

# Surgical Management of Type II Diabetes

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# Objectives

- Describe the correlation between obesity and diabetes
- Discuss Weight loss treatment options
- Discuss metabolic surgery as a treatment of Type 2 Diabetes (T2D)



# Disclosure

- I am a Surgeon



# Type 2 Diabetes and Obesity

- Obesity (BMI  $>30$  kg/m<sup>2</sup>) is a major independent risk factor for developing diabetes
  - 90% of people with type 2 diabetes are overweight

World Health Organization. Obesity and Overweight Fact Sheet. How Does Excess Body Fat Impact health.  
<http://www.who.int/dietphysicalactivity/media/en/gsf Obesity.pdf>



# Type 2 Diabetes and Obesity

- Weight loss can lead to diabetes remission
  - Multiple randomized controlled trials supporting this:
    - DiRECT trial
    - DIADEM-I trial
  - These trials support the idea that greater weight loss is directly correlated with greater rates of remission



# Obesity Associated Comorbidities


- Type 2 Diabetes
- High Blood Pressure
- Sleep Apnea
- Hypertension
- High Cholesterol
- GERD (Reflux)
- Arthritis
- Asthma
- Heart Disease/Failure
- Anemia
- Cancer
- Gallbladder Disease
- Urinary Incontinence
- Depression







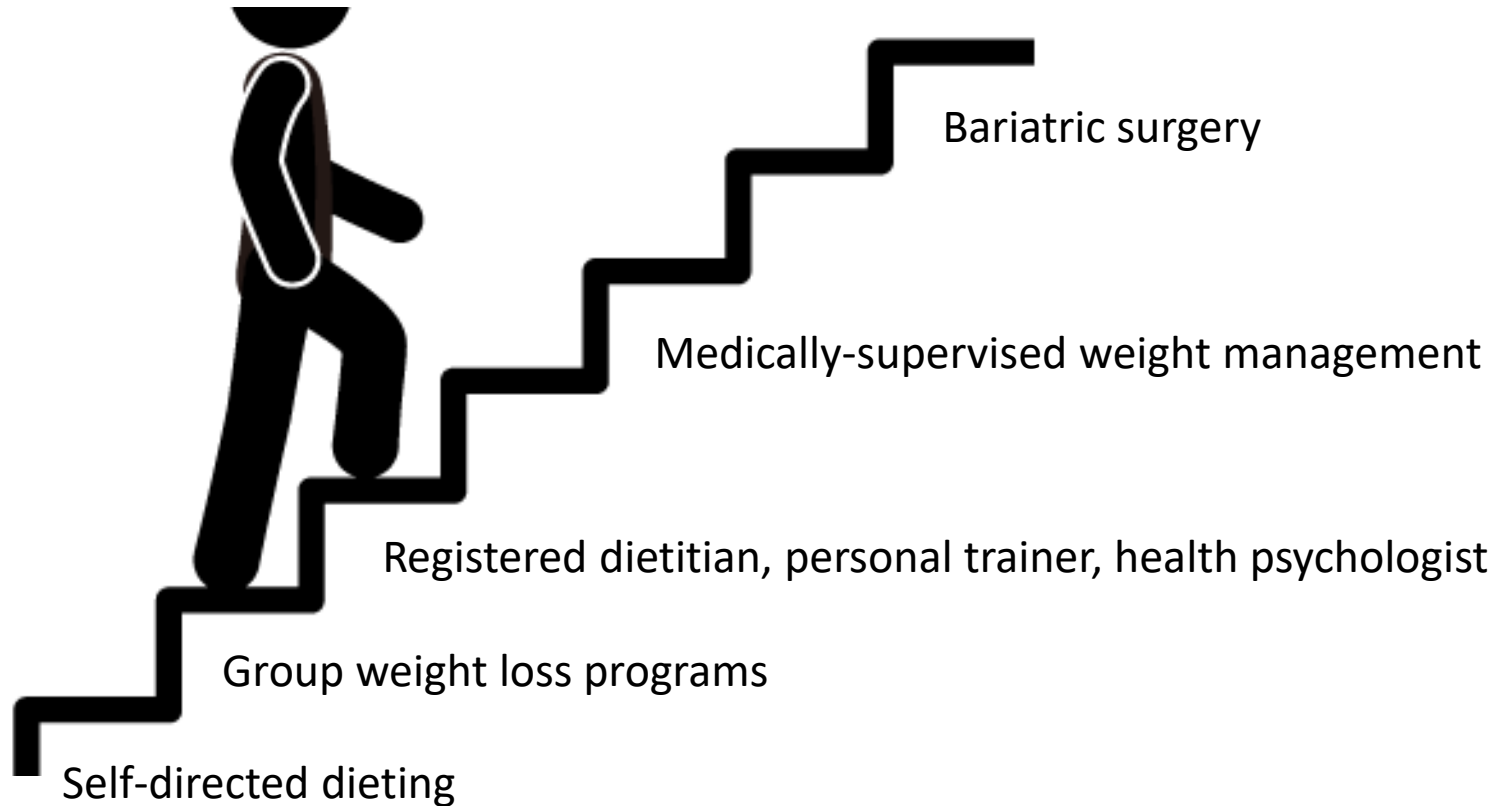
I plan on losing 15 lbs  
and I expect to see  
results by morning.



your e cards  
someecards.com

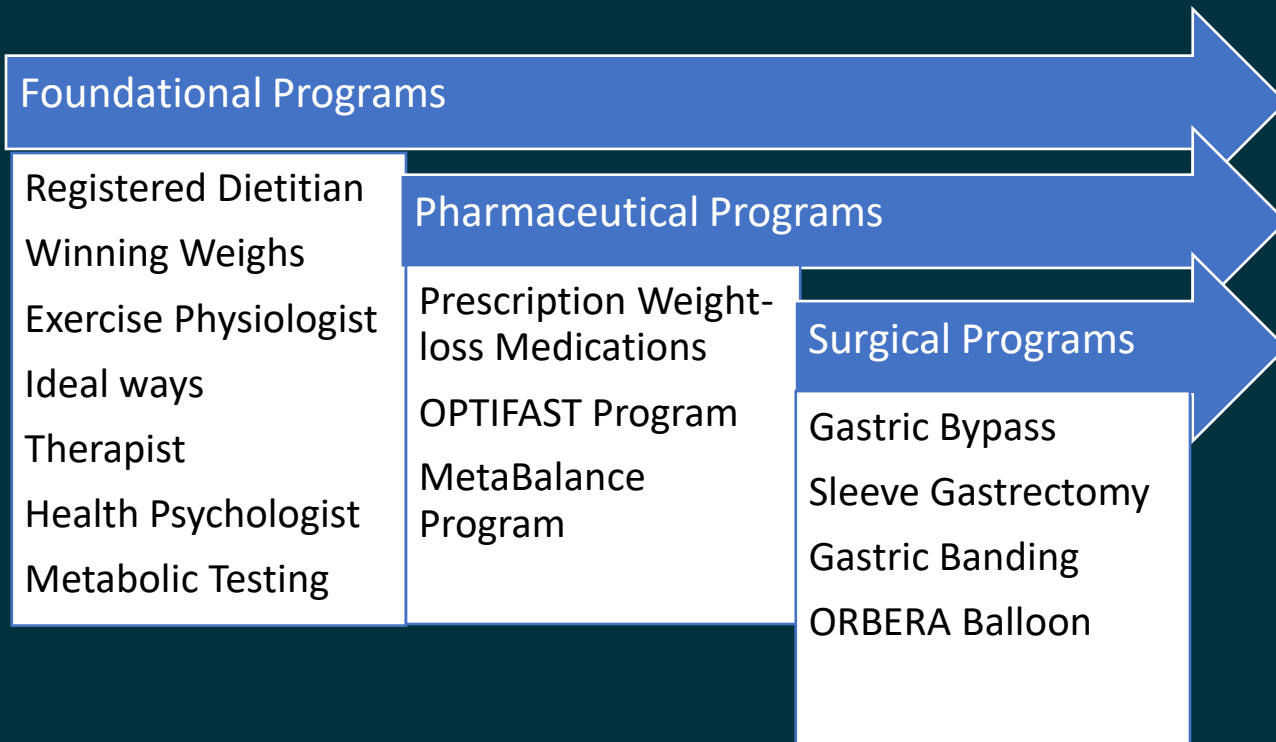


# Diet Program Progression





# The Comprehensive Weight Management System



# Prescription Weight-Loss Medications

- Available Medications & Outcomes:

1. Phentermine
2. Qsymia (Phentermine/Topamax)
  - 7-10% weight loss
3. Belviq
  - 5% weight loss
4. Contrave
  - 5% weight loss
5. Saxenda (Victoza-liraglutide)
  - 9% weight loss



# OPTIFAST Meal Replacement Program

- Three-phase aggressive program:
  - 3-5 OPTIFAST + one meal
  - Medical monitoring by MD
  - Lifestyle change with RD
  - 500 Club
  - Winning Weighs
  - Laboratory testing
  - Metabolic testing
- Decrease food “noise”
- Vacation from food/decision making

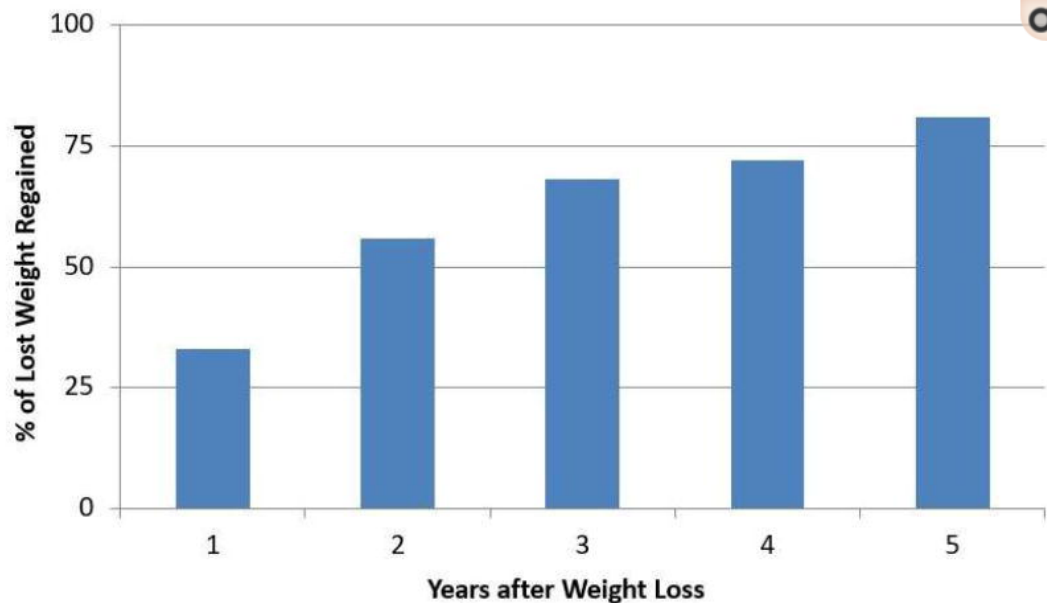


**OPTIFAST Program:**  
15% weight loss at 16 weeks



# Are diet and exercise alone enough?

- Well established that dieters are able to lose weight in the short run
- Weight loss benefits diabetes and other co morbidities



Average time course of weight regain after a weight loss intervention.

Data from Anderson JW, Konz EC, Frederich RC, et al. Long-term weight-loss maintenance: a meta-analysis of US studies. Am J Clin Nutr 2001;74(5):579-584.



# Just Eat Less and Exercise More

- The 3,500 calorie = 1lb of fat rule
  - Calorie deficit of 500cal per day = 1lb fat loss/week
  - Approx 20lbs in 4 month
- In Practice- a 500 cal per day deficit will equal about 20lbs weight loss in 1 yr
  - [www.supertracker.usda.gov](http://www.supertracker.usda.gov)



# Long Term Weight Loss





# Body Weight Set Point



# Body Weight Set Point



- Avg BMI 49.5
- Predicted RMR- 2577 kcal/day
- RMR- 2607 kcal/day
- Physical activity- 5.6kcal/kg/day
- TEE- 3804 kcal/day

- Avg BMI 30.2
- Predicted RMR- 2272 kcal/day
- RMR- 1996 kcal/day
- Physical Activity- 10.1 kcal/kg/day
- TEE- 3002 kcal/day



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- TEE- 3002 kcal/day



- Avg BMI 43.8
- Predicted RMR- 2403 kcal/day
- RMR- 1903 kcal/day
- Physical Activity- 10.1 kcal/kg/day
- TEE- 3429 kcal/day



# Is Surgery Better than Diet alone?

- On average, 6 years after surgery only 9.5% of weight lost will be regained

King WC, Hinerman AS, Belle SH, et al. Comparison of the performance of common measures of weight regain after bariatric surgery for association with clinical outcomes. *JAMA*. 2018;320(15):1560–1569



# Body Weight Set Point

- **Bariatric Surgery results in initial slowing of metabolism up to 6 months after surgery**
- **1 year post surgery patients have expected metabolic rate for their BMI**

Knuth ND, Johannsen DL, Tamboli RA, et al. Metabolic adaptation following massive weight loss is related to the degree of energy imbalance and changes in circulating leptin. *Obesity (Silver Spring)* 2014;**22**:2563–2569.

Hao Z, Mumphrey MB, Townsend RL, et al. Reprogramming of defended body weight after Roux-En-Y gastric bypass surgery in diet-induced obese mice. *Obesity (Silver Spring)* 2016;**24**:654–660.



# So What about Diabetes?

- Mounting Evidence supports metabolic surgery as an effective treatment for type II diabetes
- RCTs show gastric bypass results in complete remission or significant improvement of diabetes within two years for 90% of patients
- Many patients have resolution of diabetes at time of hospital discharge, even before weight loss occurs

Schauer, P.R., et al. (2003). Effect of Laparoscopic Roux-En Y Gastric Bypass on T2DM Section: Discussion. Annals of Surgery. doi: 10.1097/01.sla.0000089851.41115.1b





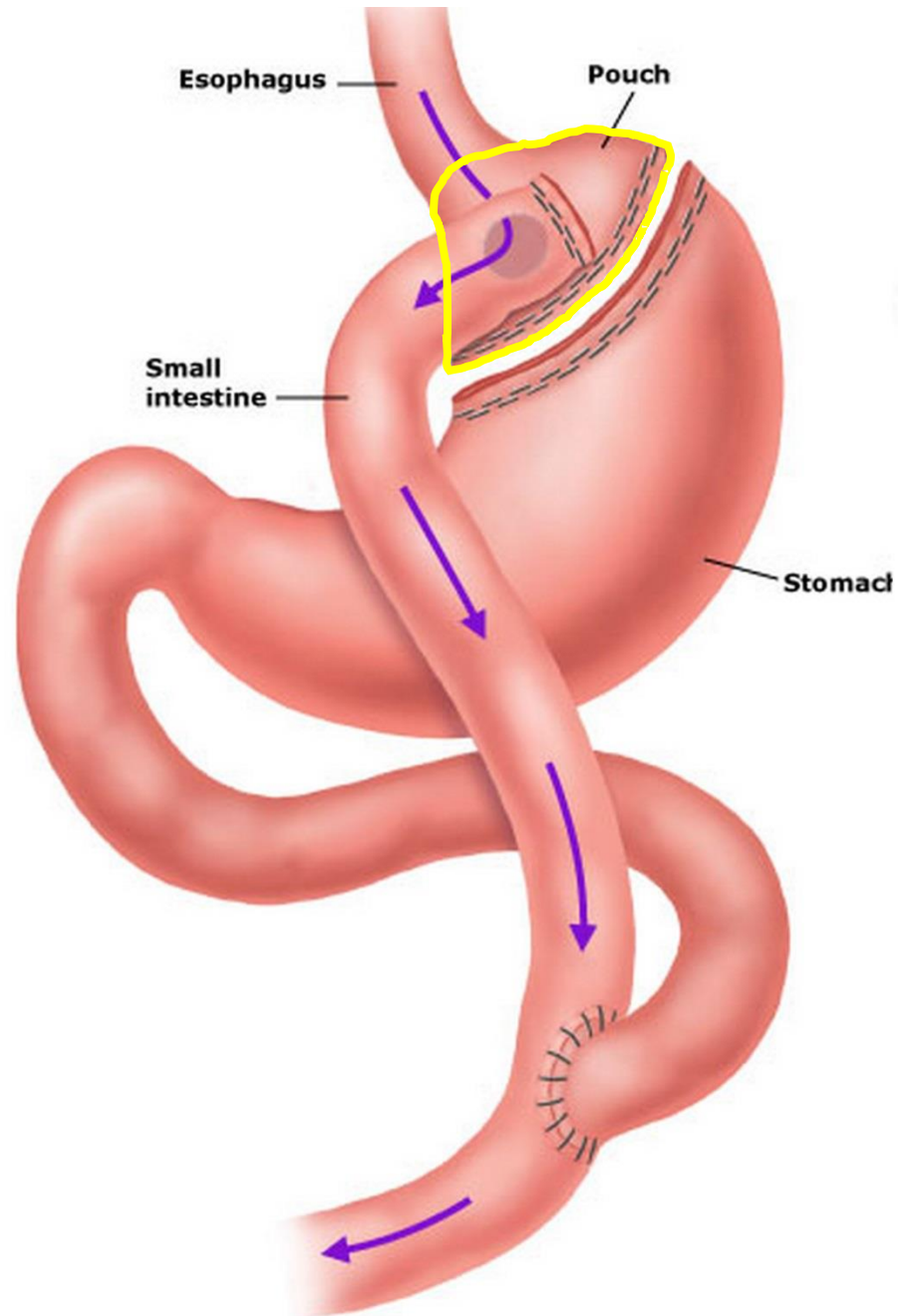
# Surgery vs Diet and Exercise

- 5 year results of the Surgical Treatment and Medications Potentially Eradicate Diabetes Efficiency (STAMPEDE) study
  - Diabetes remission rates at years 1, 3 and 5 were:

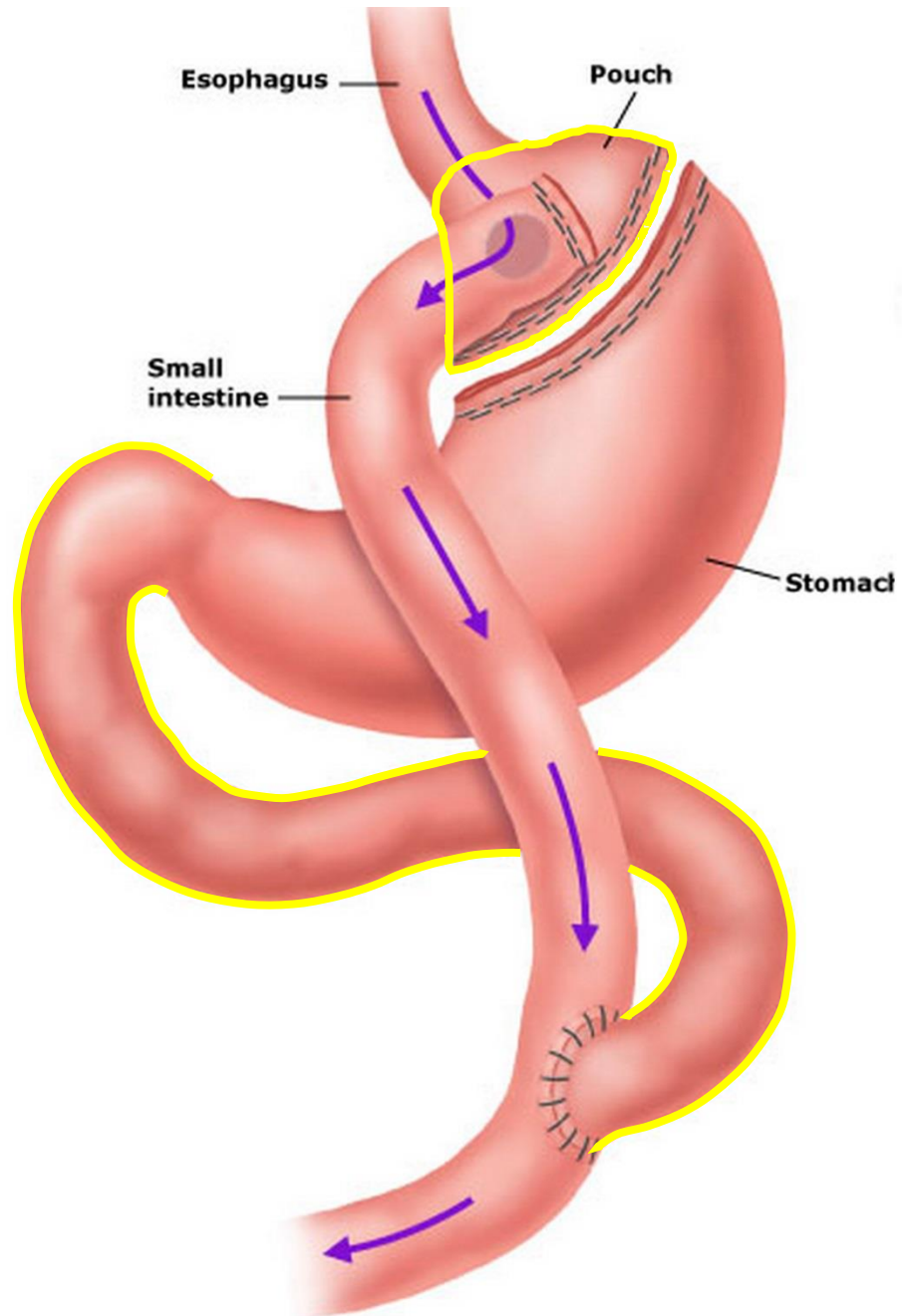
	Diabetes Remission Rate at time interval		
	1 year	3 years	5 years
Gastric Bypass	42%	38%	29%
Sleeve Gastrectomy	37%	24%	23%
Medical therapy alone	12%	5%	5%



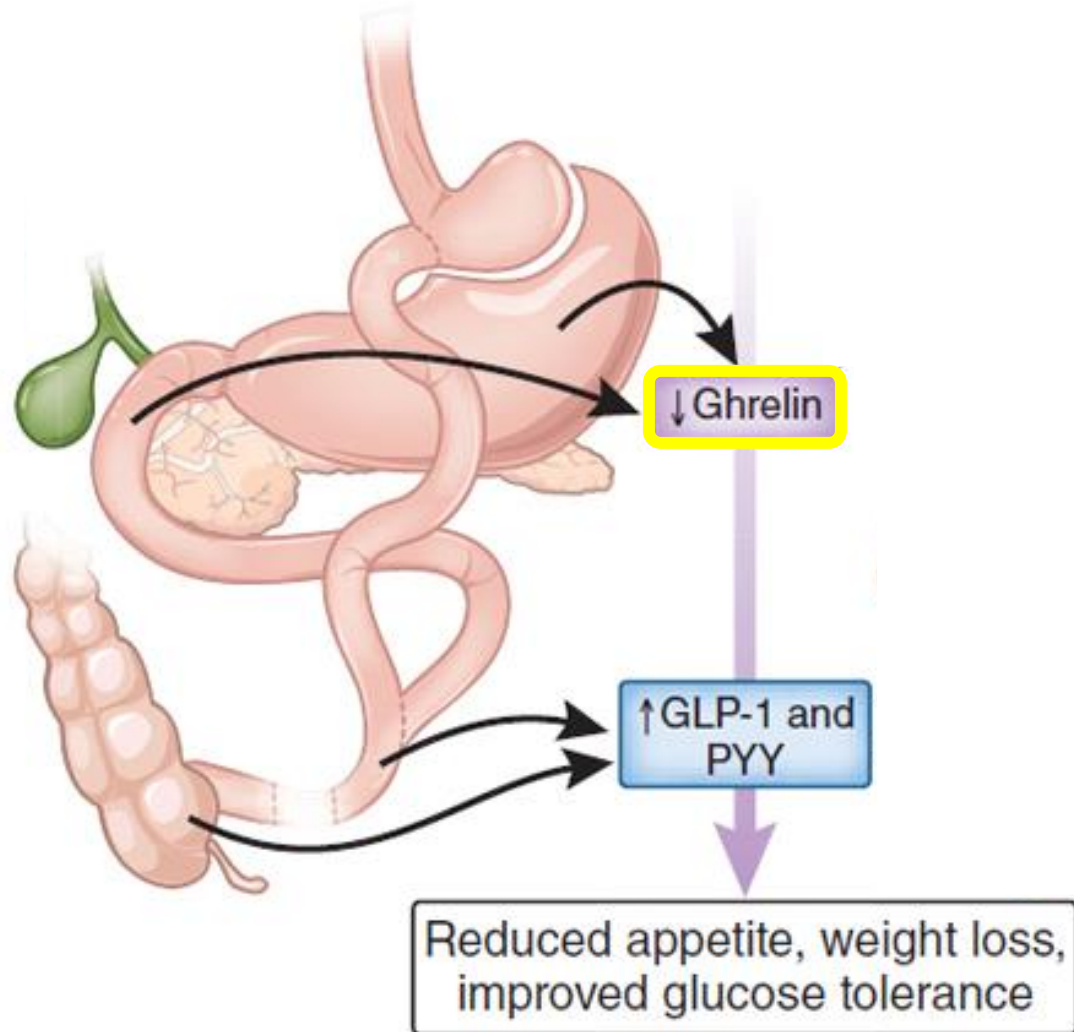
# LRYGB



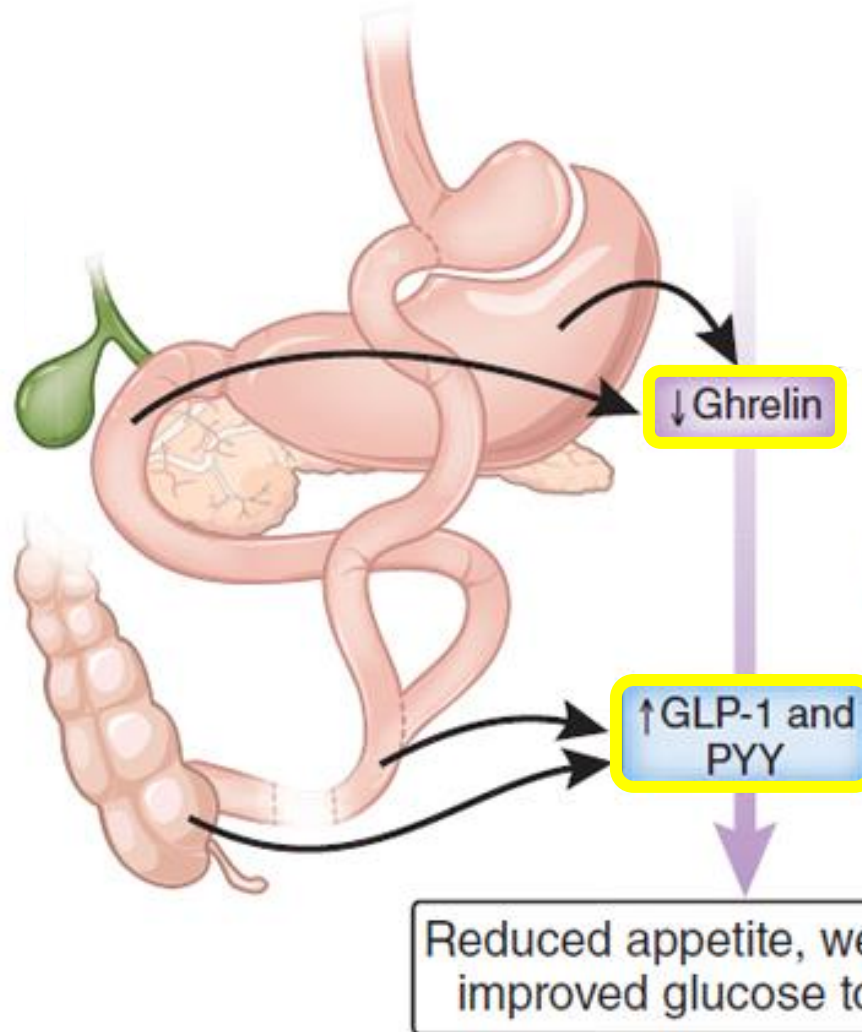
# LRYGB



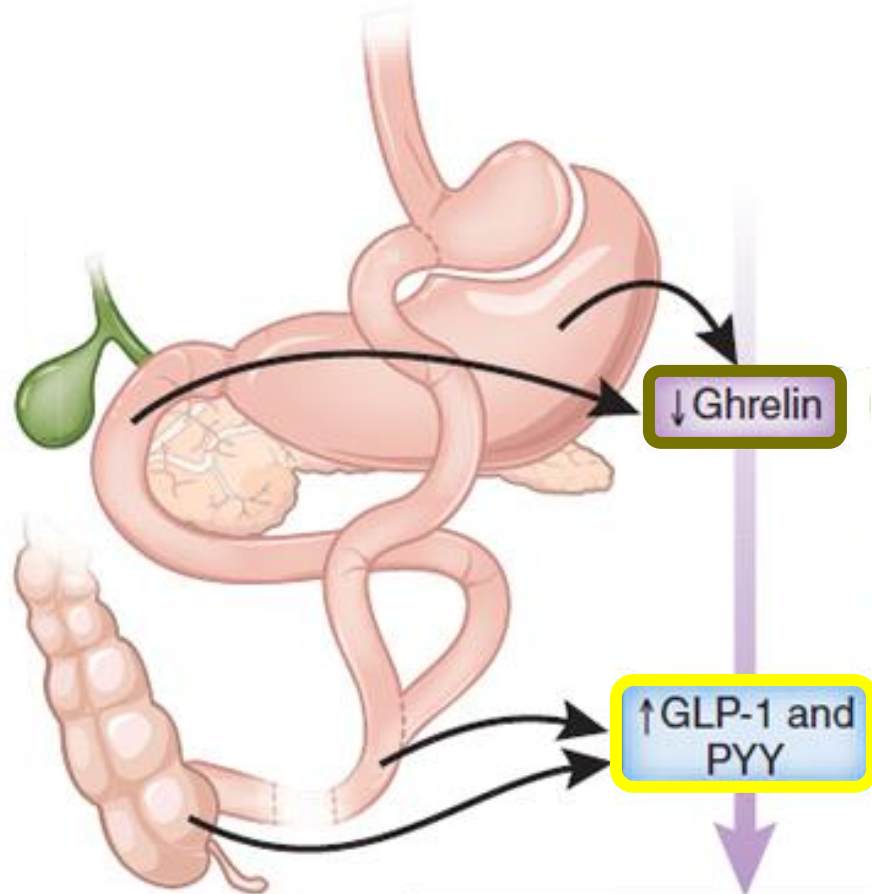
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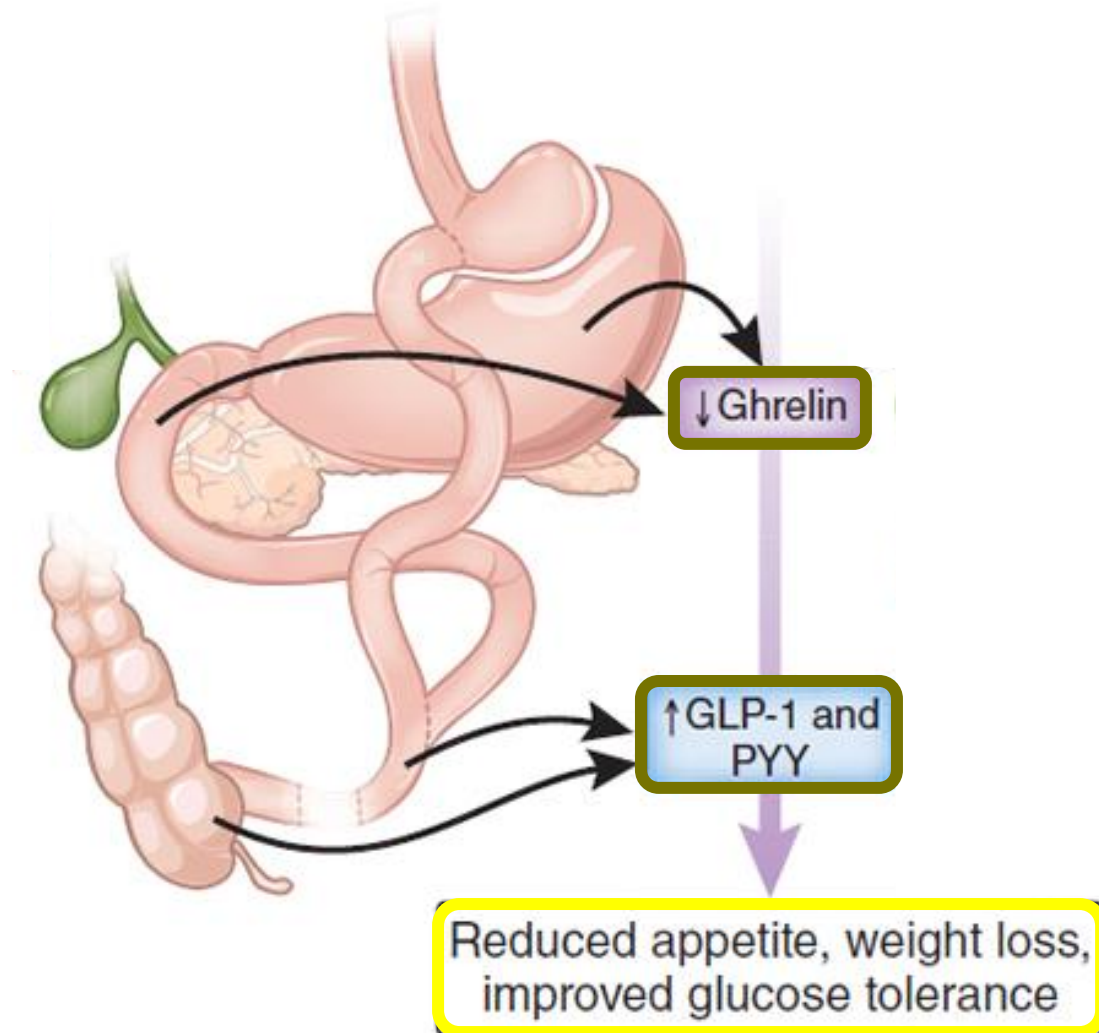


Reduced appetite, weight loss,  
improved glucose tolerance





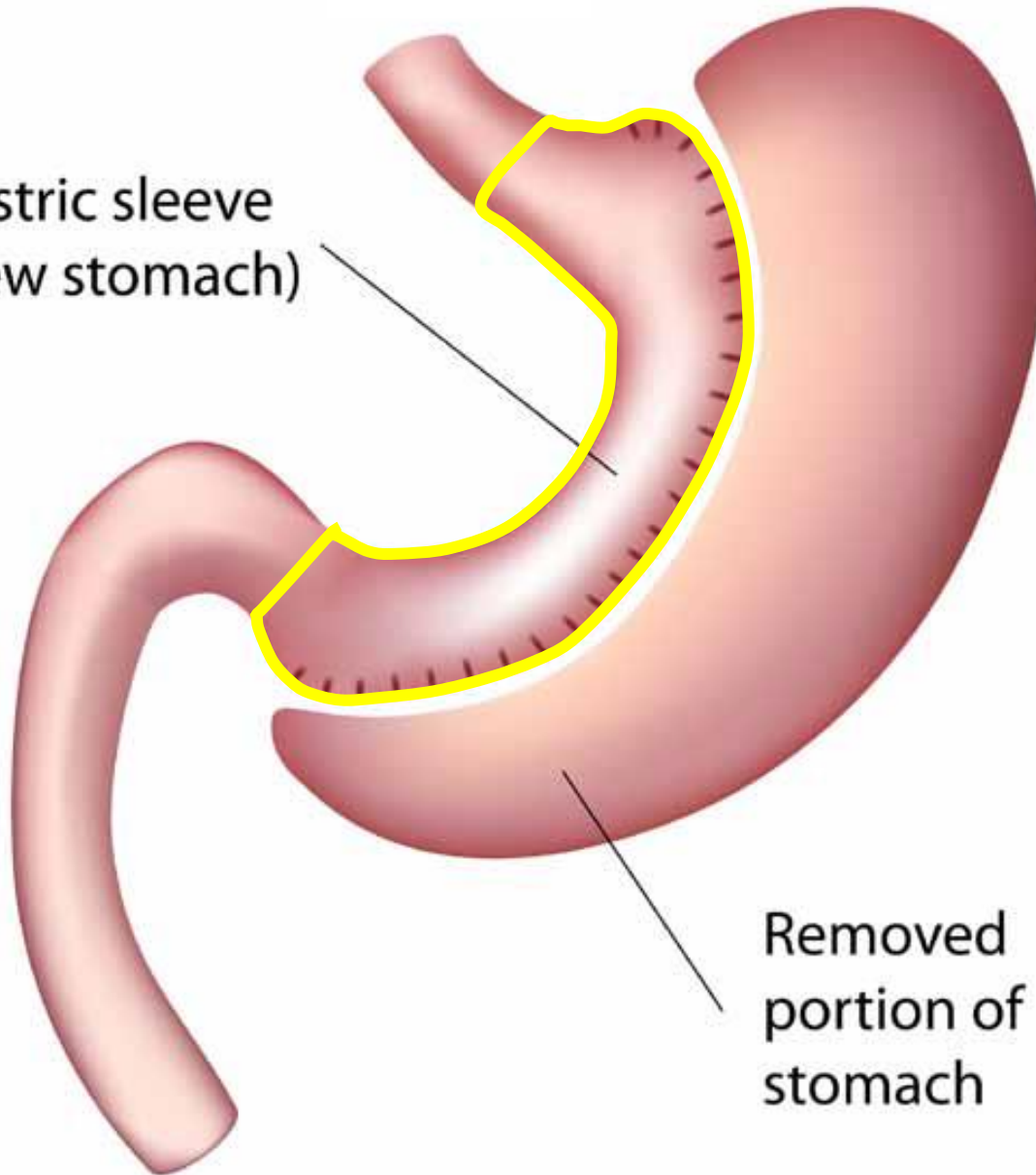
## LRYGB



**LSG**

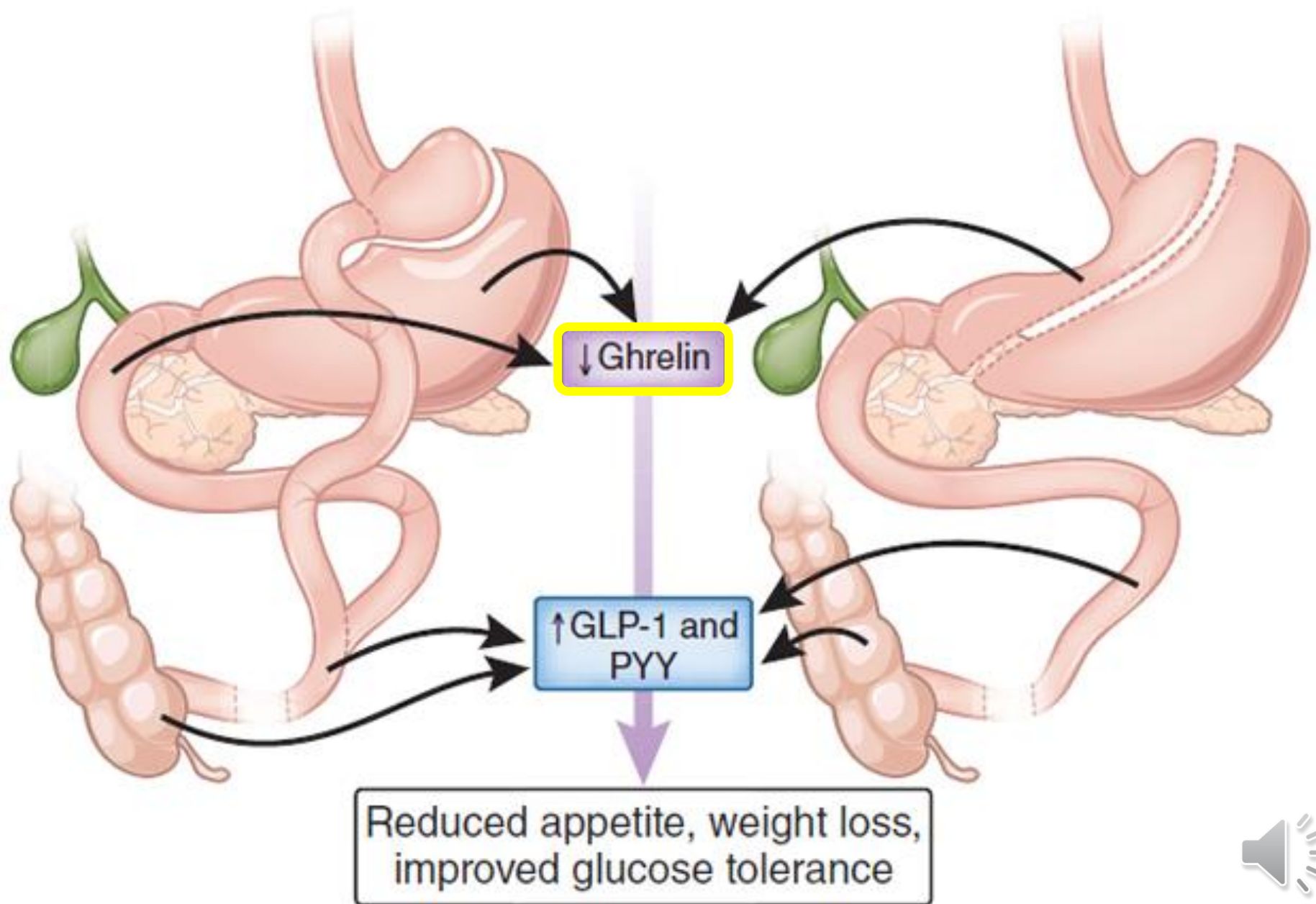
Gastric sleeve  
(new stomach)

Removed  
portion of  
stomach



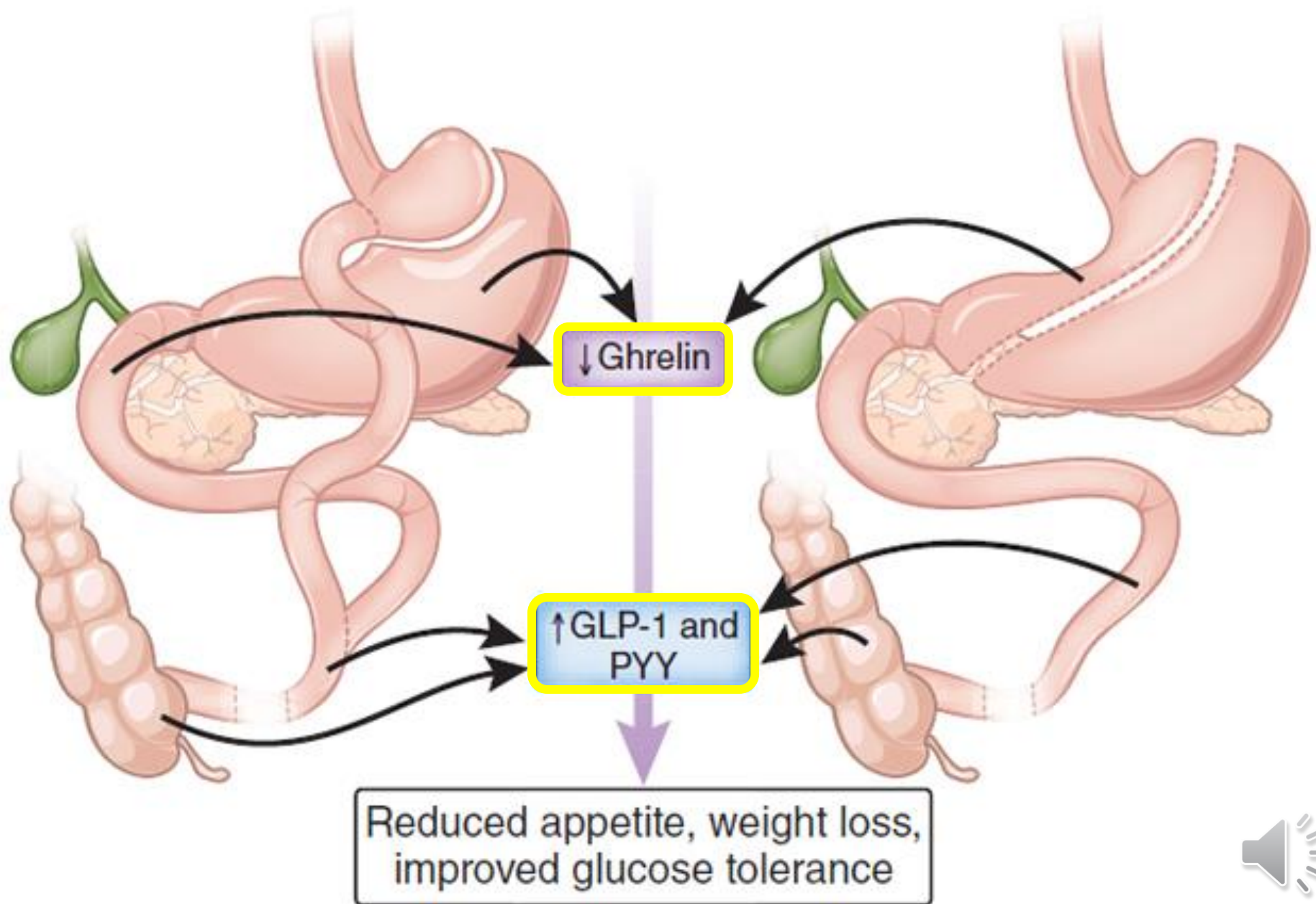
**LRYGB**

**LSG**



**LRYGB**

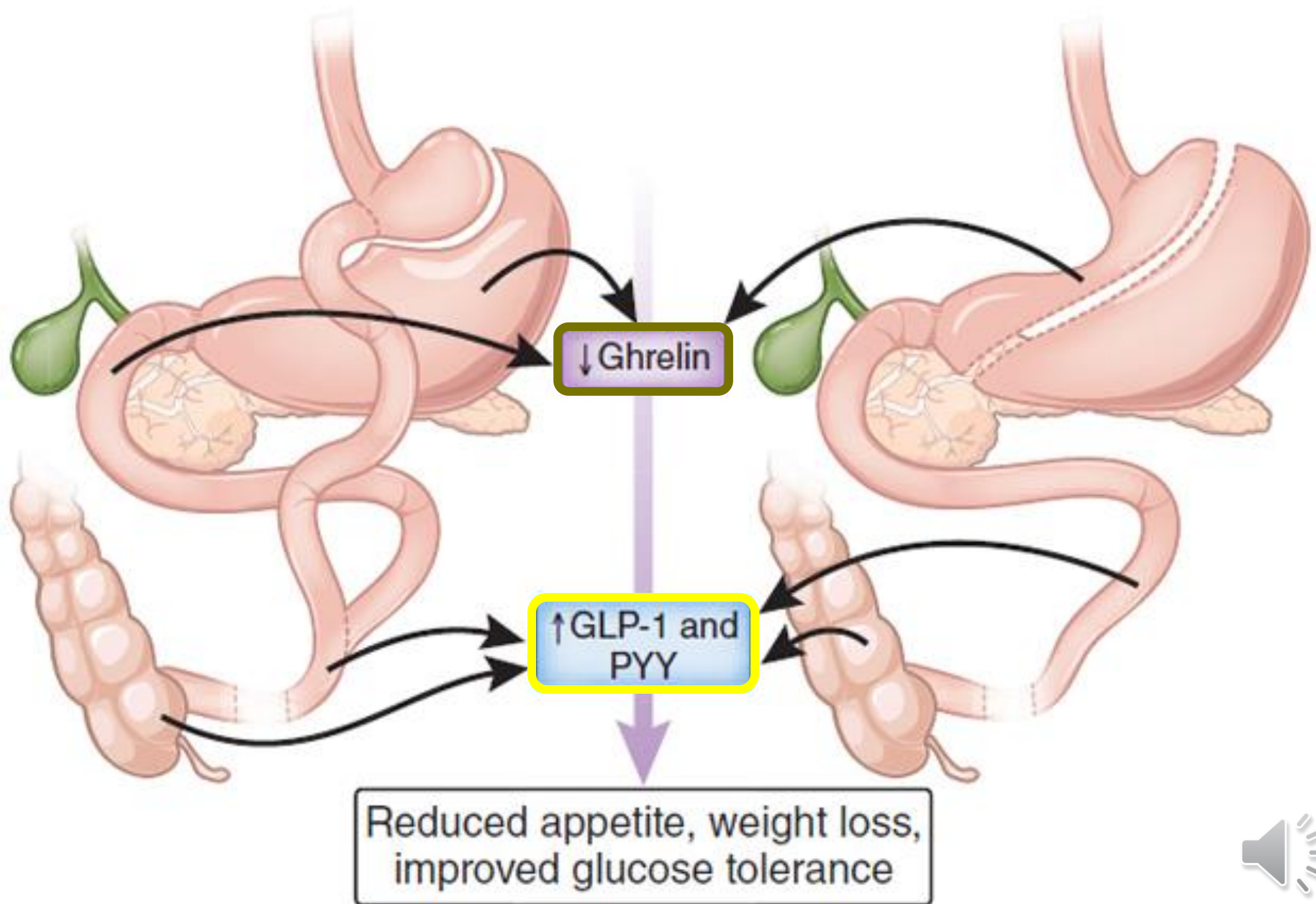
**LSG**





**LRYGB**

**LSG**



# Other surgical options

- Laparoscopic sleeve gastrectomy and Roux en Y gastric bypass are currently the most commonly performed metabolic surgeries in America
- Newer novel therapies are available and FDA approved but not covered by medicare or major insurance providers





# What does all this mean?

- Metabolic surgery significantly decreases the likelihood of death in obese patients with T2DM
  - Patients with severe obesity who had gastric bypass reduced risk of mortality from diabetes by 92% for up to seven years
  - Gastric bypass in patients with T2DM is associated with a 58% reduction in relative risk of death from any cause 5 years after surgery
    - Risk of death from MI dropped nearly 60%
    - Risk of non fatal heart attack was reduced by 49%

Adams T. D., et al. (2017). Weight and metabolic outcomes 12 years after gastric bypass. N Engl J Med. 377:1143-1155. doi: 10.1056/NEJMoa1700459

Billeter et al.. (2018). Meta-analysis of metabolic surgery versus medical treatment for microvascular complications in patients with T2DM. BrJSurg, doi:10.1002/bjs.10724.



# Metabolic Surgery in BMI < 35

- 5 years after metabolic surgery
  - 36% of patients maintained complete remission
  - 28% of patients maintained partial remission
- 5 years of medical therapy with diet and exercise:
  - 1.2% of patients had complete remission
  - 1.6% of patients had partial remission

Chih-Cheng H., et al. (2015). Effect of Bariatric Surgery vs Medical Treatment on T2D in Patients With BMI Lower Than 35. JAMA Surg. doi:10.1001/jamasurg.2015.2602



## 2<sup>nd</sup> Diabetes Surgery Summit (DSS-II)

- Collaboration with:
  - American Diabetes Association
  - International Diabetes Federation
  - Chinese Diabetes Society
  - Diabetes India
  - European Association for the Study of Diabetes
  - Diabetes UK
- Guidelines endorsed by 45 medical professional societies



# DSS-II guidelines

- Metabolic Surgery should be a *recommended* option to treat T2D in appropriate surgical candidates with:
  - BMI >40 regardless of glycemic control
  - BMI 35.0-39.9 with inadequately controlled hyperglycemia despite lifestyle and medical therapy



# DSS-II guidelines

- Metabolic Surgery should be *considered* to treat T2D in patients with BMI 30.0-34.9 and inadequately controlled hyperglycemia despite optimal medical treatment by either oral or injectable medications
- All BMI thresholds should be reconsidered depending on the ancestry of the patient. For example, patients of Asian descent the above BMI values should be reduced by 2.5 kg/m<sup>2</sup>



# Safety and Risks

- Bariatric surgery is as safe or safer than some of the most commonly performed surgeries in America including gallbladder, appendectomy and knee replacement
- Risks of severe obesity and diabetes outweigh the risks of metabolic surgery:
  - Risk of death associated with metabolic surgery is <0.1% and overall risk of major complication is about 4%

Christou, N. V., et al. (2004). Surgery decreases long-term mortality, morbidity, and health care use in morbidly obese patients. *Annals of Surgery*. 240(3) pp. 416–424 Accessed from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1356432/pdf/20040900s00003p416.pdf>

Schauer, D. P., et al. (2010). Decision modeling to estimate the impact of gastric bypass surgery on life expectancy for the treatment of morbid obesity. *Archives of Surgery*. 145(1) pp.57-62. Accessed from <http://www.ncbi.nlm.nih.gov/pubmed/20083755>

Flum, D. R., et al. (2009). Perioperative safety in the longitudinal assessment of bariatric surgery. *New England Journal of Medicine*. 361 pp.445-454. Accessed October 2013 from <http://content.nejm.org/cgi/content/full/361/5/445>



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