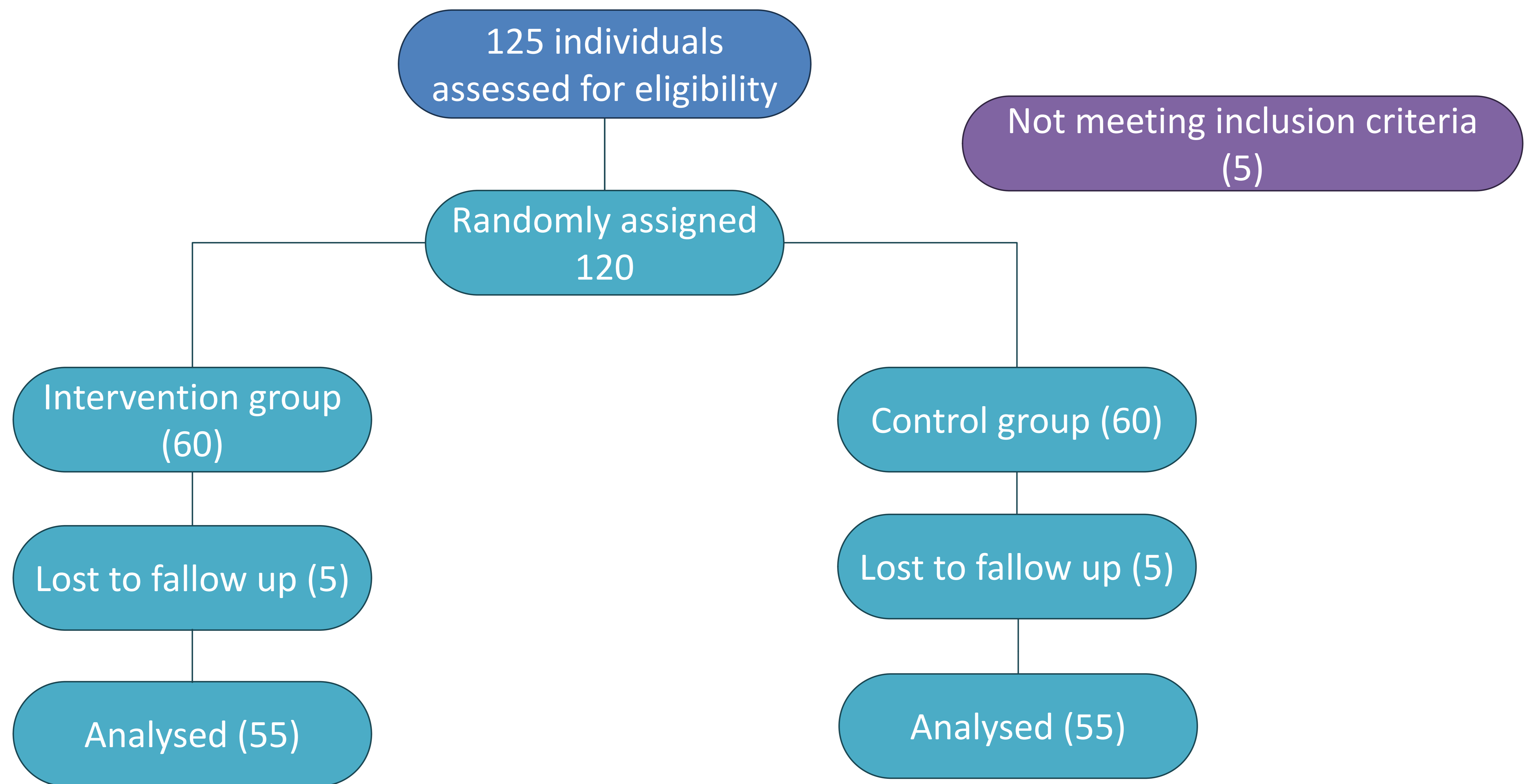
That is clear with utilizing a diet abundant in the SFA; liver fat increases



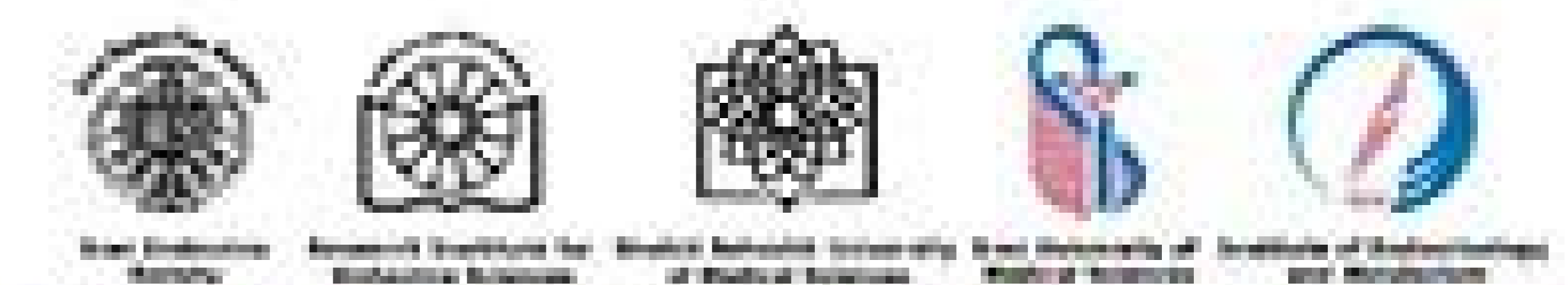
Canola has the most tremendous potential to reduce SFA usage by substituting with clarified butter in the diet



Material and Methods:

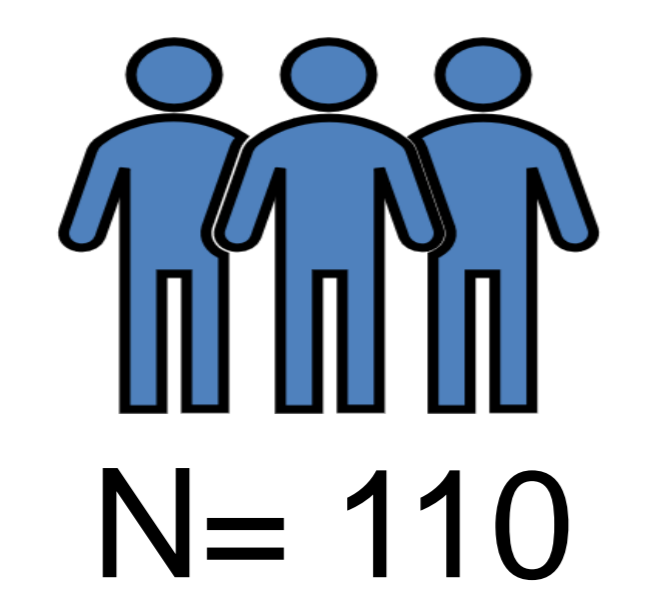


The flowchart of study participants based on the CONSORT guidelines.

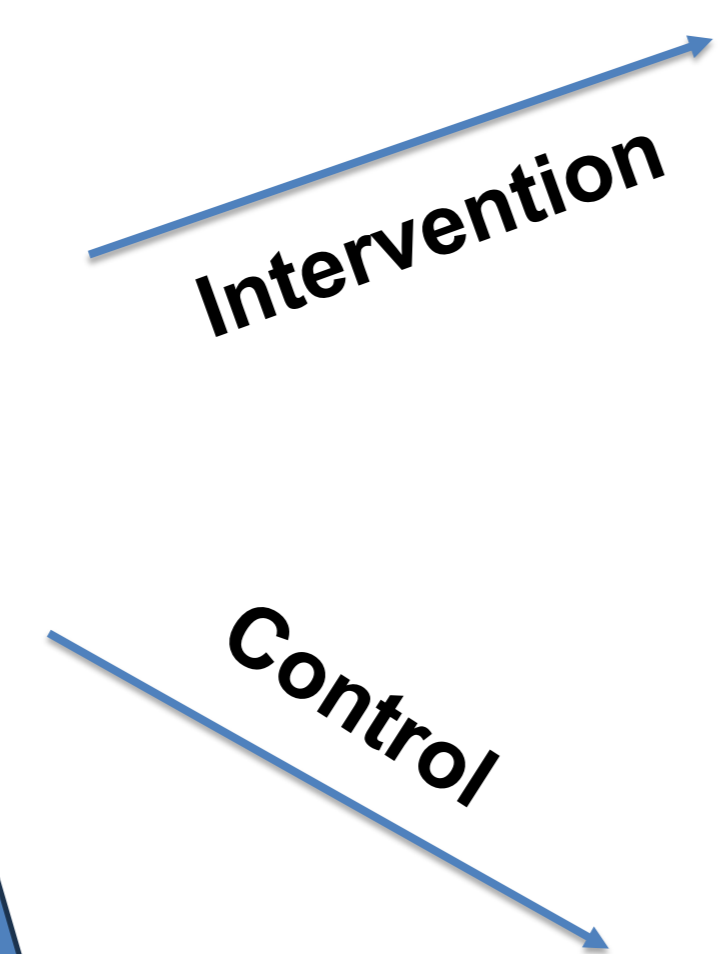


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Material and Methods:



N= 110



N=55

Consumed canola oil instead of ghee

Before and end of the study

- Biochemical measurements
- Anthropometric measurements
- Liver ultrasonography

Before and each month

- 3-day 24-hour recalls
- (MET) questionnaire

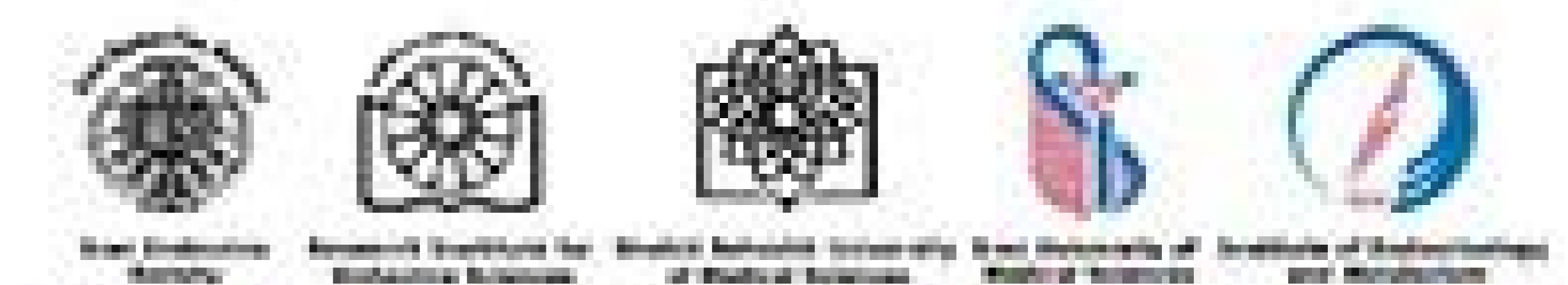


N=55

Continued ghee consumption

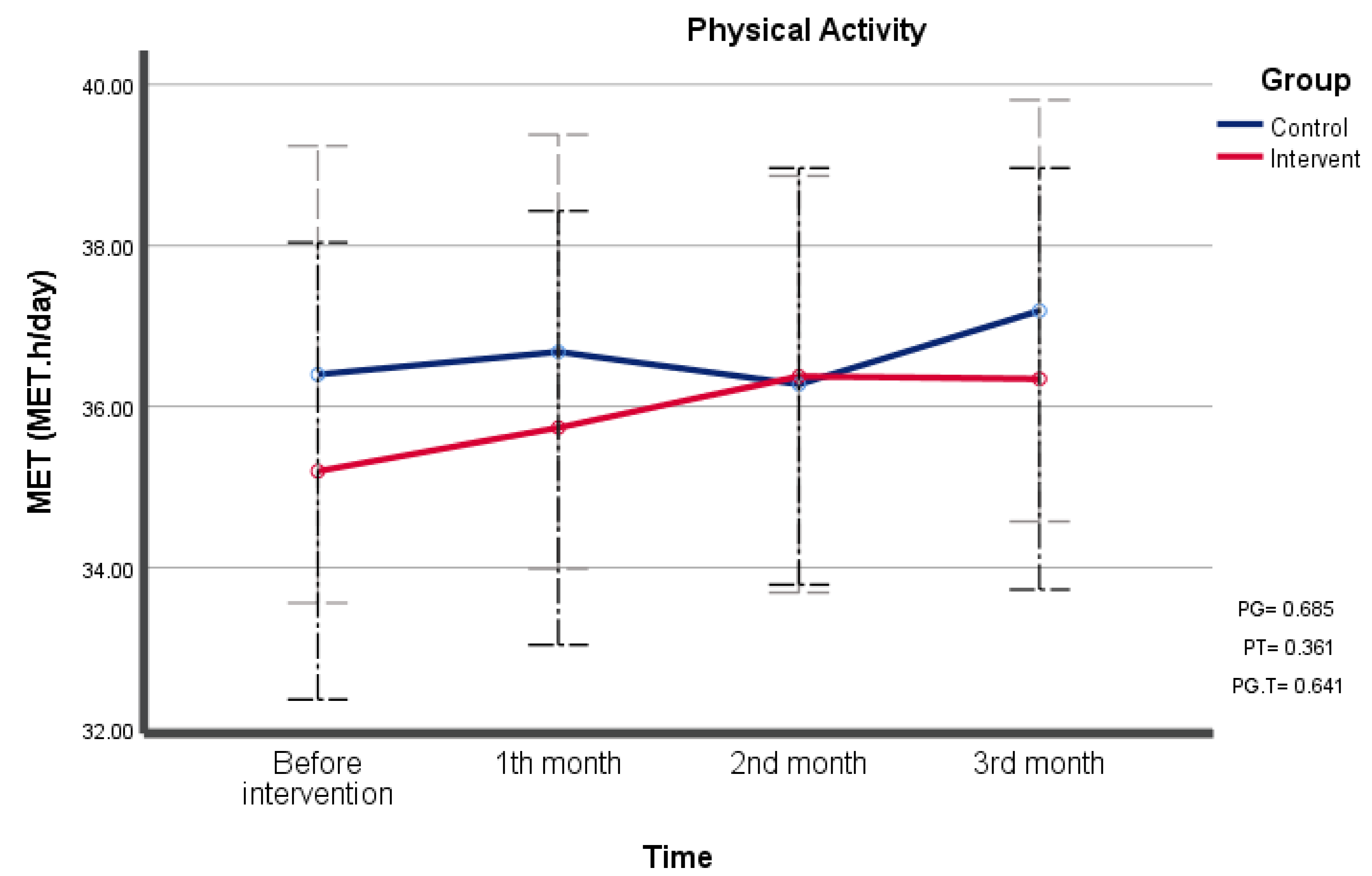
1) Who were consuming 3 to 8 servings of ghee daily.
2) Satisfied the eligibility criteria and consented to take part.

Participants of the pair of groups were asked to pursue the guidelines provided by the Food and Agriculture Organization (FAO) for Iranian.



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Results:





Results:

➤ Liver enzymes

Variable	Changes in Intervention g.	Changes in Control g.	P value (independent sample T-test)	P value (adjusted for baseline value of the outcome)
ALT	-14.4 ± 25 ↓	-4.2 ± 17.2	0.014	< 0.001
AST	-7.4 ± 9.9 ↓	-4.13 ± 10.8	0.097	< 0.001
GGT	-1.8 ± 8.3 ↓	1.2 ± 5.2	0.024	< 0.001
ALP	6.2 ± 27.9 ↑	-10.21 ± 33.7	0.006	< 0.001



Results:

➤ Glycemic variables

Variable	Changes in Intervention g.	Changes in Control g.	P value (independent sample T-test)	P value (adjusted for baseline value of the outcome)
FBS	-7.5 ± 7.7 ↓	2.8 ± 7.5	< 0.001	< 0.001
INSULIN	-3.05 ± 7.1 ↓	4.9 ± 4.1	< 0.001	< 0.001
HOMA-IR	- 0.9 ± 1.9 ↓	1.3 ± 1.2	< 0.001	< 0.001
QUICKI	0.01 ± 0.03 ↑	.002 ± 0.03	< 0.001	< 0.001



Results:


➤ Anthropometric measurements

Variable	Changes in Intervention g.	Changes in Control g.	P value (independent sample T-test)	P value (adjusted for baseline value of the outcome)
Weight	-4.3 ± 3.4 ↓	0.004 ± 3.1	< 0.001	< 0.001
BMI	-0.04 ± 0.04 ↓	- 0.003 ± 0.03	< 0.001	< 0.001
WC	-5.6 ± 4.6 ↓	- 0.25 ± 3.9	< 0.001	< 0.001
WHtR	-0.04 ± 0.09 ↓	-0.003 ± 0.03	< 0.001	< 0.001



Results:

➤ Liver steatosis grade

Group	Change	P (Chi-square)	P (adjusting for mean change in weight and baseline value of outcome)
Intervention	Reduction in grade: 46 (41.81) 	< 0.001	< 0.001
	Deterioration: 0 (0)	----	----
Control	Reduction in grade: 15 (13.63)	----	----
	Deterioration: 2 (1.81)	----	----



Discussion:

Improve the insulin resistance

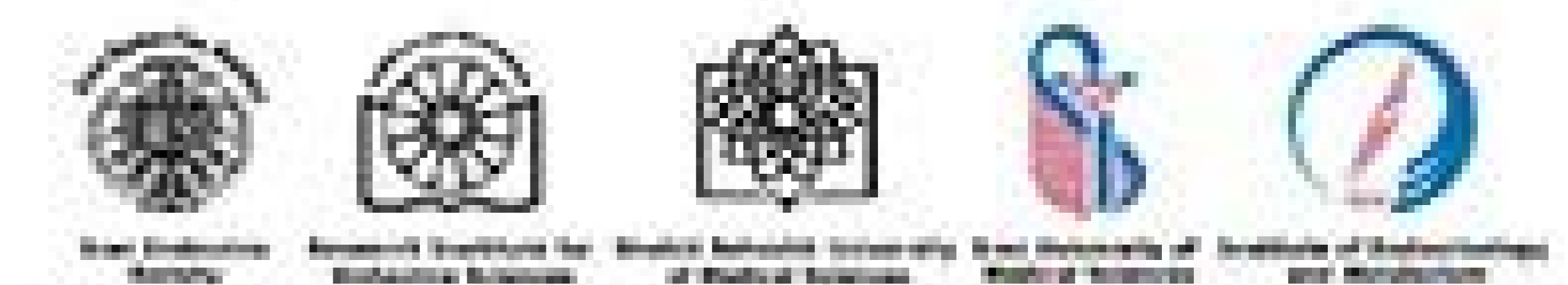
Sinapine, as a prebiotic agent of rapeseed oil → ↓ insulin resistance and non-alcoholic fatty liver disease

Improve the obesity, and NAFLD

Sinapine → modulate the composition of the intestinal microflora → ↑ short-chain fatty acids (SCFAs) → ↓ NAFLD

Improve the obesity

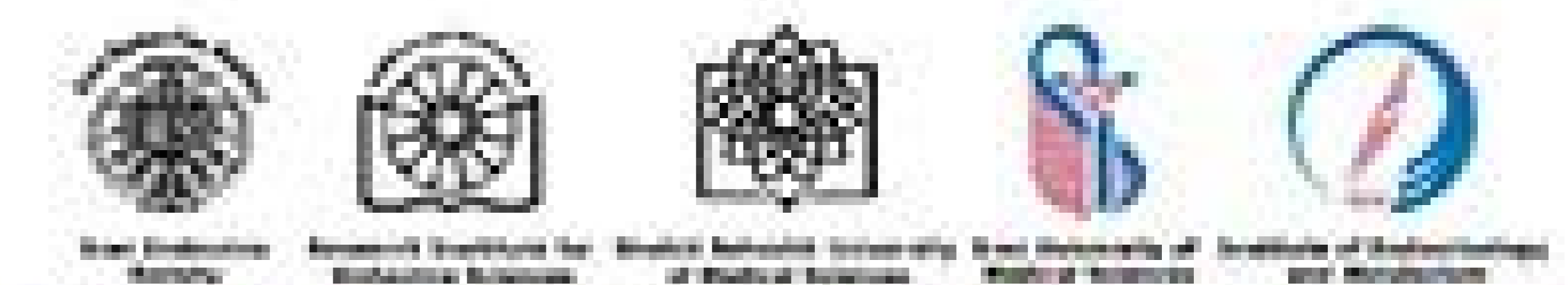
- 1) Canola oil → ↑ secretion of cholecystokinin → ↑ sense of satiety
- 2) PUFA → modulating the gene expression → ↑ oxidation in adipose tissue, liver, and other organs → ↓ fat storage → weight loss



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Conclusion:

In conclusion: Replacing ghee with canola oil improved NAFLD symptoms and Obesity and also could potentially benefit metabolic disorders.



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Thank you for your attention

Do you have any question?

