Cholesterol is a Passenger, Not a Driver

Dave Feldman

CholesterolCode.com

Conflicts of Interest:

None

Bio

- Software engineer
- Obsessed about lipids
- Conducting crazy N=1 experiments

Bio

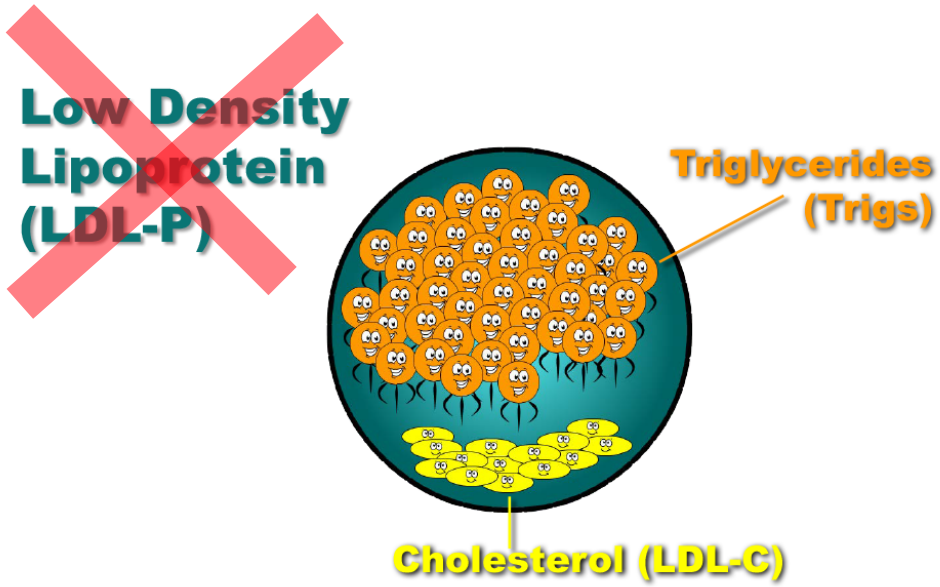
- “Cholesterol Traveler”
- *Have moved lipid numbers up and down several times through a series of experiments*
- *Brought LDL as high as 368 to as low as 98 in just the last 12 months*
- *How am I doing this?*

I’m working from a theory…

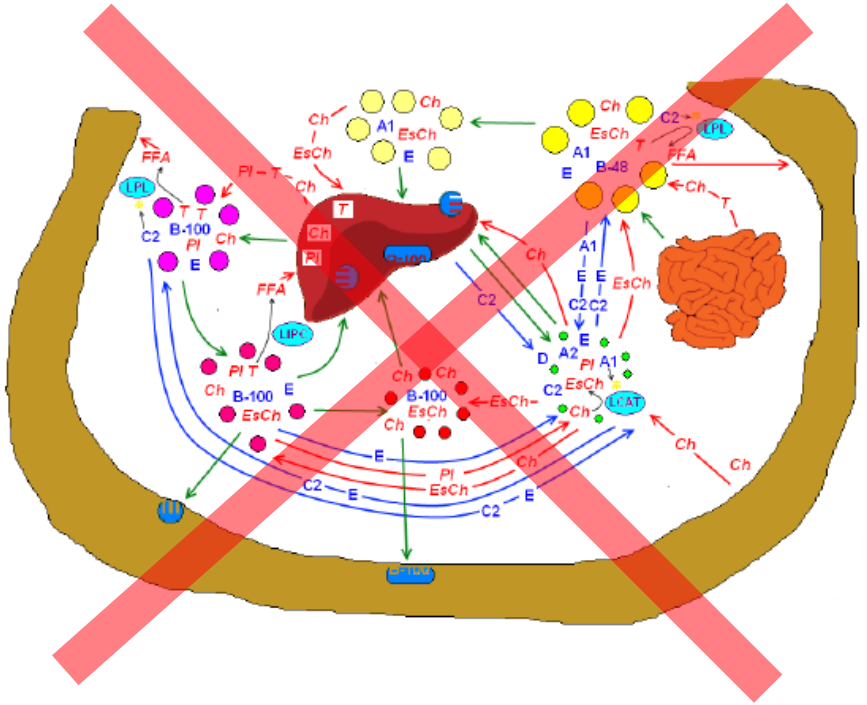
… that seems to keep working

Two audiences, two problems

- Experts prefer I don't simplify the language



- Laypeople can't be taught lipidology in 30 minutes

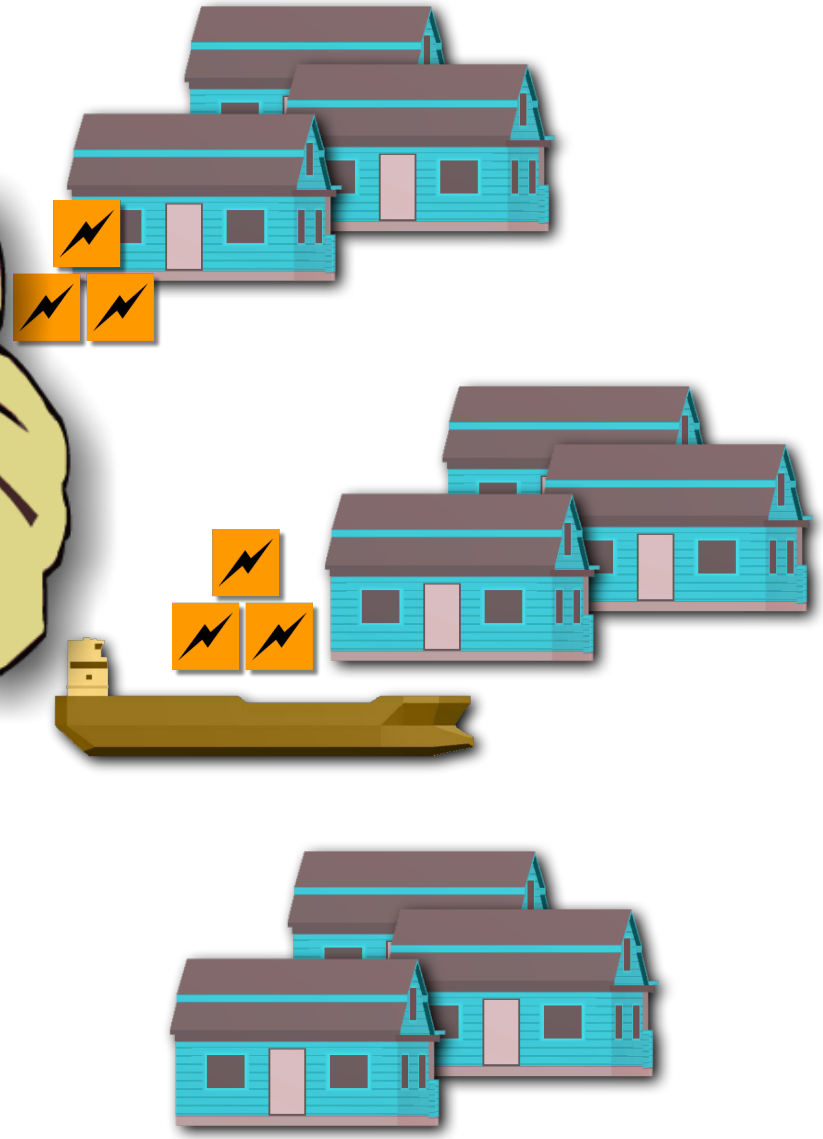


A Tale of Five Problems

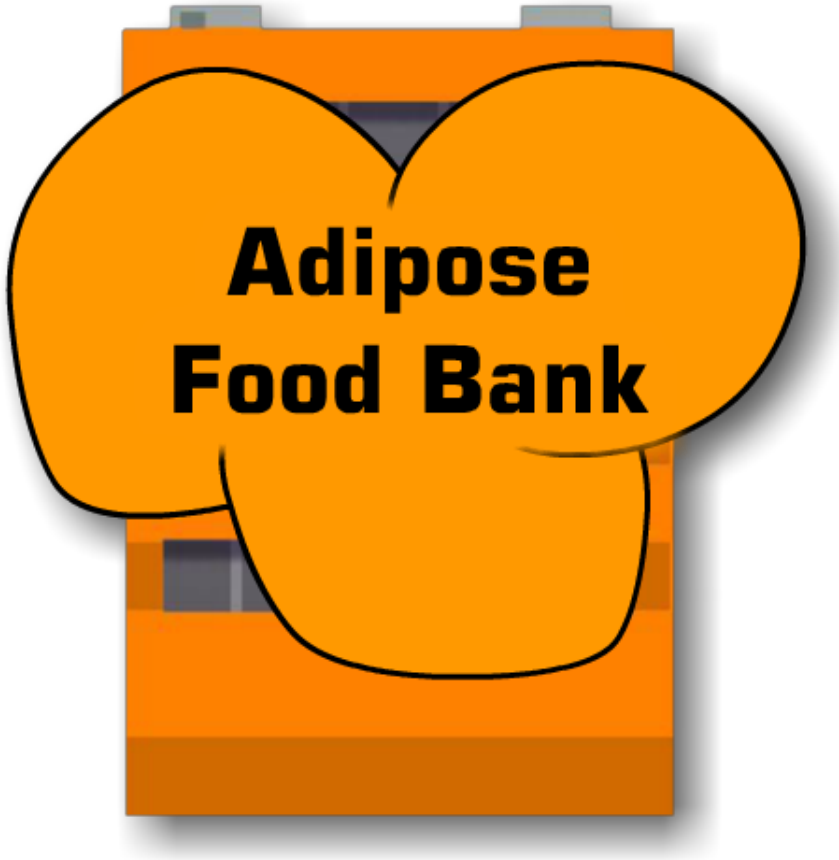
An analogy for lipoproteins

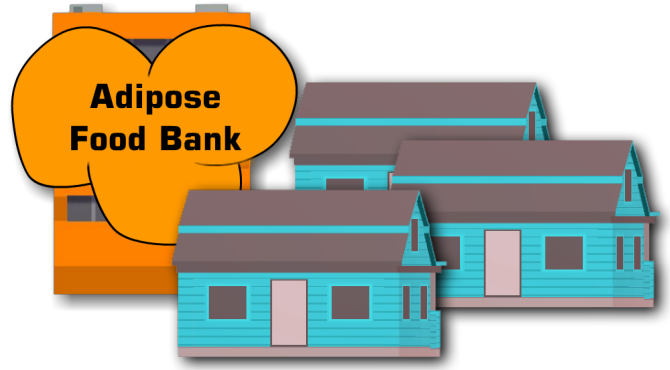
Our country is hit with a great flood…

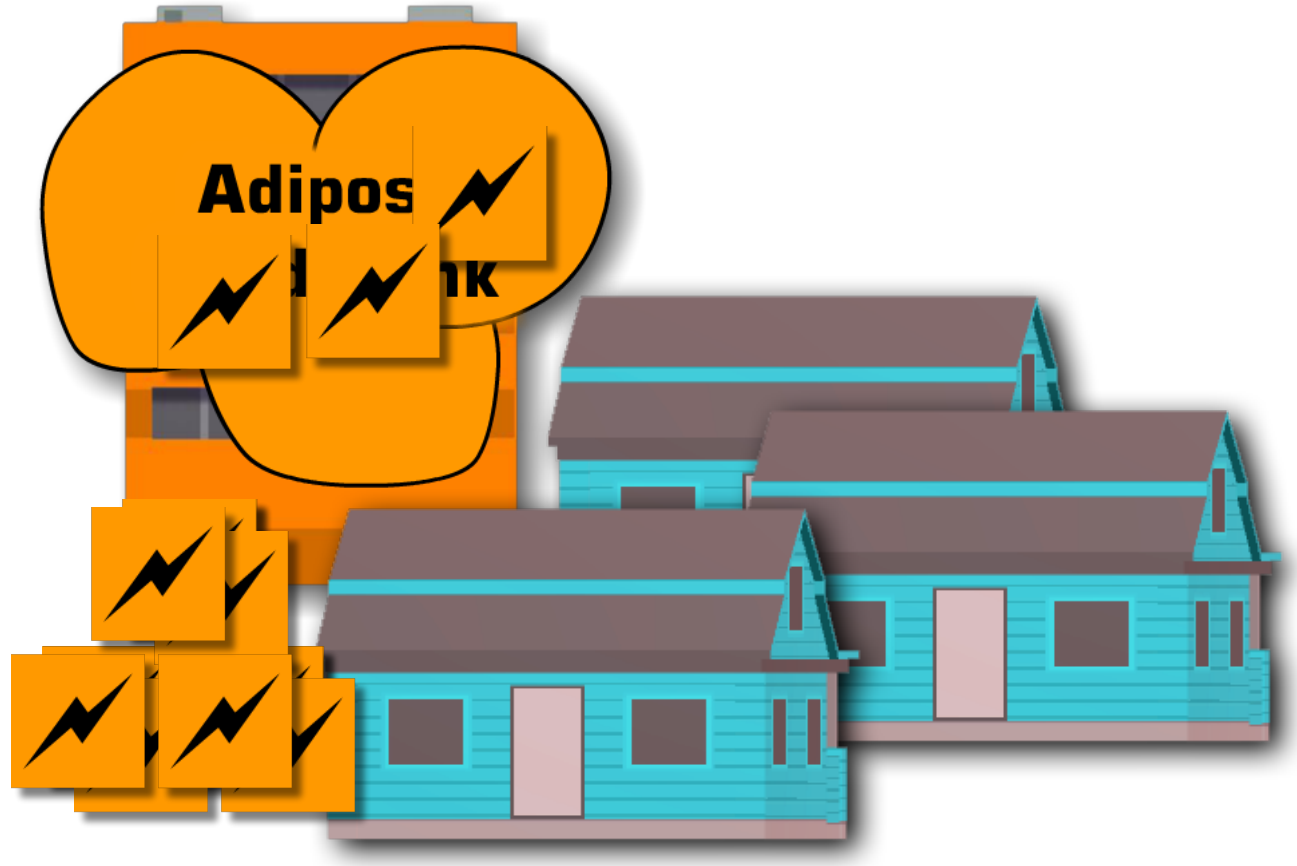
1st Problem:
Delivery from the outside



2nd Problem:
Lack of local storage






Adipos

3rd Problem: Balanced distribution

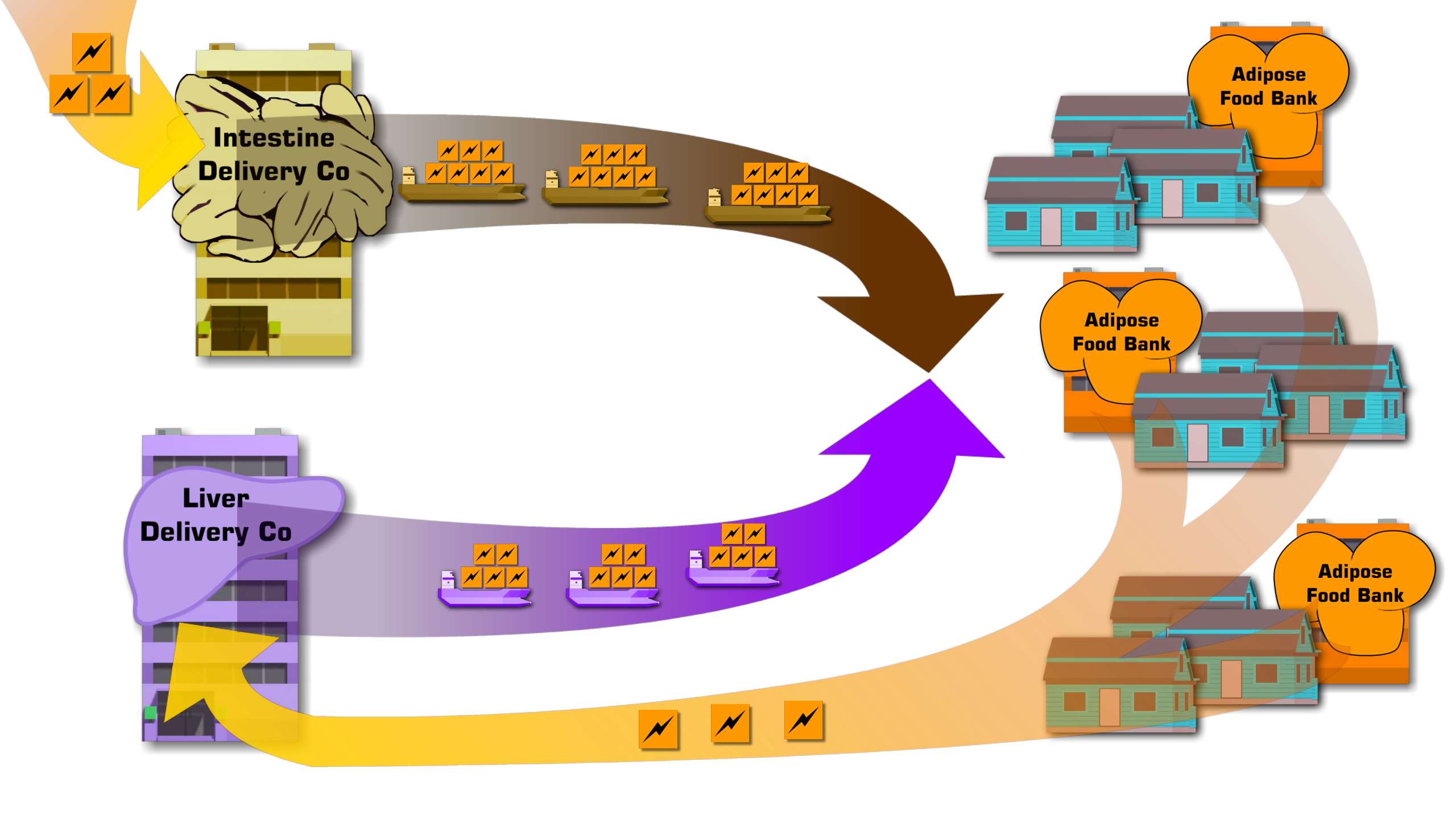

Intestine
Delivery Co

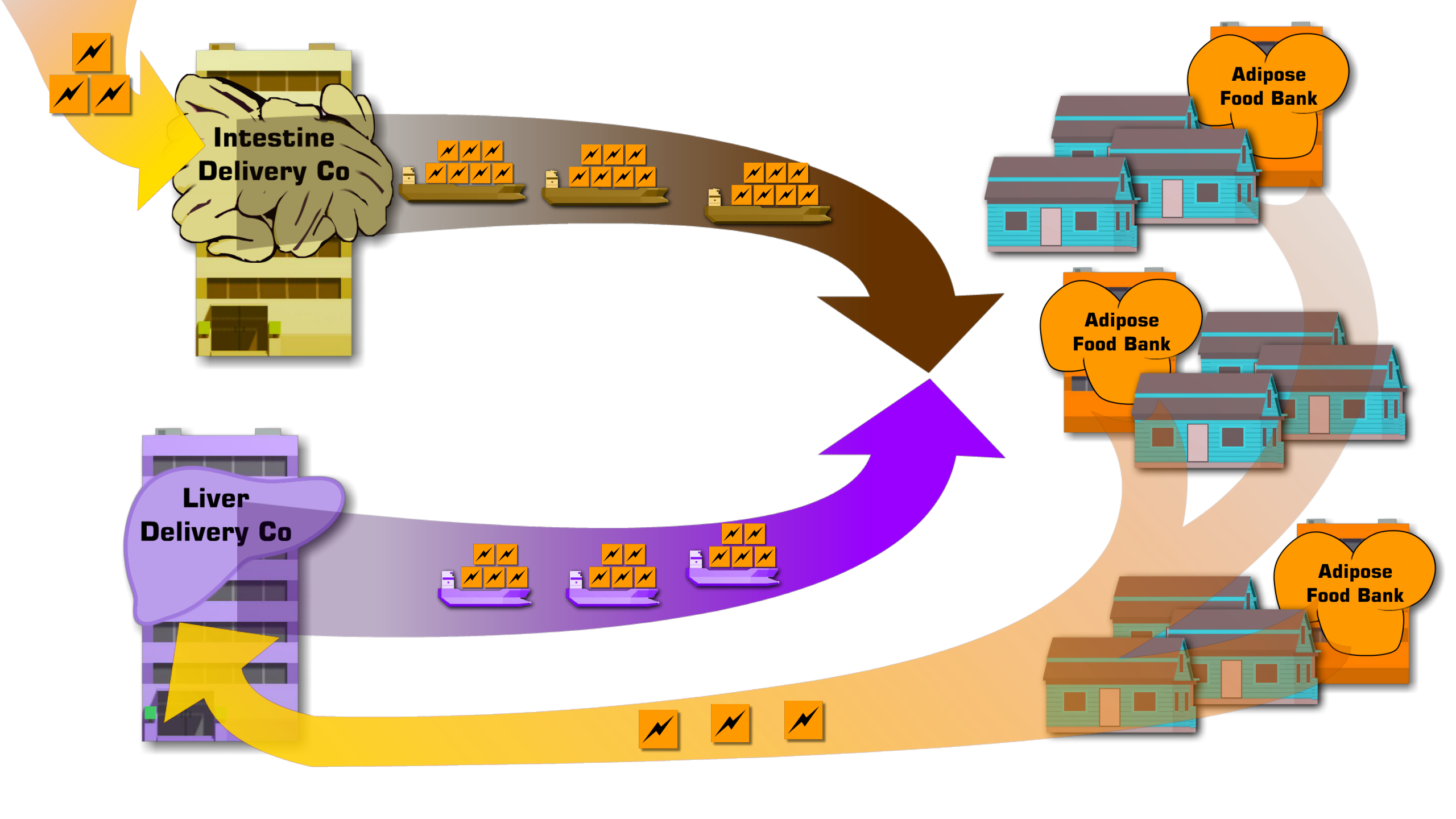

Liver
Delivery Co

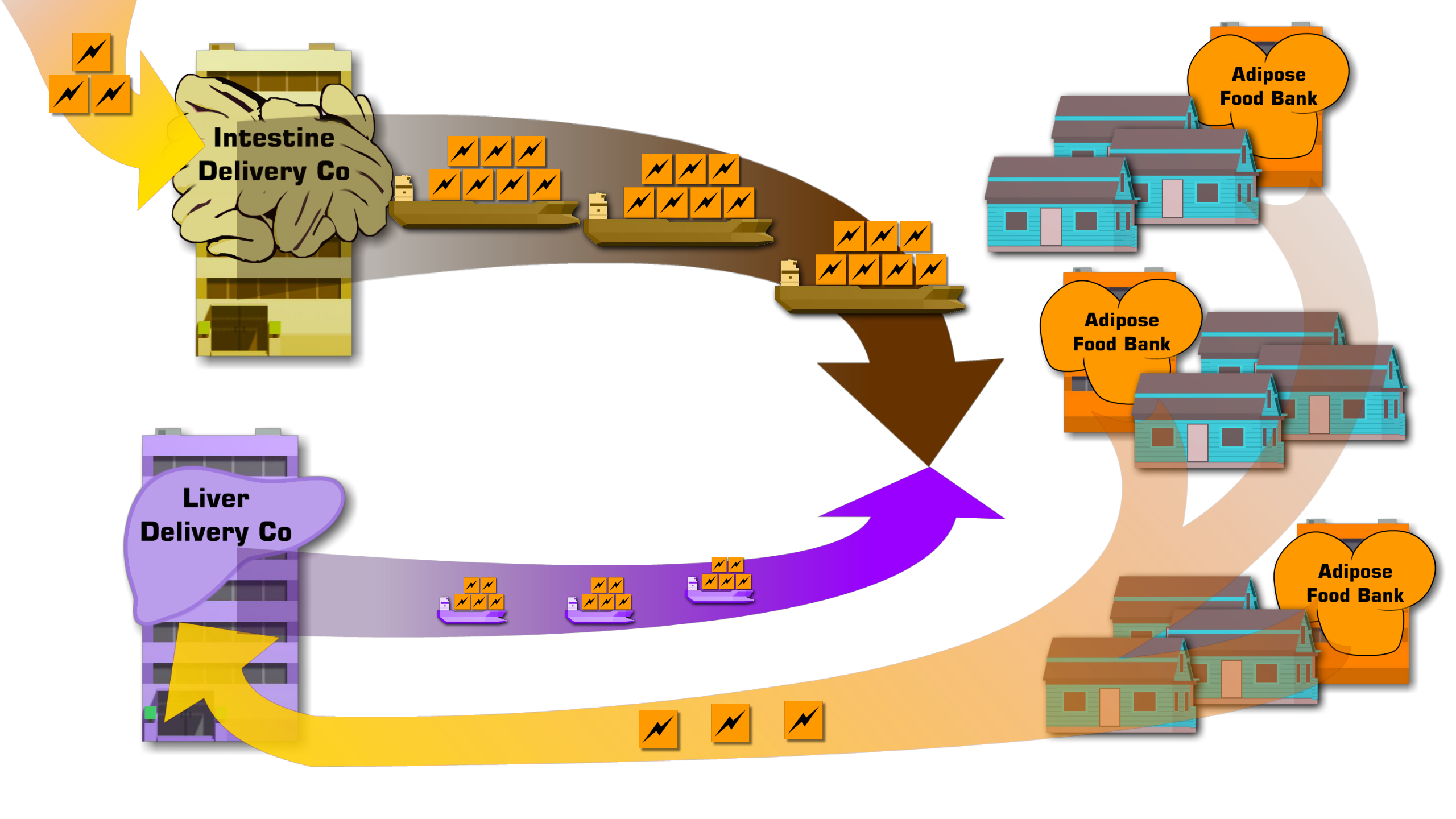

Adipose
Food Bank

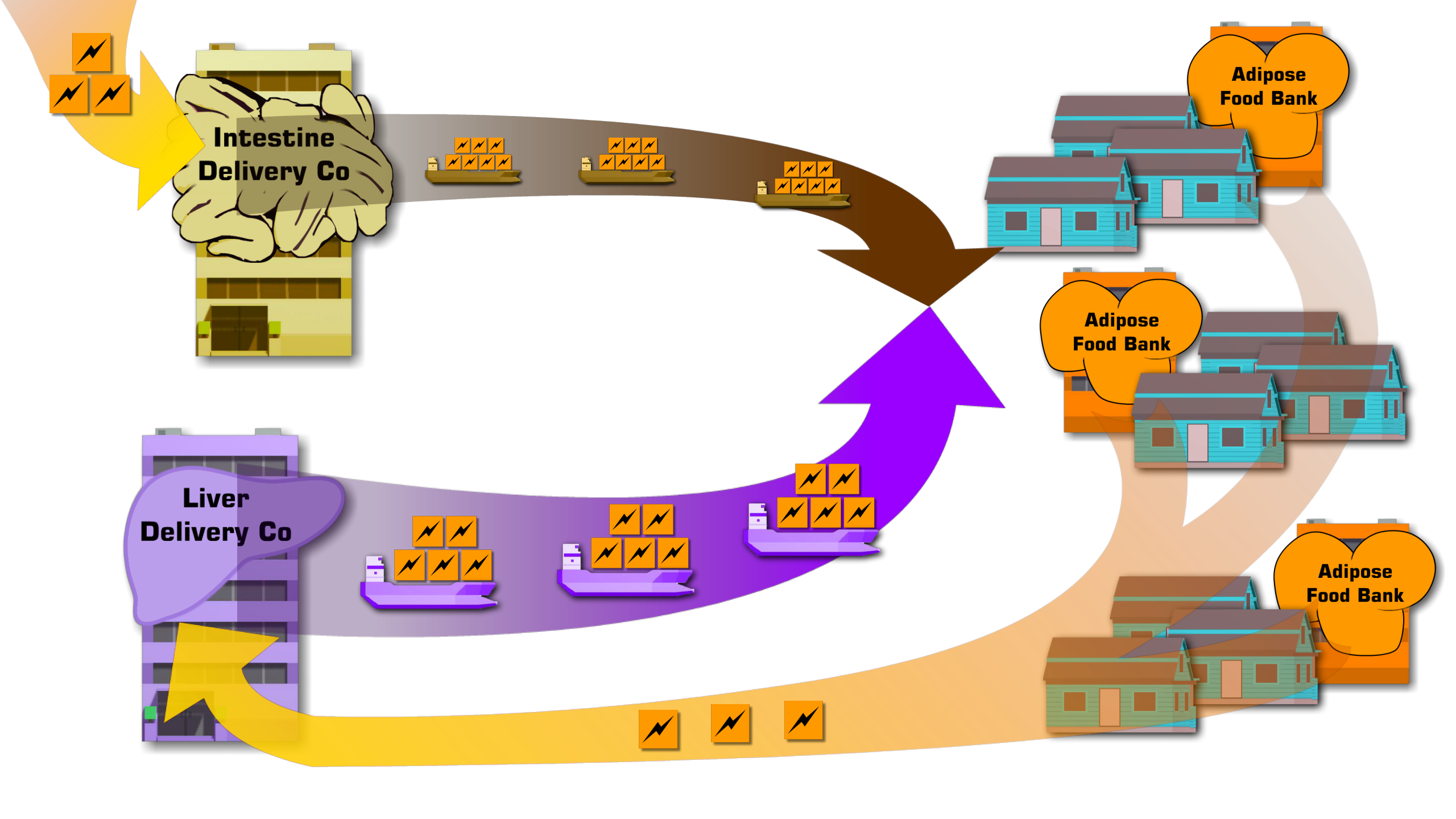

Adipose
Food Bank


Adipose
Food Bank


Intestine
Delivery Co
Adipose
Food Bank
Adipose
Food Bank
Liver
Delivery Co
Adipose
Food Bank


Intestine
Delivery Co
Adipose
Food Bank
Adipose
Food Bank
Liver
Delivery Co
Adipose
Food Bank

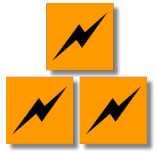

Intestine
Delivery Co
Adipose
Food Bank
Adipose
Food Bank
Liver
Delivery Co
Adipose
Food Bank


Intestine
Delivery Co
Adipose
Food Bank
Adipose
Food Bank
Liver
Delivery Co
Adipose
Food Bank

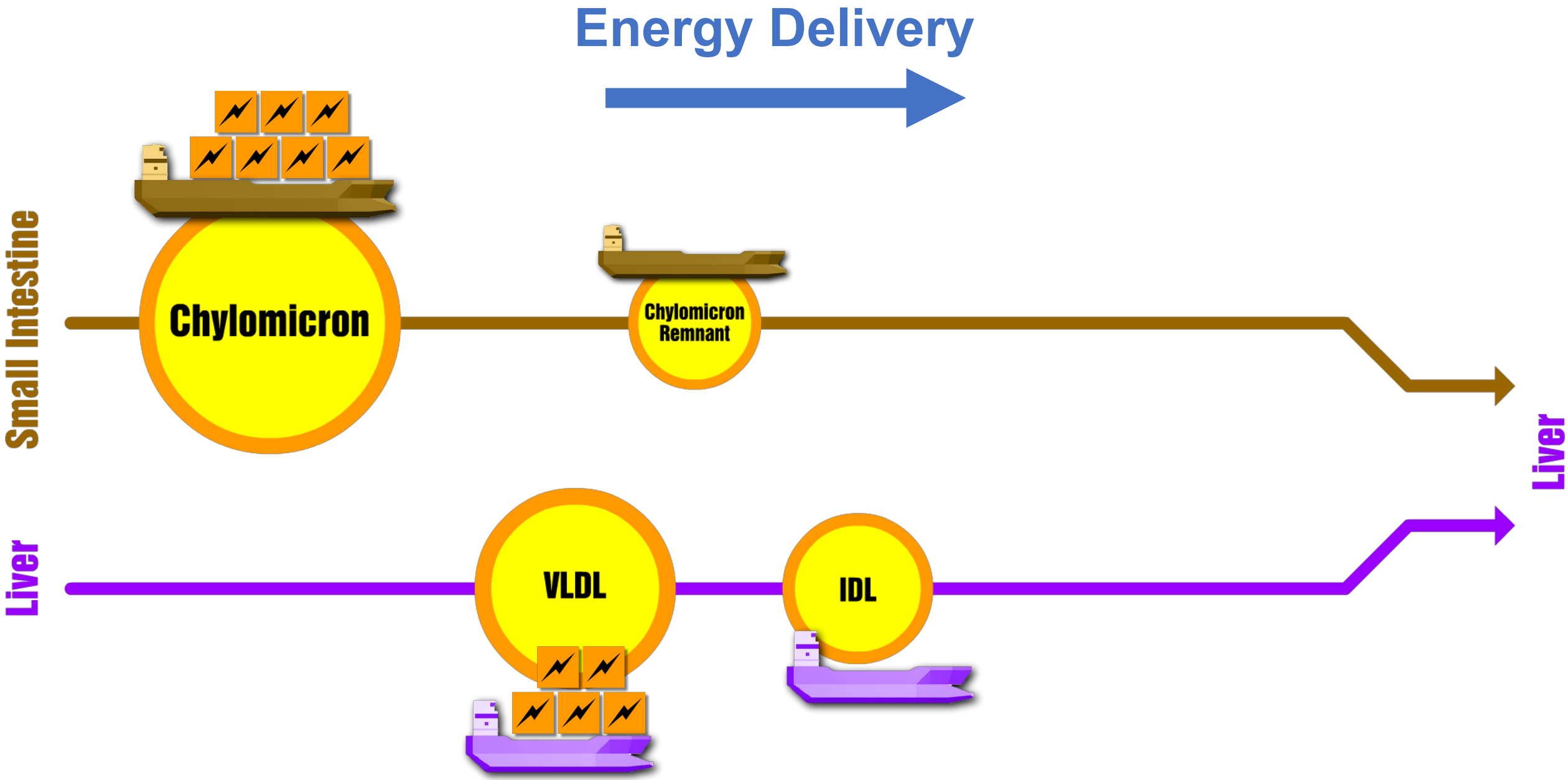
Lipid Analogy Legend

= Cells

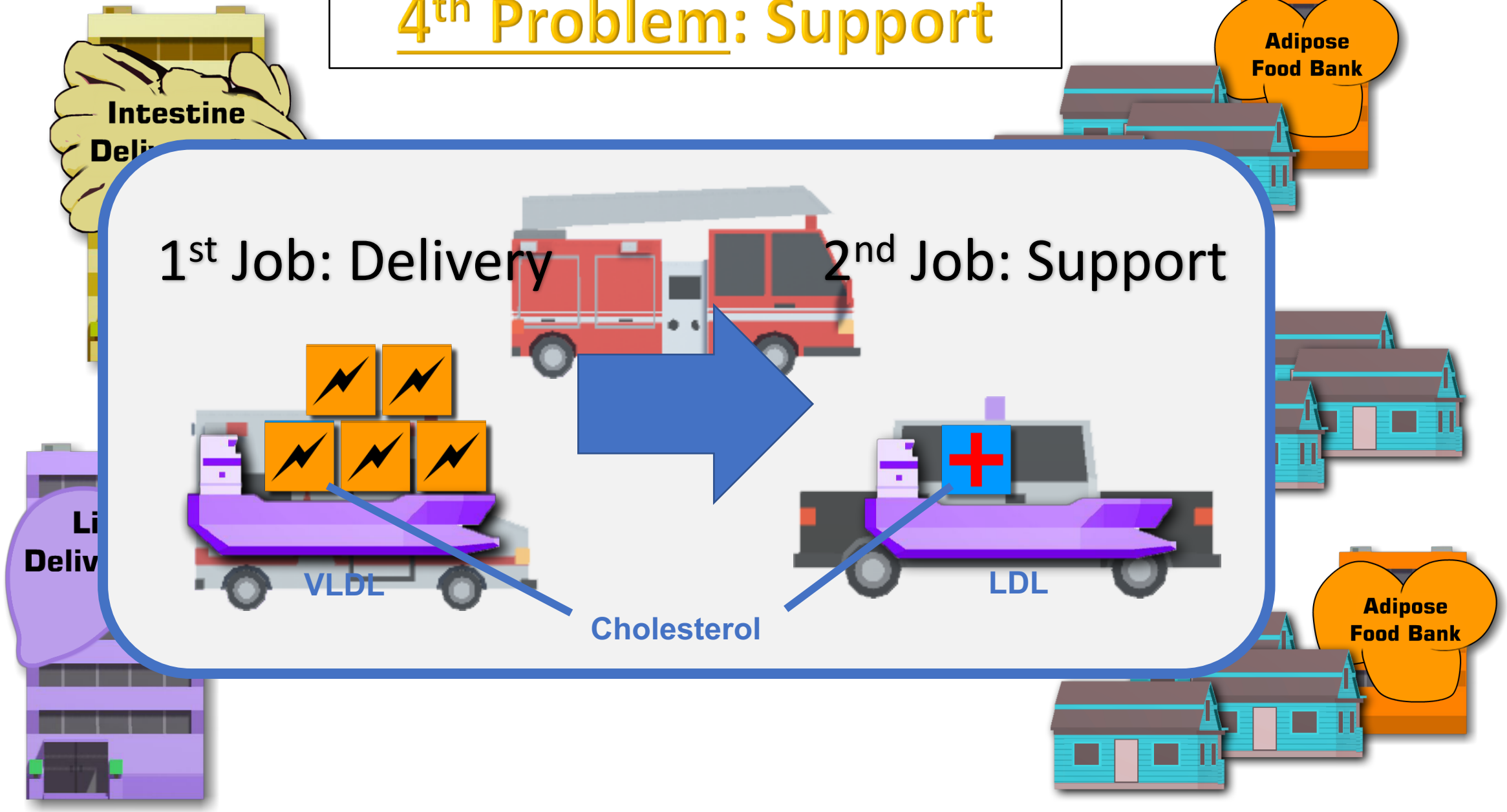
= Fatty Acids

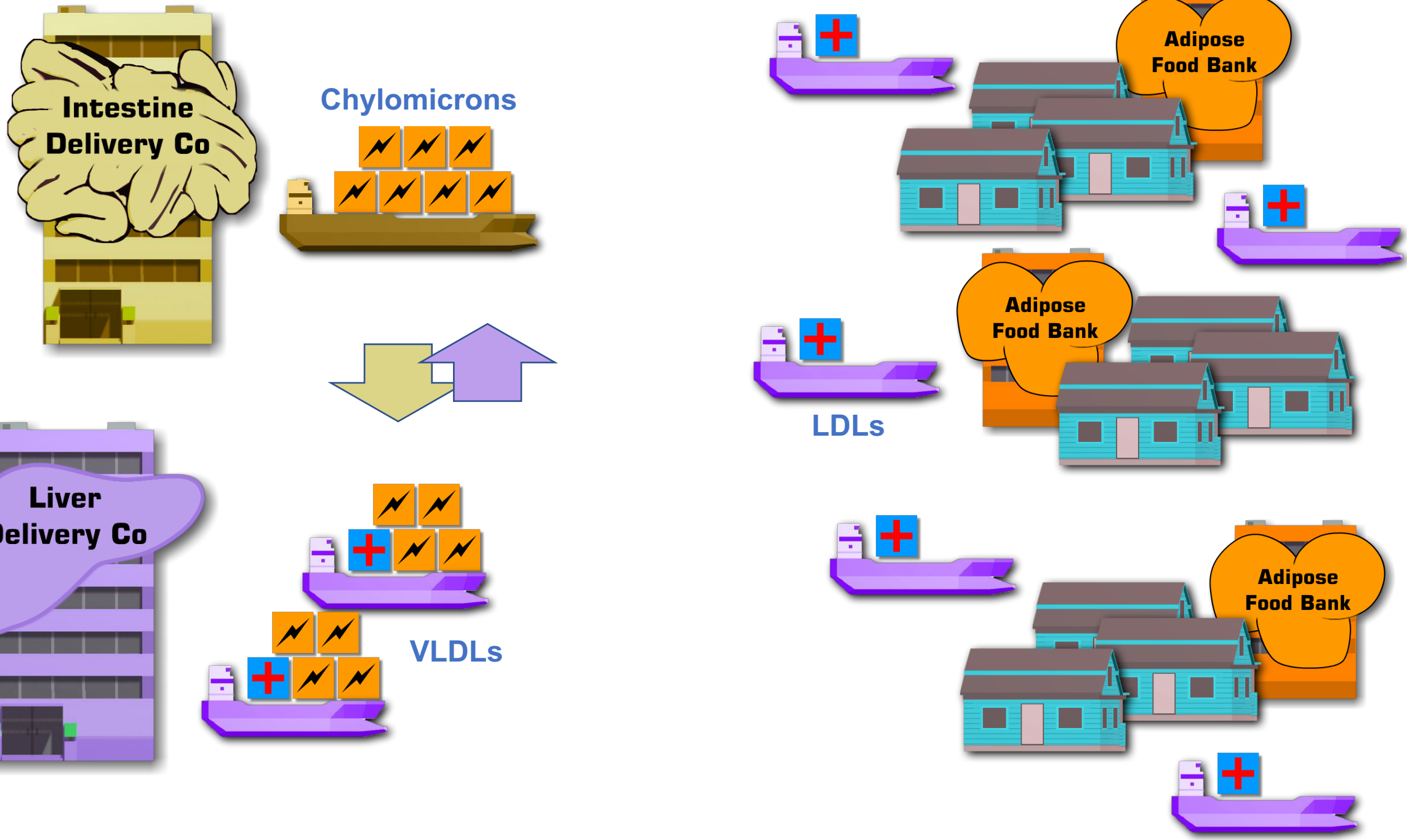


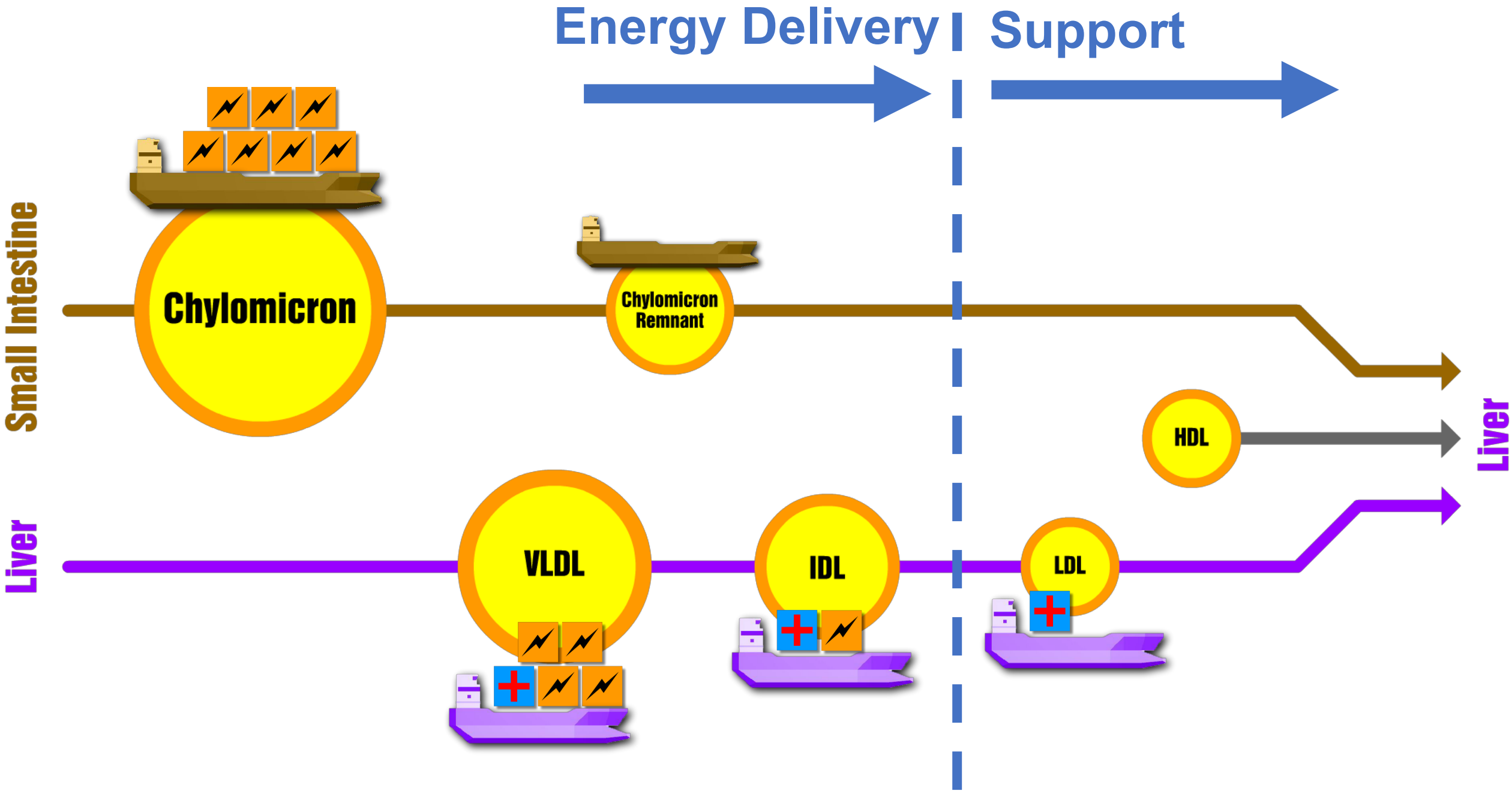
= Triglycerides


Energy Delivery
Small Intestine
Chylomicron
Chylomicron Remnant
Liver
Liver
VLDL
IDL

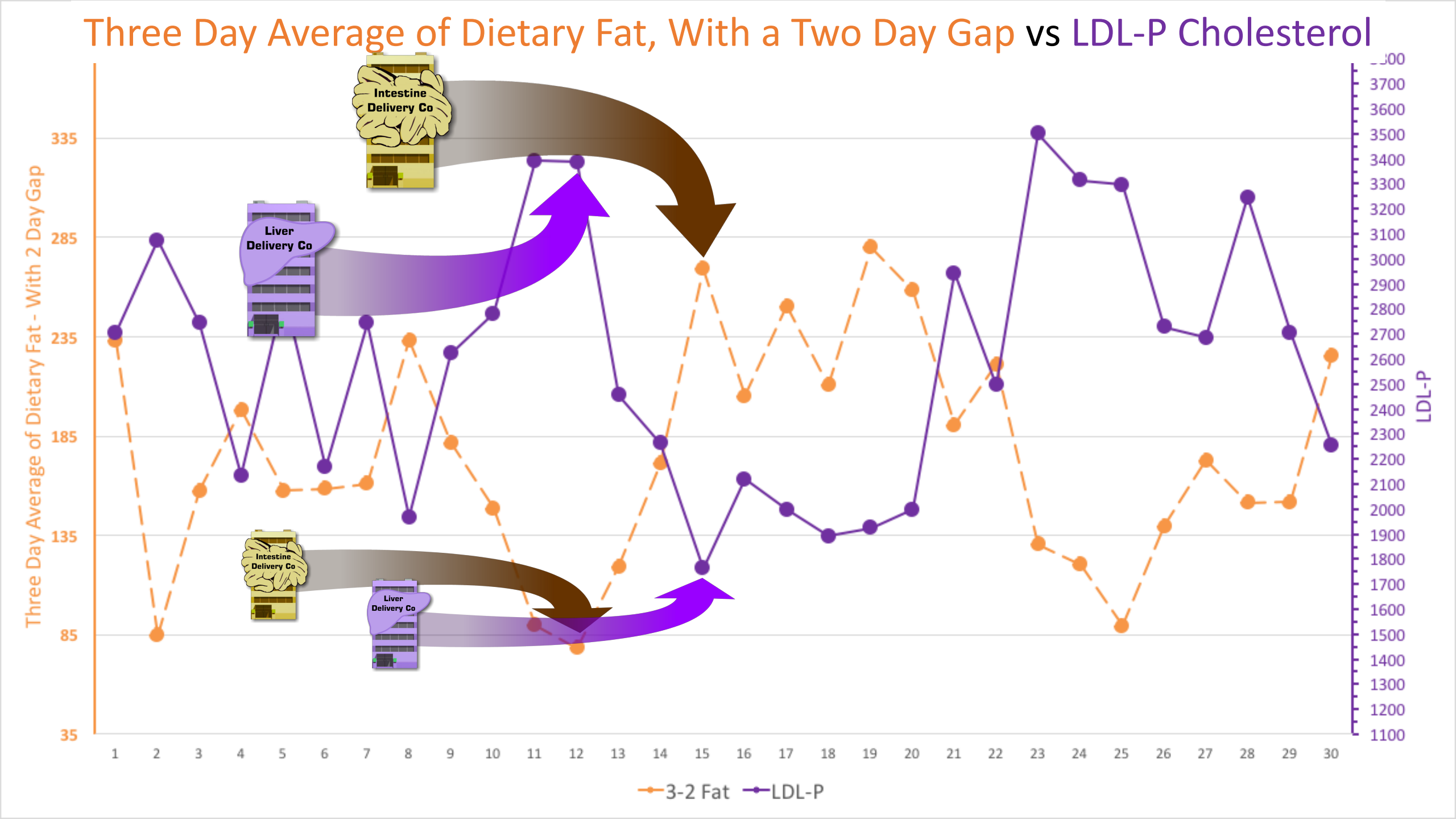
4th Problem: Support




Intestine Delivery Co
Chylomicrons
Liver Delivery Co
VLDLs
LDLs
Adipose Food Bank
Adipose Food Bank
Adipose Food Bank


Energy Delivery
Support
Small Intestine
Chylomicron
Chylomicron Remnant
HDL
Liver
Liver
VLDL
IDL
LDL

Three Day Average of Dietary Fat, With a Two Day Gap vs LDL-P Cholesterol



Emerging Patterns of LCHF Cholesterol

Anecdotes coming together

Cholesterol Code

Reverse Engineering the Mystery

JAN 20

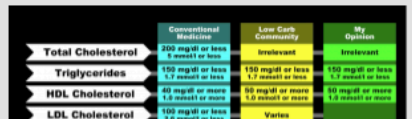
START HERE (Pinned)

Cholesterol, Experiments, Interview, Presentation, Video

by Dave

Please consider supporting my Patreon. All funding for my research and this site come solely from individuals like you. Thank you!

- **If you know little to nothing about cholesterol->**
  - **And you want to learn the basics->**
    - You can check out my Simple Guide to Cholesterol series. It's full of



Donate

My primary costs are the many frequent and expensive blood tests I take for this research and data. Any size donation is appreciated. Thank you for your support!

Donate

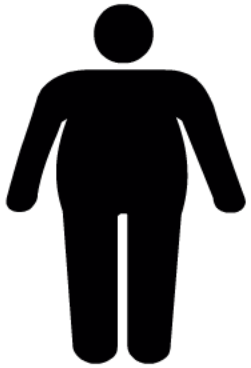
Biggest Cholesterol Influencers

When **metabolically healthy** and on a low carb, ketogenic diet, these appear to have the biggest impact on cholesterol

Body Fat

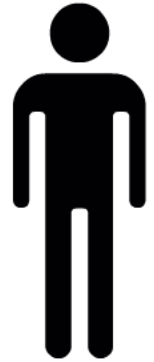
Overweight

Mildly Overweight



Medium

Lean



Energy Demands

Sedentary

Light

Moderate

High

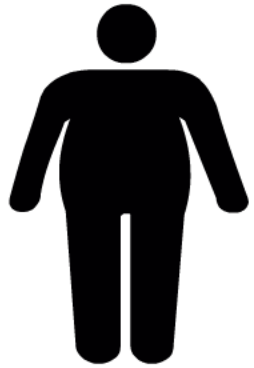
Biggest Cholesterol Influencers

When **metabolically healthy** and on a low carb, ketogenic diet, these appear to have the biggest impact on cholesterol

Body Fat

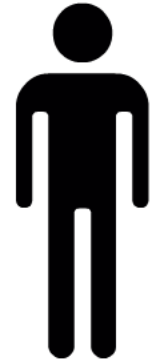
Overweight

Mildly Overweight



Medium

Lean



Energy Demands

Sedentary

Light

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Body Fat

Energy Demands

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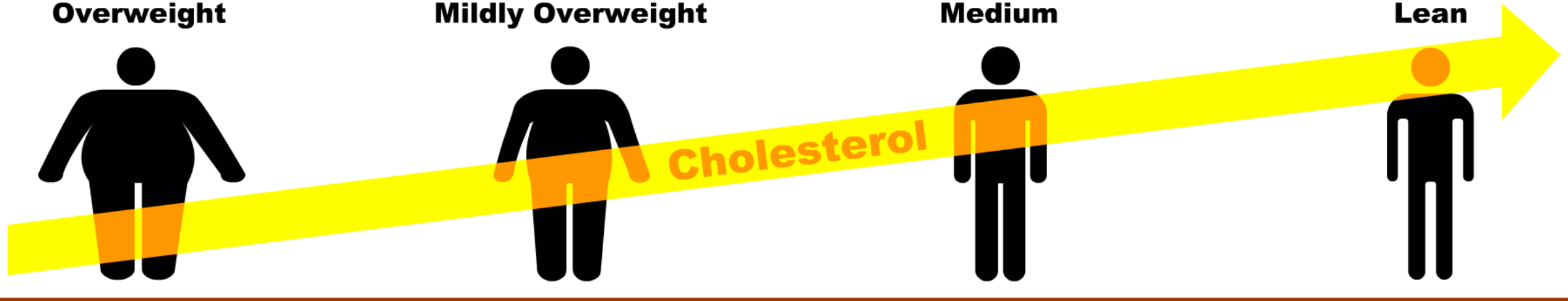
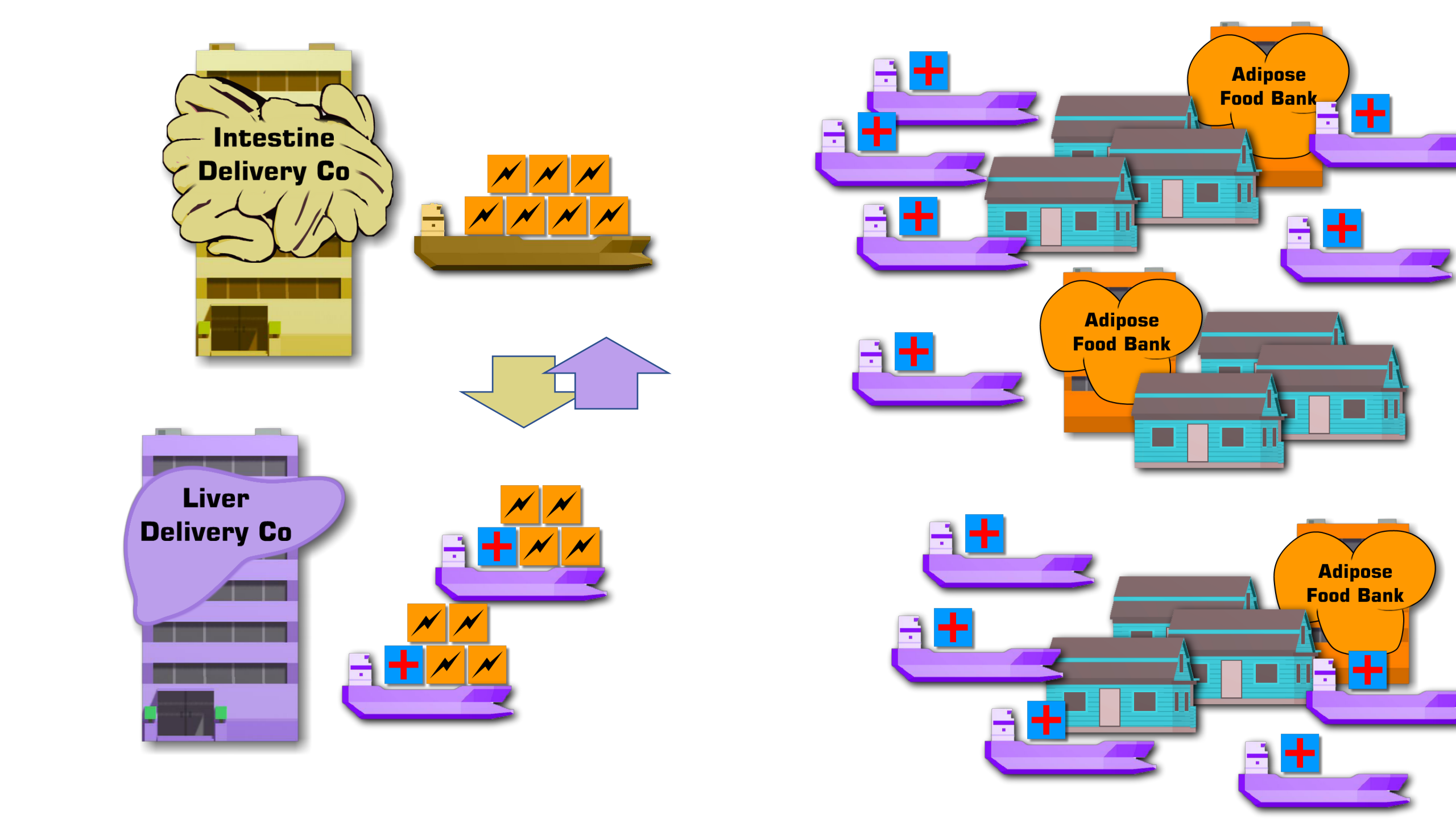
Body Fat



Energy Demands


Intestine
Delivery Co
Liver
Delivery Co
Adipose
Food Bank
Adipose
Food Bank
Adipose
Food Bank

A Working Hypothesis is Born…

Hypothesis (brief version):

High LDL cholesterol (LDL-C) and particle count (LDL-P) on LCHF diet can be a reflection of higher VLDL secretion *and use* to meet energy demands.

… wouldn't it be great if we had a profile that showcases this perfectly?

Lean Mass Hyper-responder

Low Carb Diet
= Lower Glycogen Stores

Low Body Fat
= Lower Adipose Stores

Athletic / Active
= Higher Energy Demands

- LDL of 200 or higher
- HDL of 80 or higher
- Triglycerides of 70 or lower

cholesterolcode.com
/are-you-a-lean-mass-hyper-responder

Tear Down this Hypothesis

A formal Invitation

The great tragedy of science - the slaying of a beautiful hypothesis by an ugly fact.

Thomas Huxley

BRING ON THE UGLY FACTS!!!

Dave Feldman @DaveKeto · 11 Dec 2017

Question for those in the know: Are there any studies that show high LDL with high CVD in spite of having **low triglycerides**?

7 3 21

Is Isolated Low High-Density Lipoprotein Cholesterol a Cardiovascular Disease Risk Factor?

New Insights From the Framingham Offspring Study

Study Participants

Participants were adult men and women from the Framingham Heart Study Offspring Cohort whose baseline evaluation took place between 1987 and 1991 (examination cycle 4). The development of new CVD events[12] was monitored through 2011, as previously described.[13]

Of the initial 3925 participant samples available, 188 were excluded because of loss to follow-up, history of CVD at baseline, or TG >400 mg/dL. After excluding users of lipid-lowering therapy (n=147), the final sample size available for analysis was 3590 men and women.

Conclusions—CVD risk as a function of HDL-C phenotypes is modulated by other components of the lipid panel.

(*Circ Cardiovasc Qual Outcomes*. 2016;9:206-212. DOI: 10.1161/CIRCOUTCOMES.115.002436.)

Key Words: coronary heart disease risk ■ epidemiology ■ high-density lipoprotein cholesterol ■ low-density lipoprotein cholesterol ■ triglycerides

Table 2. Effect Sizes of Low HDL-C and High HDL-C in Conjunction With Varying Levels of TG and LDL-C*

	Low HDL-C			High HDL-C		
	N	OR	CI	N	OR	CI
TG<100, LDL<100	84			388	0.6	0.5–0.7
TG<100, LDL≥100	300	1.3	1.0–1.6	1098	0.7	0.5–1.0
TG≥100, LDL<100	137	1.3	1.1–1.5	72	0.7	0.6–1.0
TG≥100, LDL≥100	853	1.6	1.2–2.2	658	0.9	0.7–1.4
TG<100, LDL<130	213			929	0.6	0.5–0.7
TG<100, LDL≥130	171	1.3	1.1–1.5	557	0.7	0.6–1.0
TG≥100, LDL<130	414	1.3	1.0–1.5	255	0.7	0.5–1.0
TG≥100, LDL≥130	576	1.6	1.3–2.0	475	0.9	0.7–1.3
TG<150, LDL<100	133			434	0.6	0.5–0.7
TG<150, LDL≥100	660	1.3	1.0–1.7	1531	0.7	0.5–1.0
TG≥150, LDL<100	88	1.2	1.0–1.5	26	0.7	0.5–1.0
TG≥150, LDL≥100	493	1.6	1.2–2.2	225	0.9	0.6–1.3
TG<150, LDL<130	367			1095	0.6	0.5–0.7
TG<150, LDL≥130	426	1.3	1.1–1.6	870	0.8	0.6–1.0
TG≥150, LDL<130	260	1.2	1.0–1.5	89	0.7	0.5–1.0
TG≥150, LDL≥130	321	1.6	1.2–2.1	162	0.9	0.6–1.3

	Low HDL-C			High HDL-C		
	N	OR	CI	N	OR	CI
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TG≥150, LDL<100	88	1.2	1.0–1.5	26	0.7	0.5–1.0

Take the Low Carb Cholesterol CHALLENGE

There has been much complaining that those on a **Low Carb High Fat (LCHF)** diet are **overly comforted** by **low triglycerides** and **high HDL Cholesterol** even when their **LDL Cholesterol has increased !**

So submit to **@DaveKeto** (Twitter) the **best study** you can find that shows normal, non-treated* people who have **(1)High HDL**, **(2)Low Triglycerides**, and **(3)High LDL** who have **HIGH RATES OF CARDIOVASCULAR DISEASE**

* By "normal, non-treated" - We mean **no** drug or genetic studies.

CholesterolCode.com

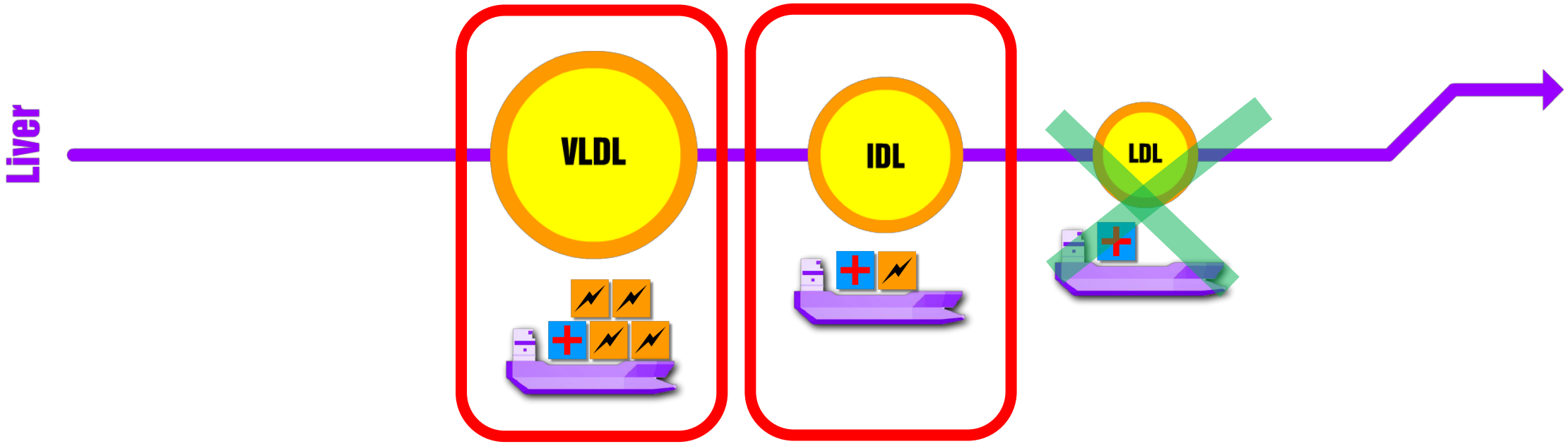
Remnant Cholesterol

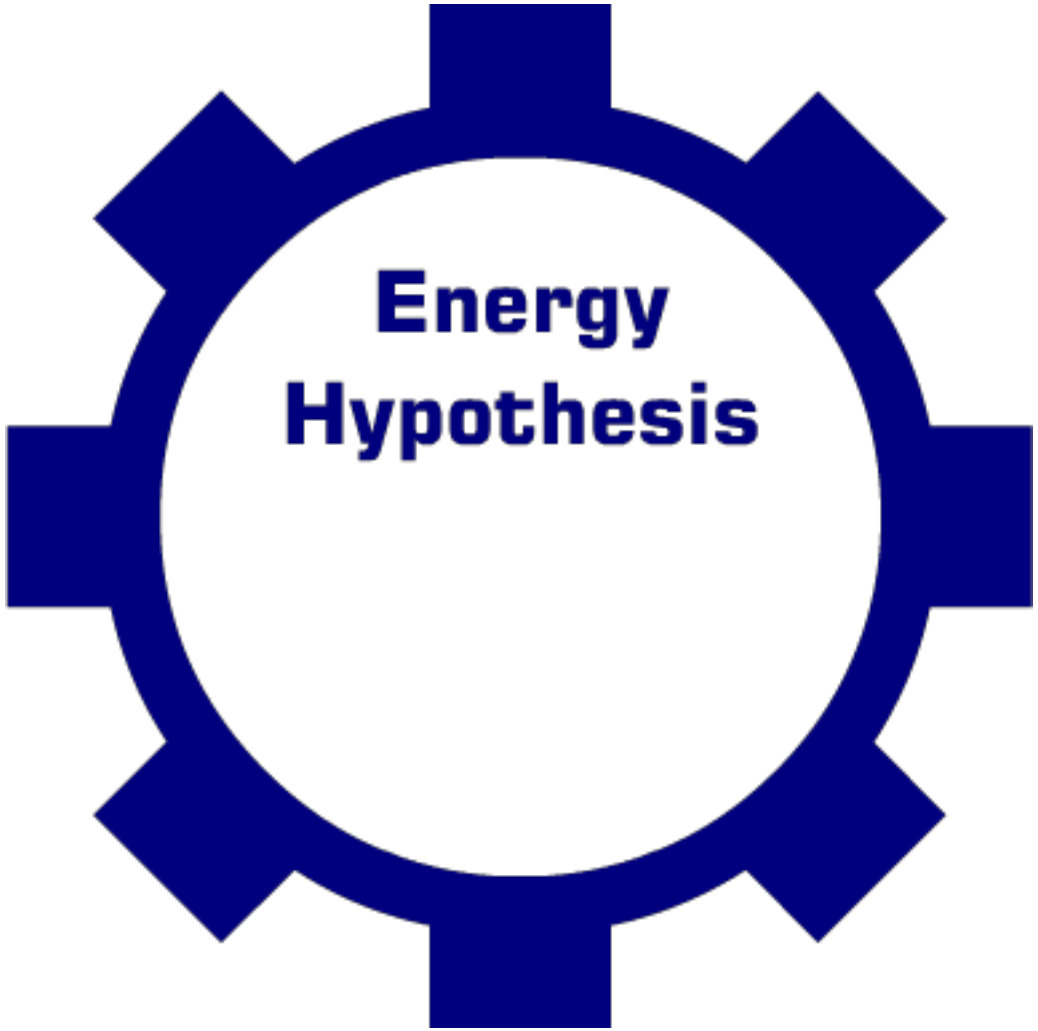
Why Every Low Carber Should Know About It

Remnant cholesterol

From Wikipedia, the free encyclopedia

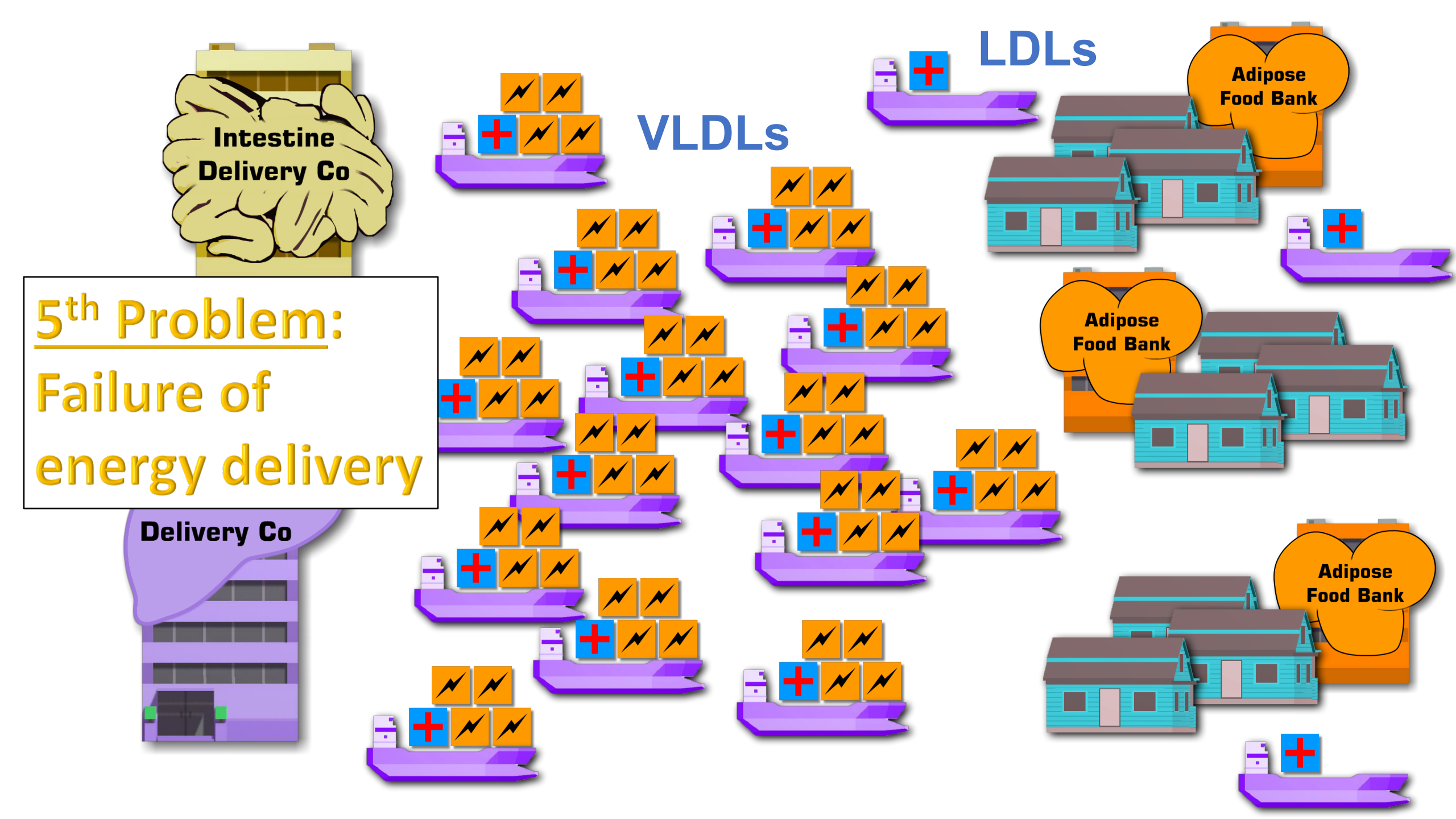
Remnant cholesterol, also known as **remnant lipoprotein**, is a very atherogenic lipoprotein composed primarily of very low-density lipoprotein (VLDL) and intermediate-density lipoprotein (IDL).[1] Stated another way, remnant cholesterol is all plasma cholesterol that is not LDL cholesterol or HDL cholesterol.[1]




Energy
Hypothesis

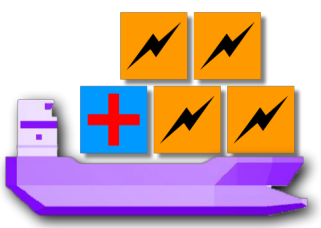

Remnant
Cholesterol

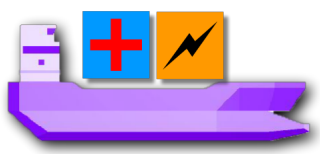

Energy
Hypothesis
Remnant
Cholesterol

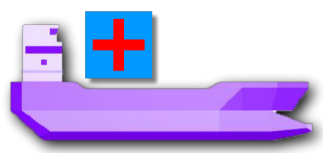


5th Problem: Failure of energy delivery

VLDL to LDL Lifecycle Represented in Pixels







Plasma RLP-C in Secondary Dyslipidemia

Insulin Resistance

The insulin-resistant state is associated with a cluster of abnormalities in glucose and lipid homeostasis, including elevated levels of plasma TG, low plasma concentrations of HDL cholesterol, and increased prevalence of small, dense LDL.[79] Metabolic defects include impaired free fatty acid metabolism, saturation of TRL remnant removal, and increased hepatic secretion of VLDL particles.[80] Hepatic VLDL-1 production and secretion are suppressed by induction of acute hyperinsulinemia in healthy men, whereas in patients with type 2 diabetes mellitus, this feedback mechanism is impaired.[81,82] Patients with the metabolic syndrome (ie, patients with visceral obesity, hypertension, and insulin resistance) equally display an atherogenic lipoprotein profile.[79] Elevated fasting plasma RLP-C concentrations have been found more frequently in individuals with insulin resistance than in healthy subjects. Moreover, in a multiple regression analysis, the HOMA (homeostasis model assessment) ratio (an index of insulin resistance) was closely related to plasma RLP-C levels.[83]

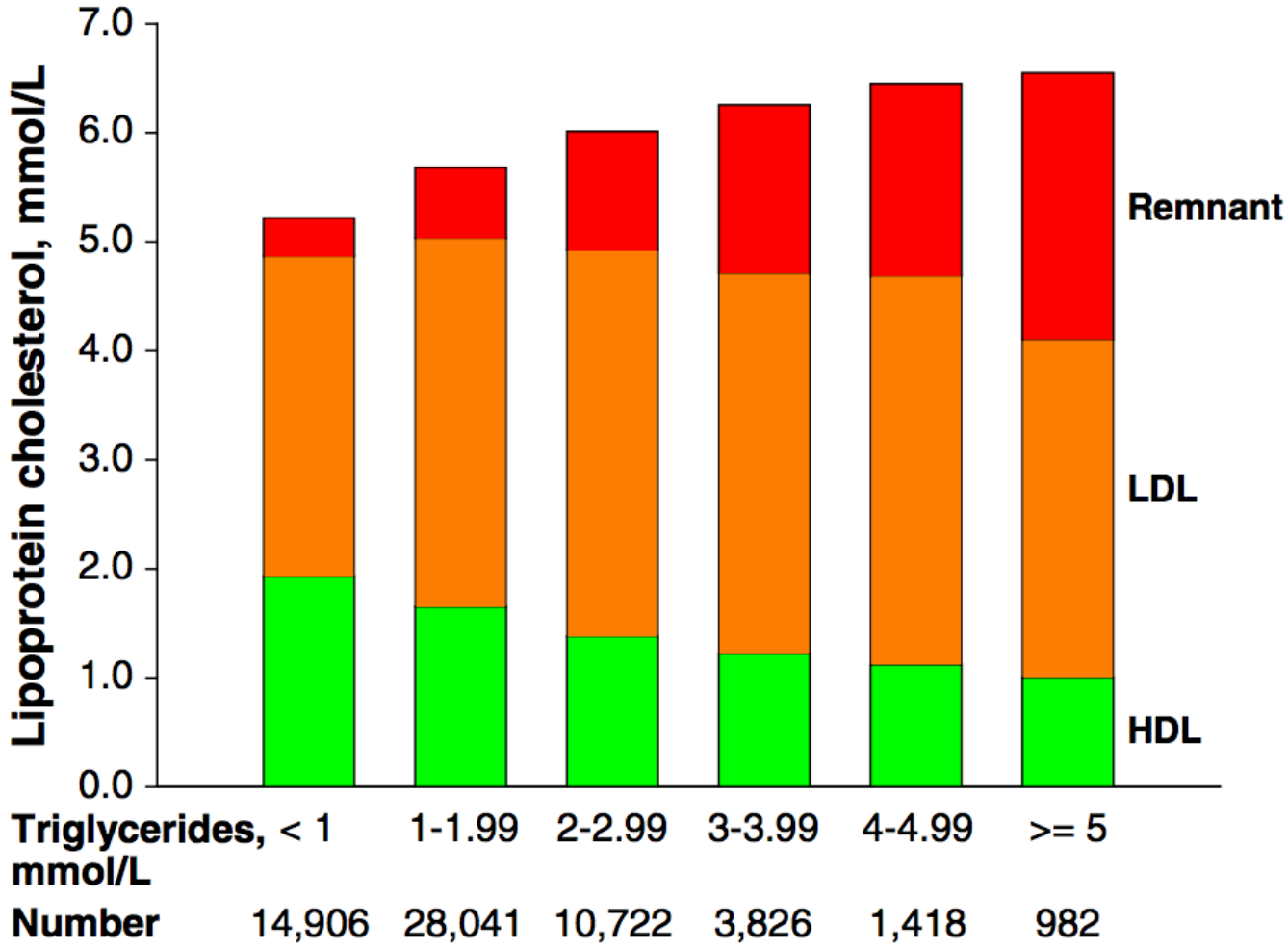
Elevated Remnant-Like Particle Cholesterol Concentration
T.B. Twickler, G.M. Dallinga-Thie, J.S. Cohn, M.J. Chapman

Associate editor: M.J. Chapman

Remnant cholesterol as a cause of ischemic heart disease: Evidence, definition, measurement, atherogenicity, high risk patients, and present and future treatment

Anette Varbo [a,b,c], Marianne Benn [b,c,d], Børge G. Nordestgaard [a,b,c,e,*]

[a] Department of Clinical Biochemistry, Herlev Hospital, Copenhagen University Hospital, Denmark
[b] The Copenhagen General Population Study, Herlev Hospital, Copenhagen University Hospital, Denmark
[c] Faculty of Health and Medical Sciences, University of Copenhagen, Denmark
[d] Department of Clinical Biochemistry, Gentofte Hospital, Copenhagen University Hospital, Denmark
[e] The Copenhagen City Heart Study, Frederiksberg Hospital, Copenhagen University Hospital, Denmark



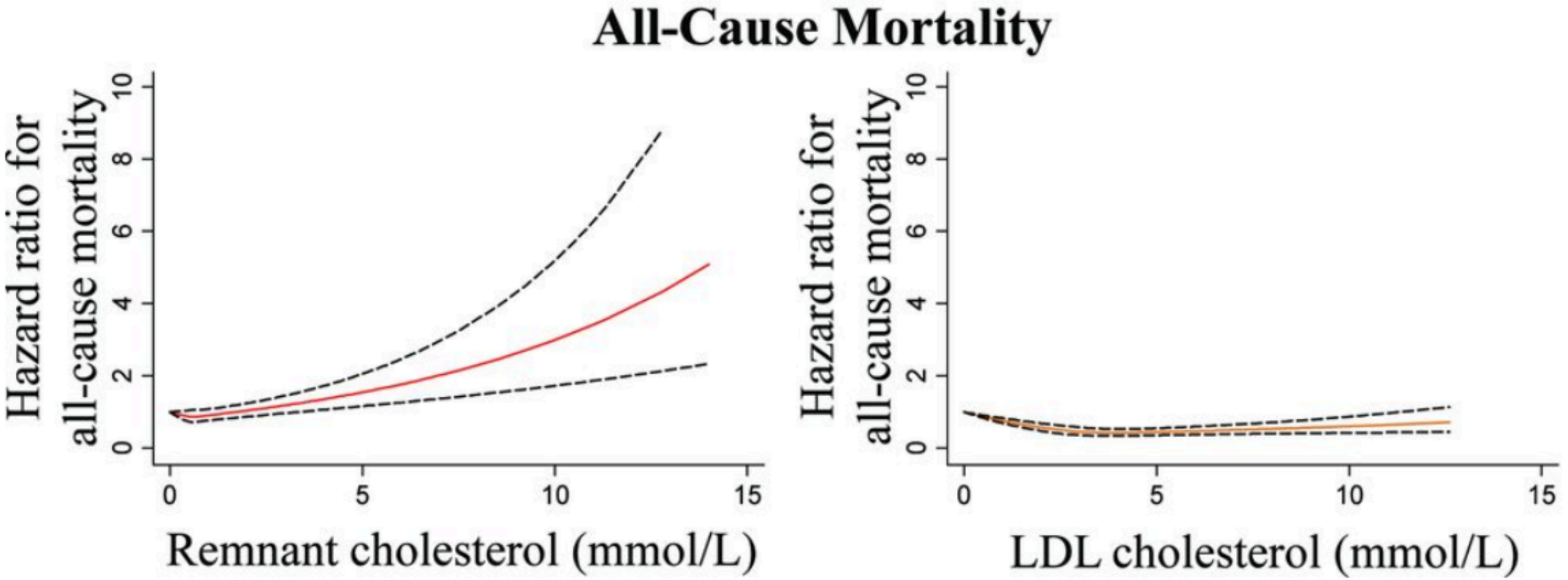
Premature myocardial infarction is strongly associated with increased levels of remnant cholesterol

Georg Goliasch, MD, PhD, Franz Wiesbauer, MD, MPH, Hermann Blessberger, MD, Svitlana Demyanets, MD, PhD, Johann Wojta, PhD, Kurt Huber, MD, Gerald Maurer, MD, Martin Schillinger, MD, Walter S. Speidl, MD

Results

Remnant cholesterol was 1.7-fold higher in premature AMI patients compared with controls (61.1 ± 36.8 vs 35.8 ± 16.8 mg/dL; $P < .001$). Remnant cholesterol was the lipid fraction most strongly associated with premature myocardial infarction (odds ratio 3.87; 95% confidence interval 2.26–6.64; $P < .001$) for an increase of 1-standard deviation. This observation was independent from clinical risk factors and plasma lipid levels.

Extreme Nonfasting Remnant Cholesterol vs Extreme LDL Cholesterol as Contributors to Cardiovascular Disease and All-Cause Mortality in 90000 Individuals from the General Population



Anette Varbo, Jacob J. Freiberg, Børge G. Nordestgaard **DOI:** 10.1373/clinchem.2014.234146 Published February 2015

A Simple Comparison - Dave Feldman

1/21/2014

- Total Cholesterol: 177
- LDL-C: 121
- HDL-C: 40
- Triglycerides: 80

- Remnant Cholesterol: 16 mg/dL

8/14/2017

- Total Cholesterol: 284
- LDL-C: 201
- HDL-C: 71
- Triglycerides: 58

- ***Remnant Cholesterol: 12 mg/dL***

Craig Moffit, 40

Total Cholesterol: 457 mg/dL
LDL-C: 335 mg/dL
HDL-C: 109 mg/dL
Triglycerides: 67 mg/dL

Remnant Cholesterol:
13 mg/dL

[Lowest risk quintile]

How do you calculate Remnant Cholesterol?

Total Cholesterol

- LDL Cholesterol

- HDL Cholesterol

= Remnant Cholesterol

CholesterolCode Data for Remnant Cholesterol

Criteria: LDL Cholesterol (LDL-C) was 200 mg/dL or above, and Triglycerides were 100 mg/dL or below.

- 138 Total Entries meet criteria out of 456
- Highest, Medium Highest, and Medium Risk categories combined: 9
- Medium Low risk category: 44
- ***Lowest risk category: 84***

Caveats

- This presentation doesn't discuss the influence of glucose, glycogen stores and overall energy status which likely impacts lipid numbers further. (Currently the Phase II focus of my research)

- There are bad reasons for higher LDL cholesterol involving immunological and reparative processes. *However*, they typically include higher triglyceride levels as well.

- Clearance timing of LDL particles probably varies per person and may be influenced by genetic variability.

The Inversion Pattern Revisited

Now Showing Everywhere

Dietary Fat Inversion

Three Day Average of Dietary Fat Before Day of Blood Test

- Dietary Fat from 3 Days Before Blood Test
- Dietary Fat from 2 Days Before Blood Test
- Dietary Fat from 1 Day Before Blood Test

→ High Inverse Correlation →

Resulting LDL-C

- Morning of Blood Test

Three Day Average of Dietary Fat Before Day of Blood Test

- Dietary Fat from 5 Days Before Blood Test
- Dietary Fat from 4 Days Before Blood Test
- Dietary Fat from 3 Day Before Blood Test

... With a Two Day Gap

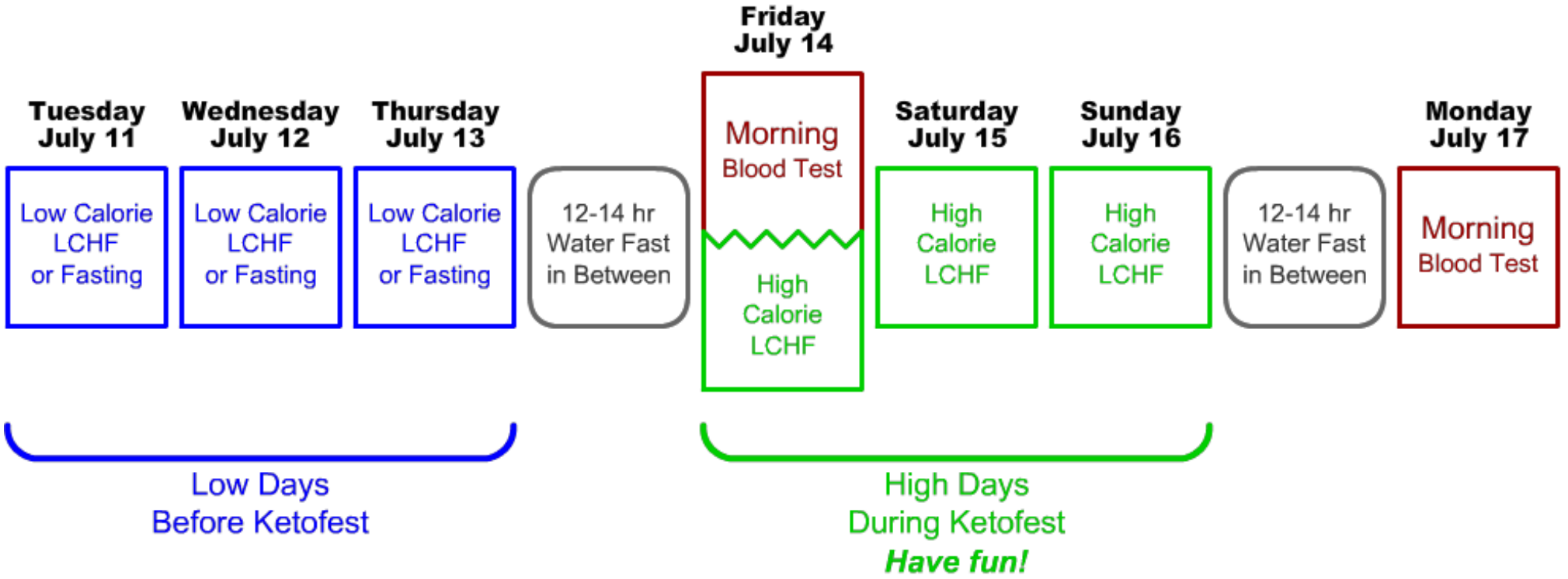
- ~~Dietary Fat from 2 Days Before Blood Test~~
- ~~Dietary Fat from 1 Day Before Blood Test~~

→ High Inverse Correlation →

Resulting LDL-P

- Morning of Blood Test

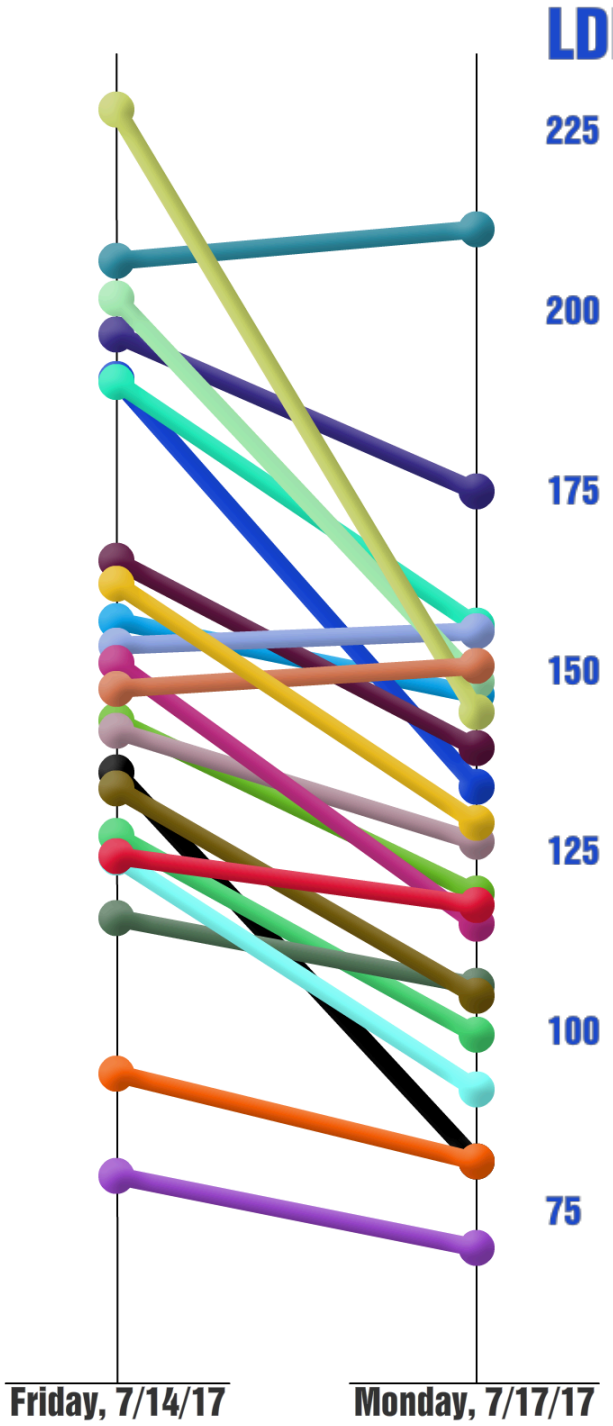
Ketofest Cholesterol Experiment - July 11-17, 2017



Hypothesis posted on the morning of July 11th:
Following the second phase of higher dietary fat, I predict the resulting LDL cholesterol for the majority of participants will show a ***decrease*** when compared to the first.


21
HOT ROD
CAFE

19 had an
decrease of 5-38%



3 had an
increase of 1-2%

Average change in LDL-C:

-16%

-25.7 mg/dl

	Low Calorie or Fasted LCHF Diet		High Calorie LCHF Diet			
ID #	7/14/17 LDL		7/17/17 LDL		Difference	% Change
1	142.8		88.8		-54	-38%
2	163.8		153.6		-10.2	-6%
3	197.4		140.8		-56.6	-29%
4	197		163.2		-33.8	-17%
5	213.8		218.2		4.4	2%
6	203.6		181.8		-21.8	-11%
7	134		106.4		-27.6	-21%
8	122.6		113.2		-9.4	-8%
9	172.2		146.2		-26	-15%
10	150		126		-24	-16%
11	140.6		111.8		-28.8	-20%
12	131		98.8		-32.2	-25%
13	160.4		162.4		2	1%
14	86.8		76.8		-10	-12%
15	208.6		155.4		-53.2	-26%
16	148.6		133.2		-15.4	-10%
17	158		121.8		-36.2	-23%
18	234.8		151.2		-83.6	-36%
19	154.4		157.6		3.2	2%
20	131.2		124.4		-6.8	-5%
21	169		135.8		-33.2	-20%
22	101		88.8		-12.2	-12%
				Average:	-25.7	-16%

NOTE: One participant with HDL >100, requires lab results for calculation

The Feldman Protocol One Year Later…

Low Carb Breckenridge 2017

- 100% success rate so far.
- Nine have tried out of curiosity.
- Ten have used it to “get my doctor off my back.”
- Four have used it to improve their life insurance rate.

- **Low Carb Breckenridge 2018**
- Apx 85% success rate so far.
- Comments on Twitter, Facebook, CholesterolCode.com, Reddit, blogs, and direct message suggest…

  …over 100 have tried the Protocol!
- 13 have used it to improve their life insurance rate.

Possible Protocol Pitfalls

Anecdotally, these elements have been the most common when the Protocol hasn’t yielded expected drop in LDL-C.

- Use of MCT or Coconut Oil.
- Use of coffee.
- Some with hypothyroidism appear to have unexpected results.

Summary

- More VLDLs may be trafficked on a LCHF diet for fuel.
- This may result in higher presence of its later stage as an LDL particle (LDL-P), resulting in higher LDL cholesterol (LDL-C) as well.
- This may be not only appropriate, but a mechanistic necessity.
- Remnant Cholesterol (Total Cholesterol – LDL-C – HDL-C) is a far stronger indicator of risk of both heart disease and all cause mortality than LDL-C.
- Remnant Cholesterol typically drops with a low carb diet.

Thank you, Patrons!

Adam K
Alan G
Alan W
Albert M
Ali M
Amy B
An A
Andrew C
Angela D
Anita C
Anne M
April R
Aud N
BjÃ¸rg H
Bonnie L
Bret S
Brett R
Brian M
Bruno S
Cat s
Cheryl M
Chris B
Chris F
Chris W
Christina Y
Christopher G
Christy K
Craig M
Dan W
Daniel K
Darla R
Daryl J
Dave G
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Mikkel C
Moses d
nicholas w
Nick M
Nr H
Pedro J
Pete J
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Richard A
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Ross M
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Thank you for watching

For more information on my research, please visit:
CholesterolCode.com

Or contact me on Twitter: @DaveKeto