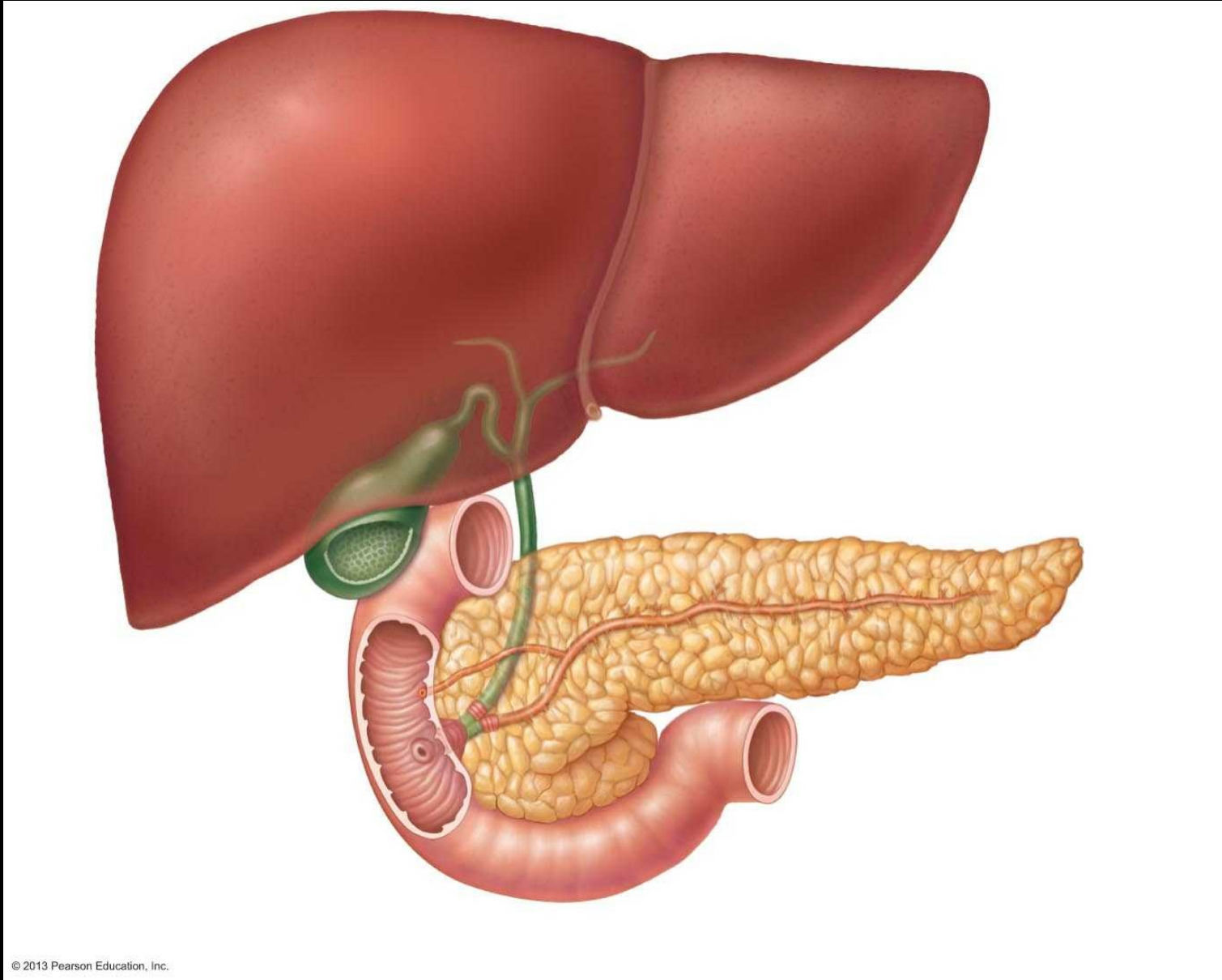
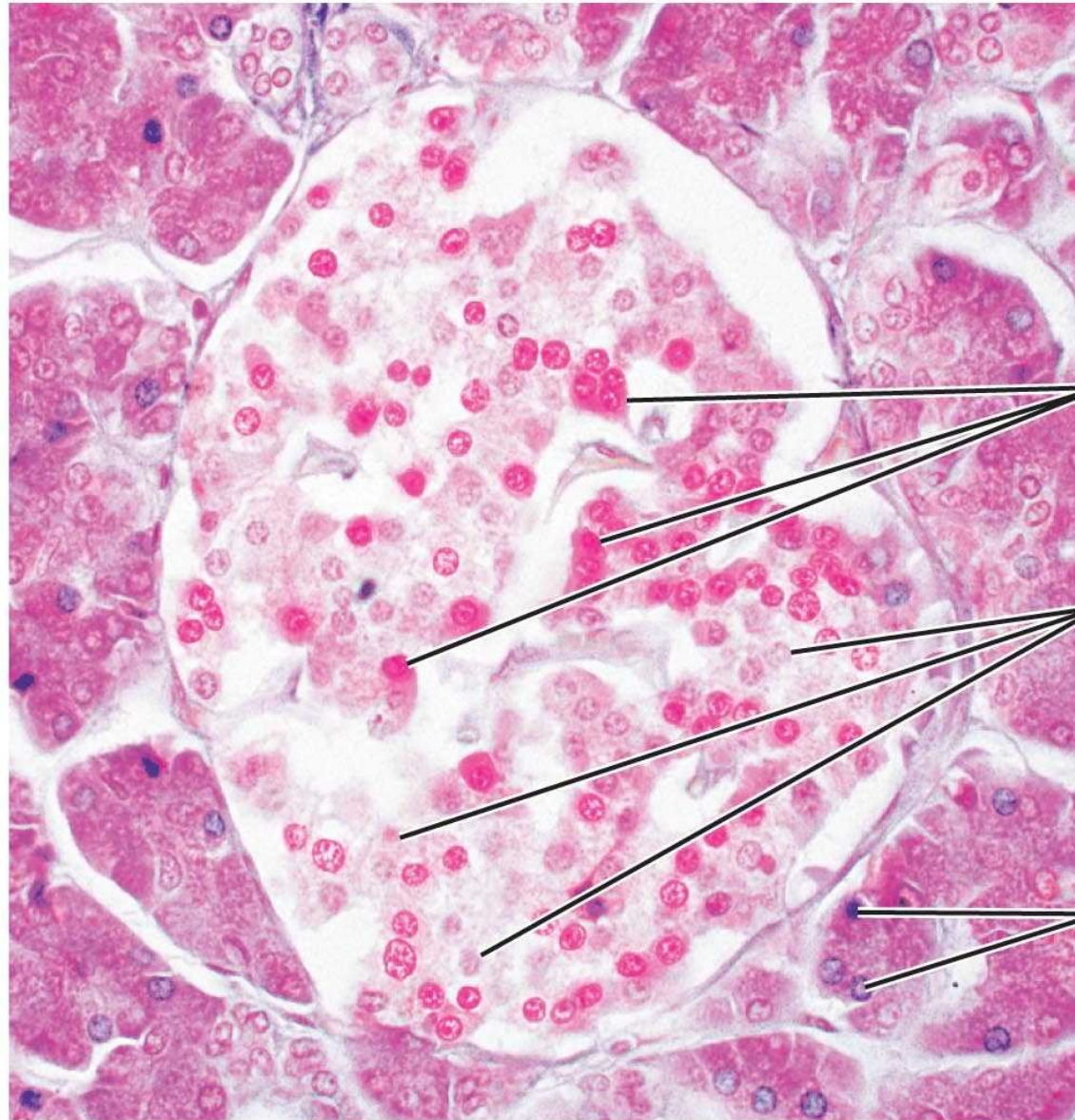


Drugs for Diabetes

Pancreas



Islets of Langerhans



Pancreatic islet

- α (Glucagon-producing) cells

- β (Insulin-producing) cells

Pancreatic acinar cells (exocrine)

Insulin

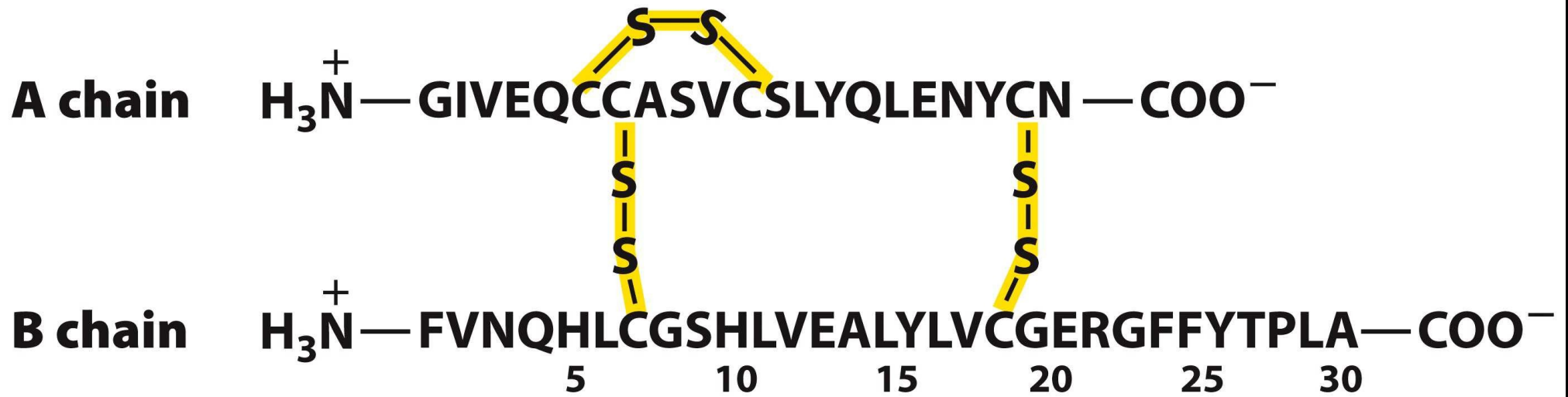


Figure 3-24

Lehninger Principles of Biochemistry, Sixth Edition

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Insulin

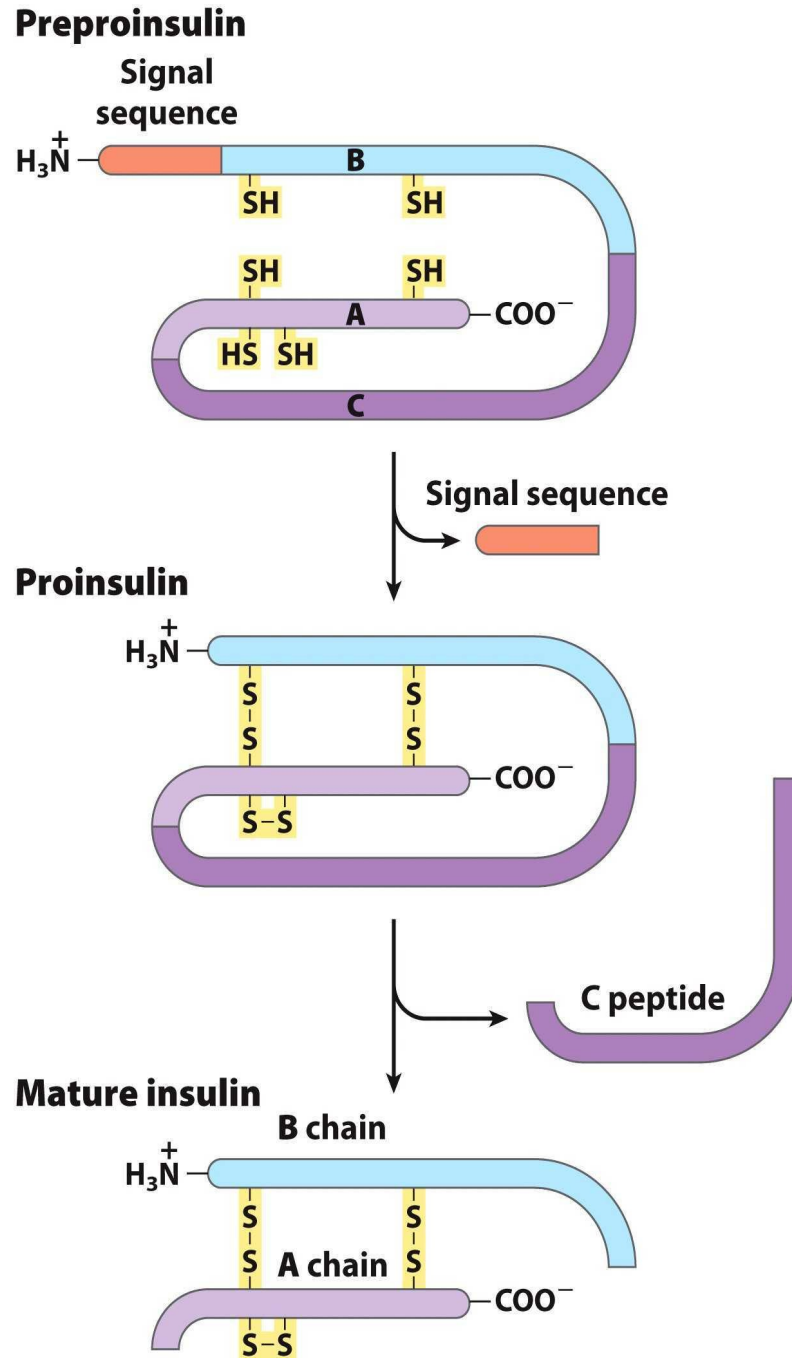


Figure 23-4

Lehninger Principles of Biochemistry, Sixth Edition

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Diabetes mellitus

Type 1

Type 2

Gestational

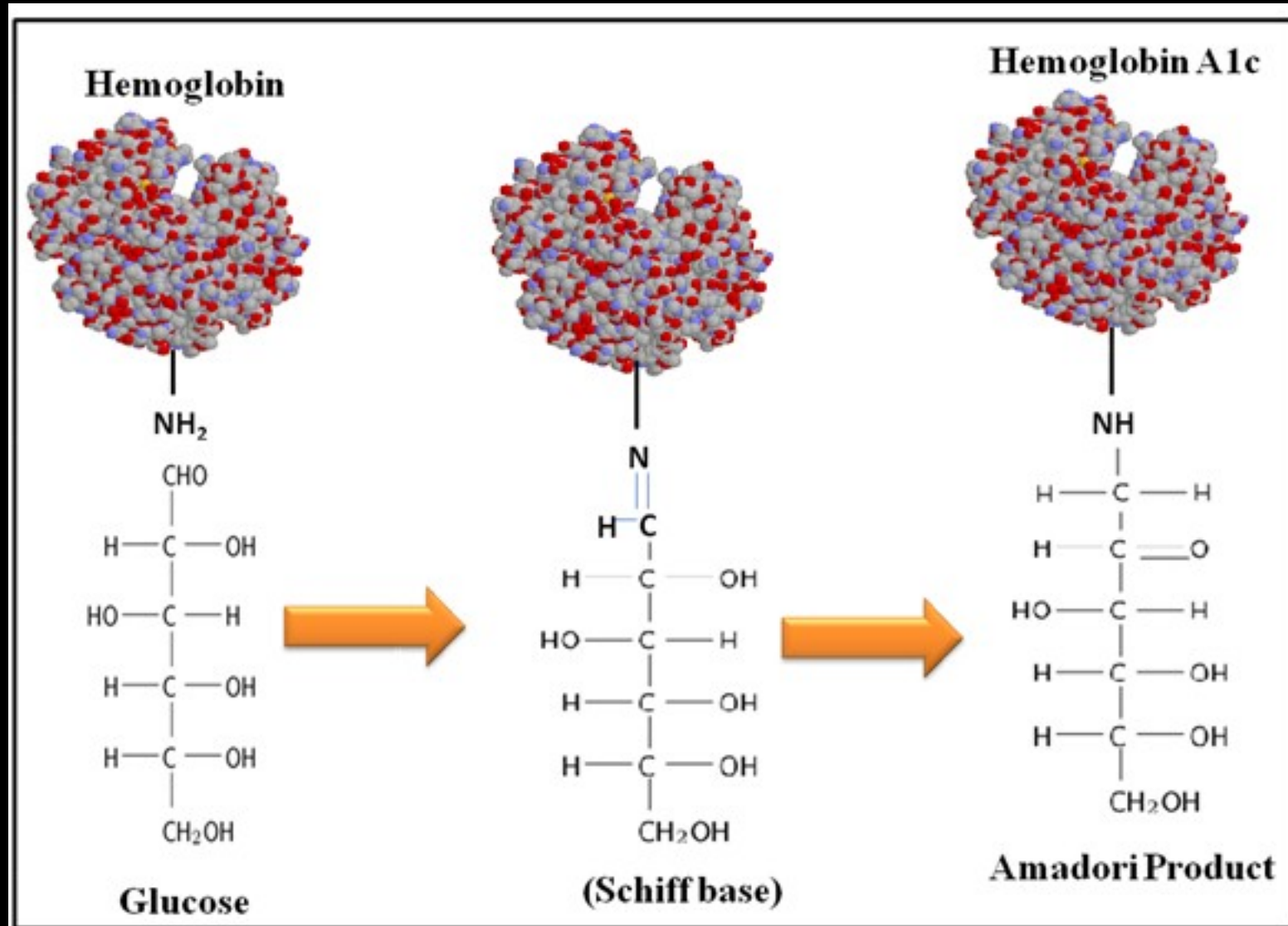
Other

Blood glucose levels

Normal fasting = < 110 mg/dl

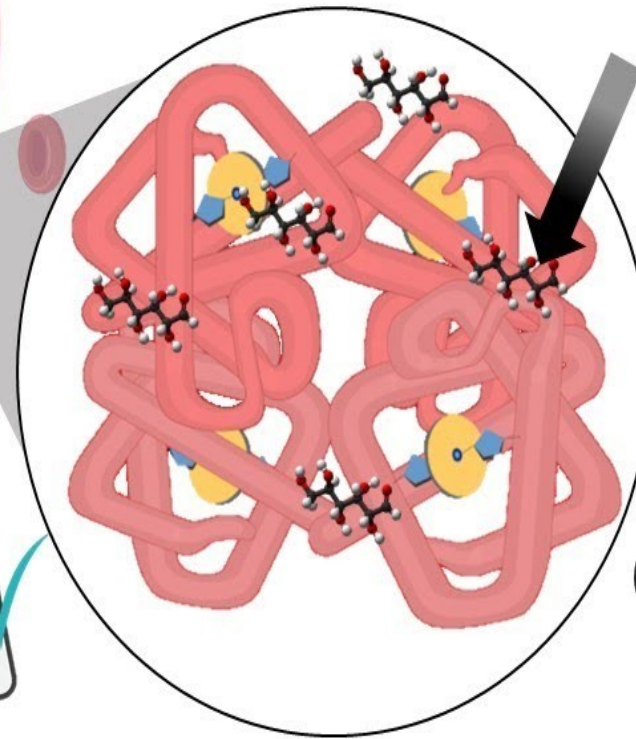
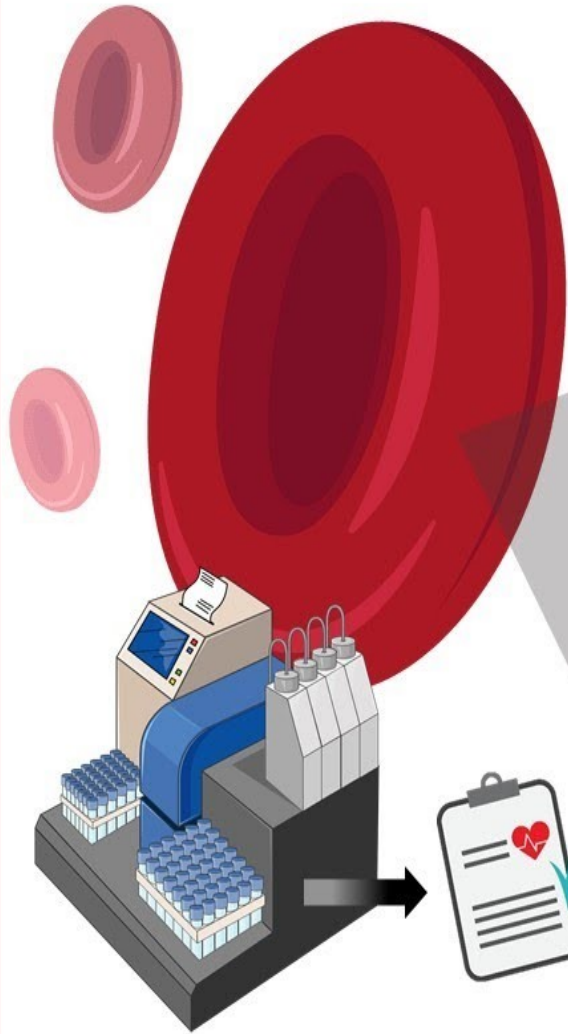
Normal nonfasting 120 mg/dl

HbA_{1c}

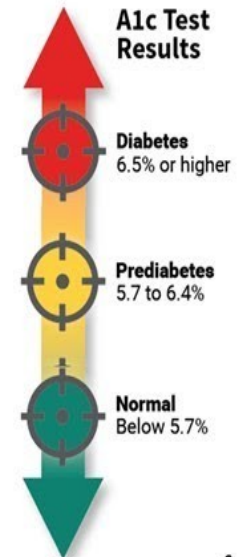


HbA_{1c}

HbA_{1c} Test



glucose



Glycosylated Hemoglobin

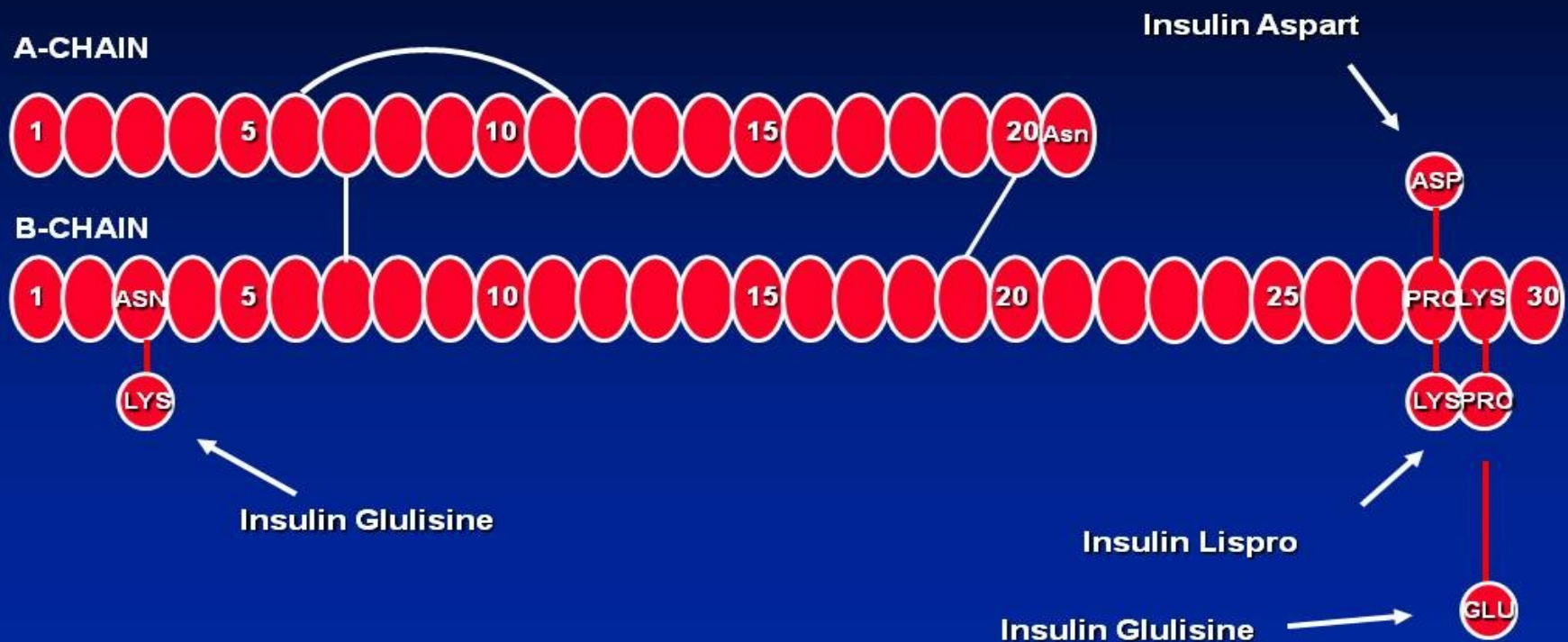
Type 1 Diabetes

Treatment = insulin
replacement

Insulin or
insulin analog

Insulin Analogs – Rapid & Short

Insulin Aspart, Lispro, & Glulisine Structure

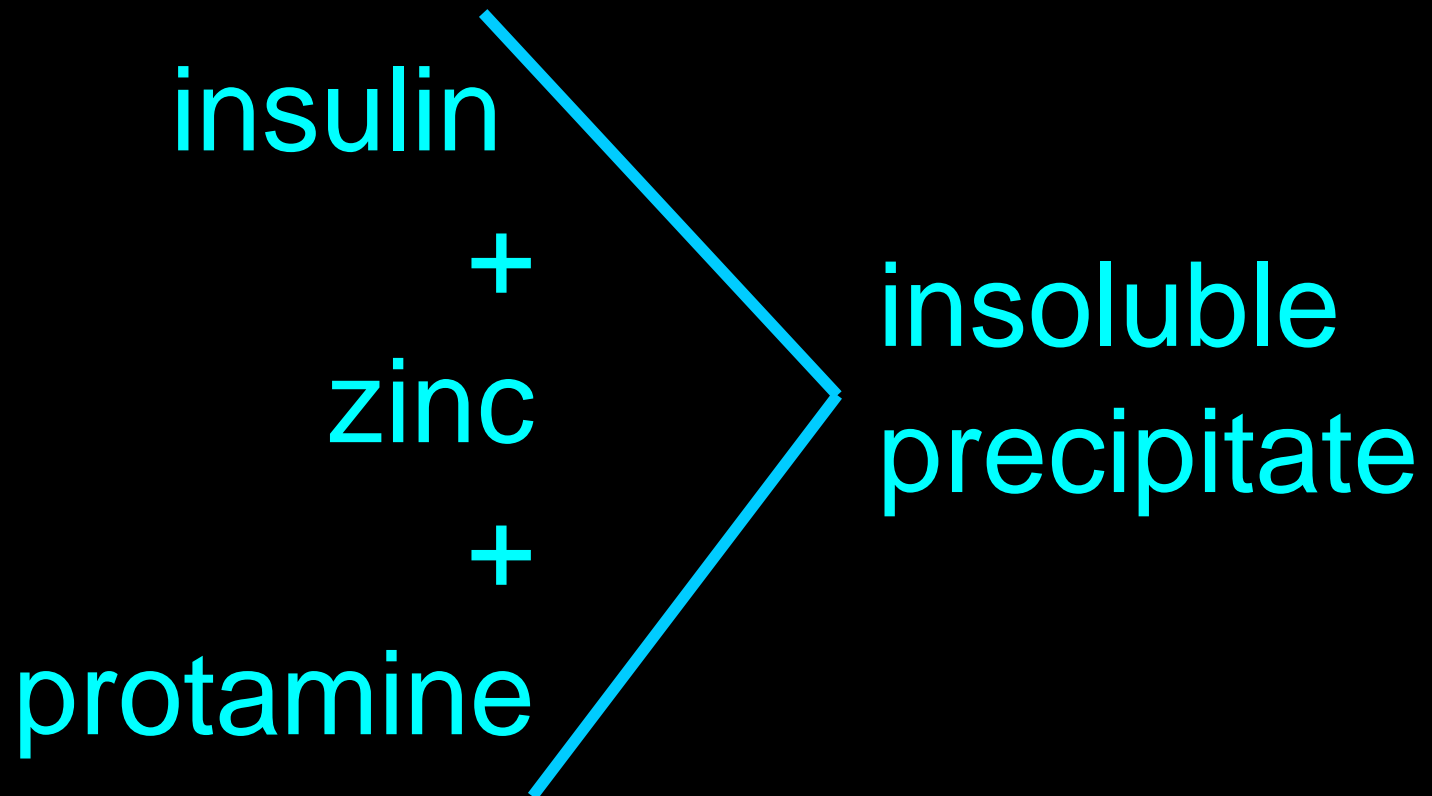


Analog - Intermediate Insulin

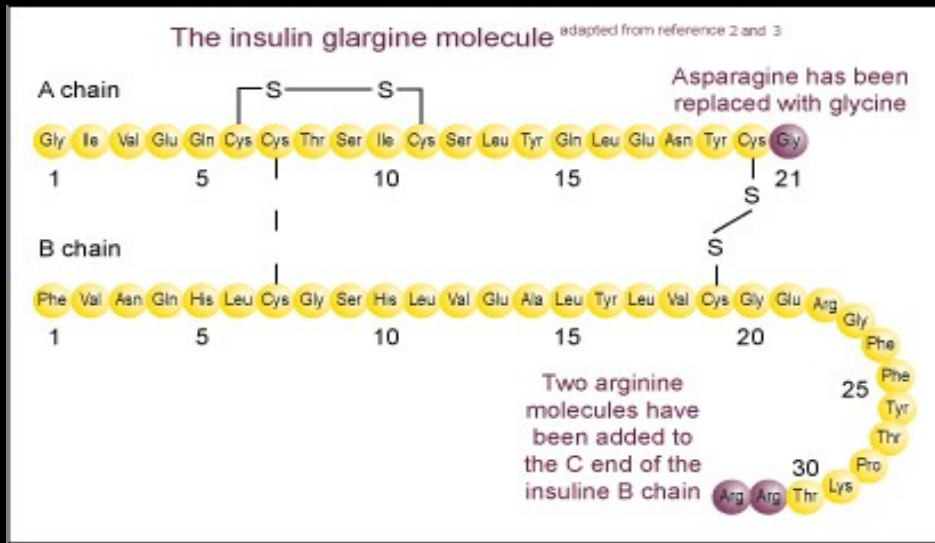
neutral protamine Hagedorn (NPH)

(Humulin N)

(Novolin N)

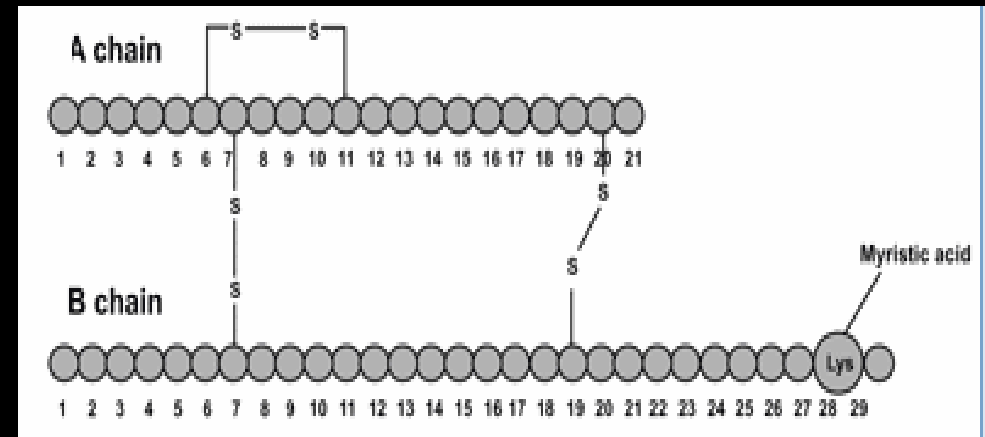


Analog - Long acting Insulin



insulin glargine (Lantus)

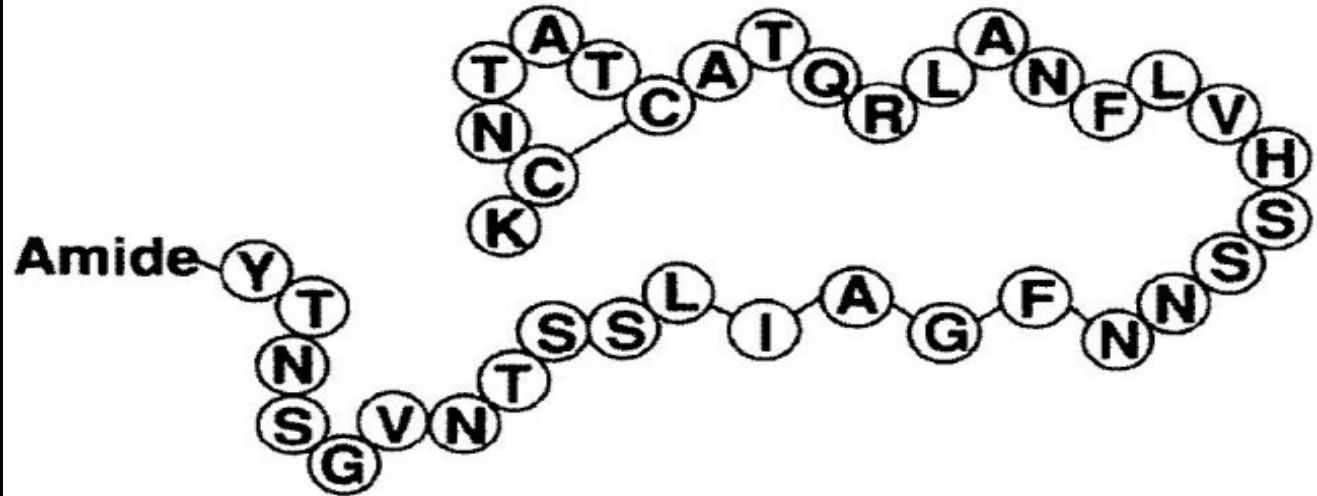
insulin detemir (Levemir)



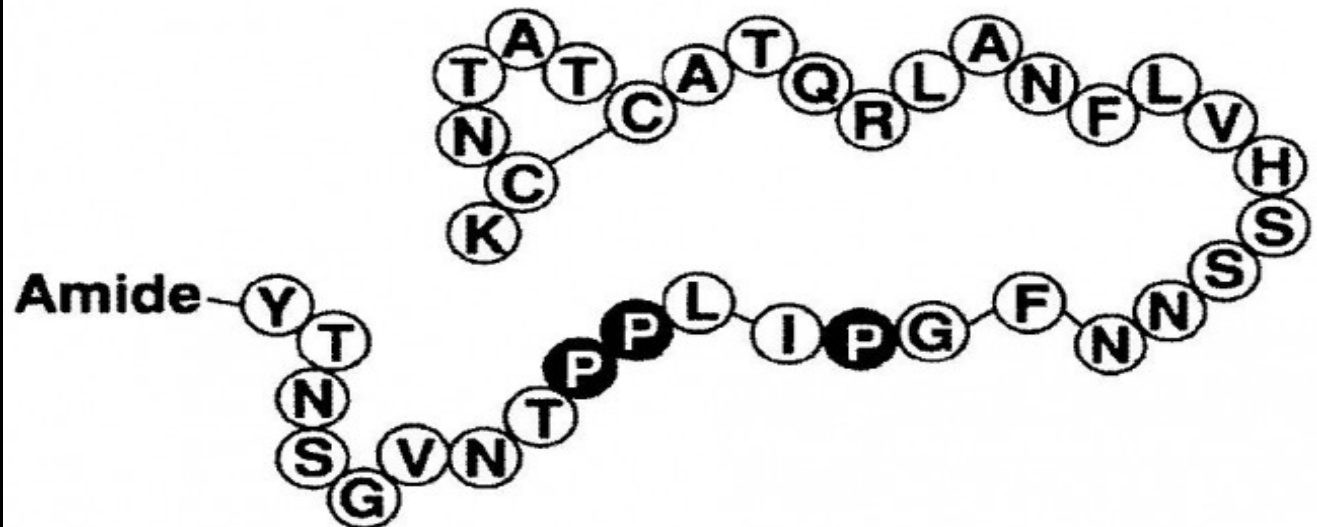
Amylin Analog

pramlintide (Symlin)

Human amylin



Pramlintide
(^{25, 28, 29} Pro-h-amylin)



Type 2 Diabetes Treatment Strategies

↑ insulin production
target pancreas

↑ insulin sensitivity
target body cells

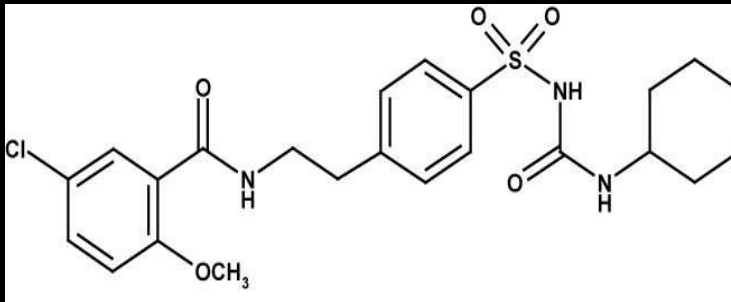
↑ glucose excretion
target kidneys

Type 2 Diabetes Treatment

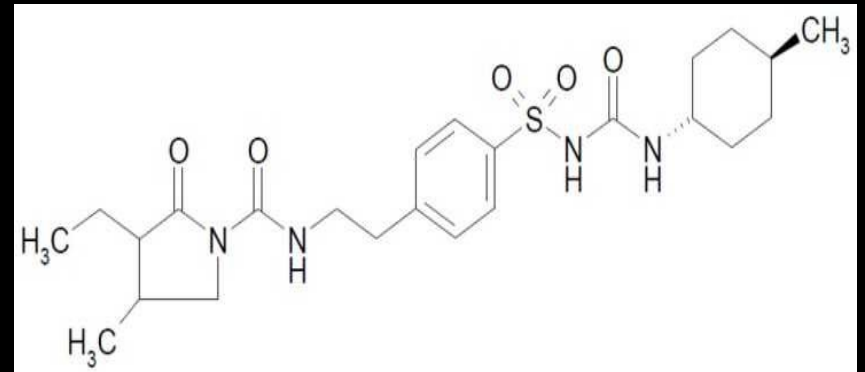
↑ insulin production

Sulfonylureas

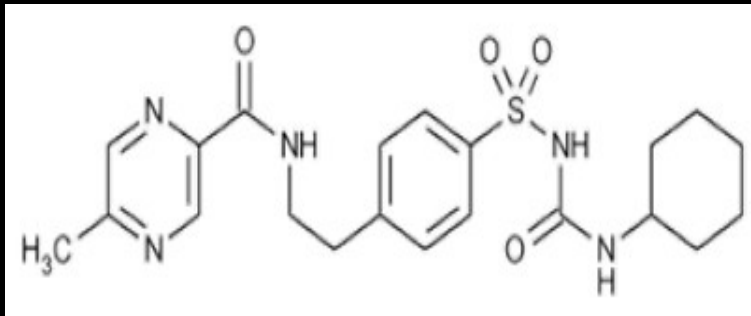
glyburide (Diabeta & Glynase prestab)



glimepiride (Amaryl)



glipizide (Glycotrol)

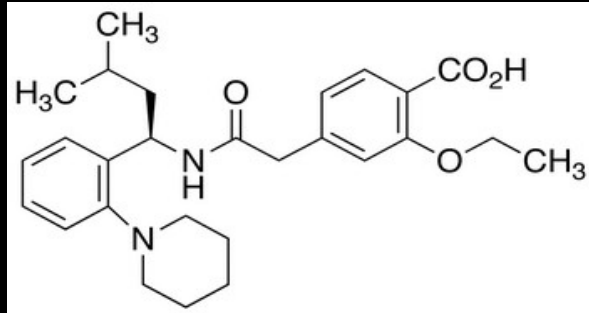


Type 2 Diabetes Treatment

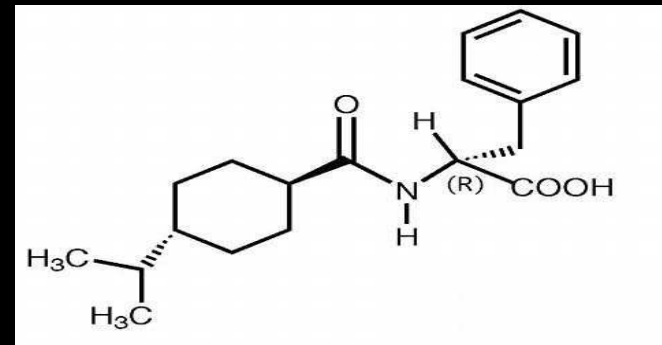
↑ insulin production

Glinides

repaglinide (Prandin)



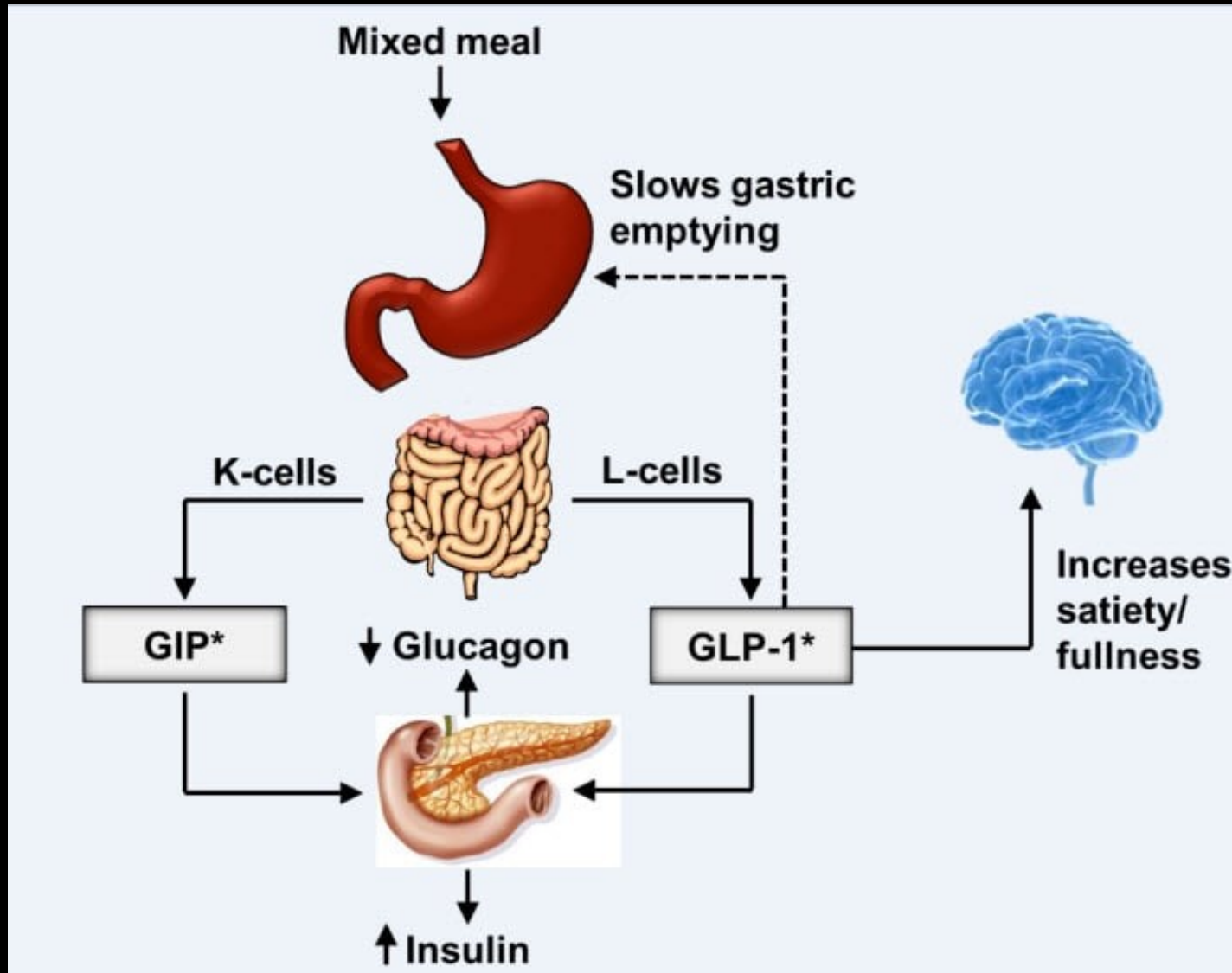
nateglinide (Starlix)



Type 2 Diabetes Treatment

↑ insulin production

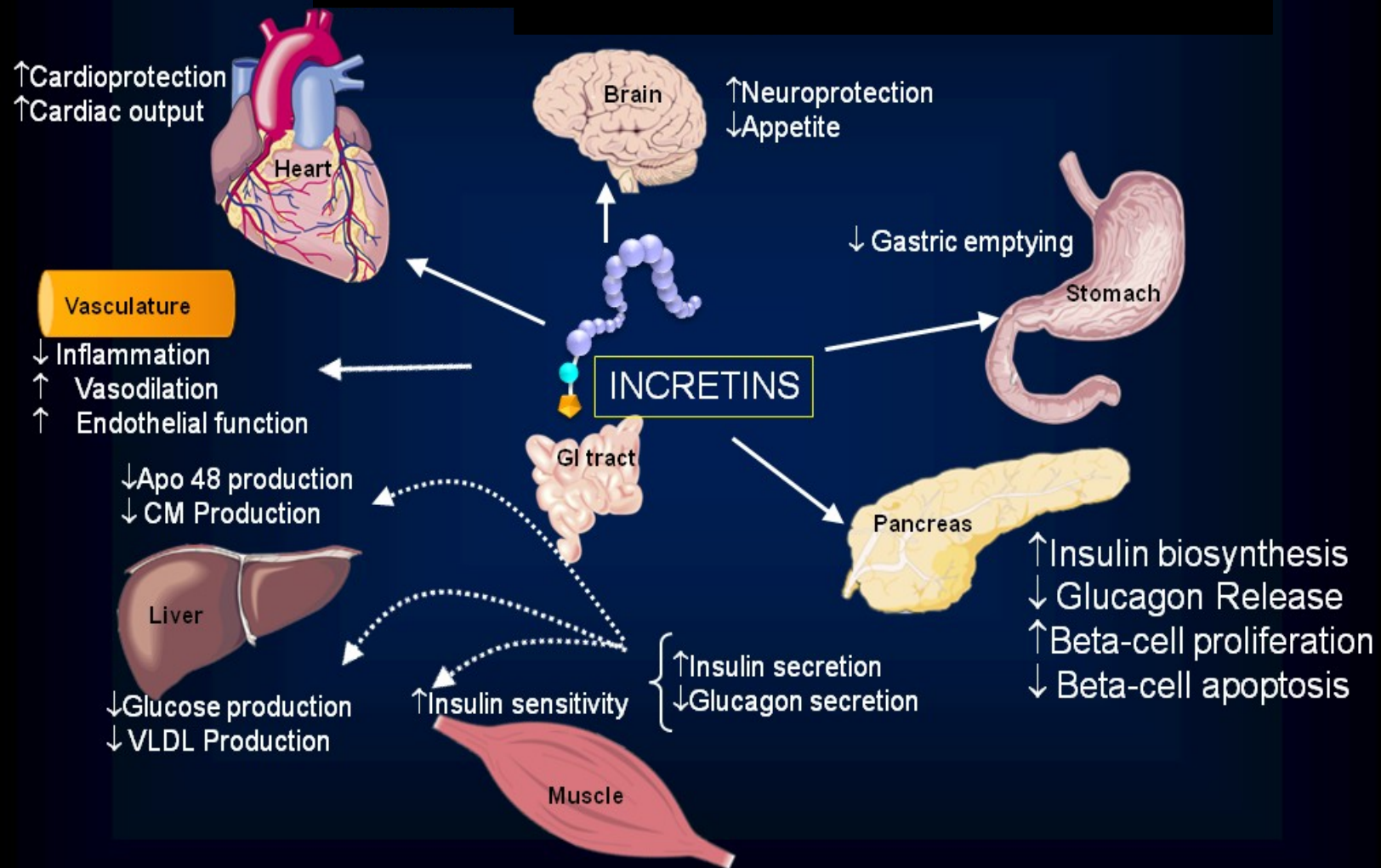
Incretins



Type 2 Diabetes Treatment

↑ insulin production

Incretins

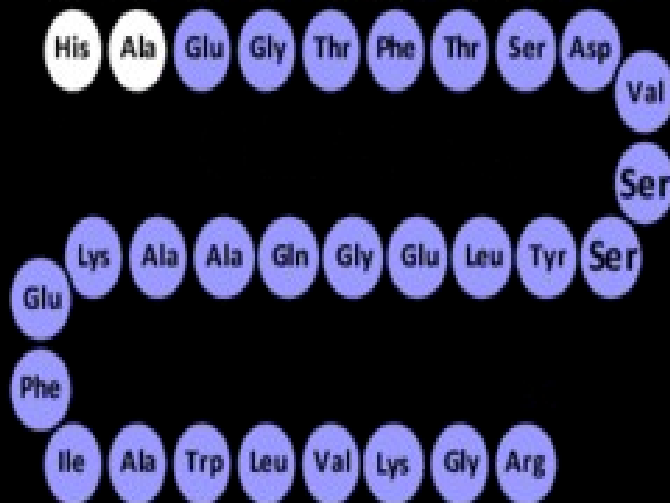


Type 2 Diabetes Treatment

↑ insulin production

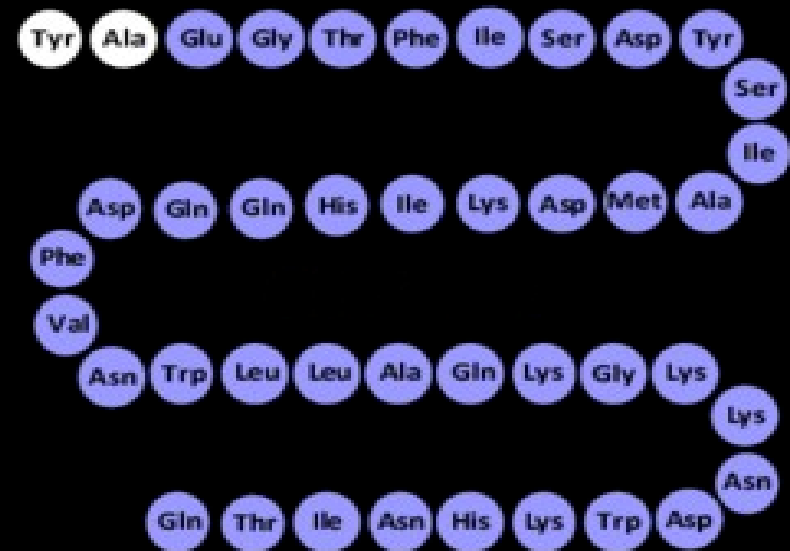
Incretins

GLP-1



7-36

GIP



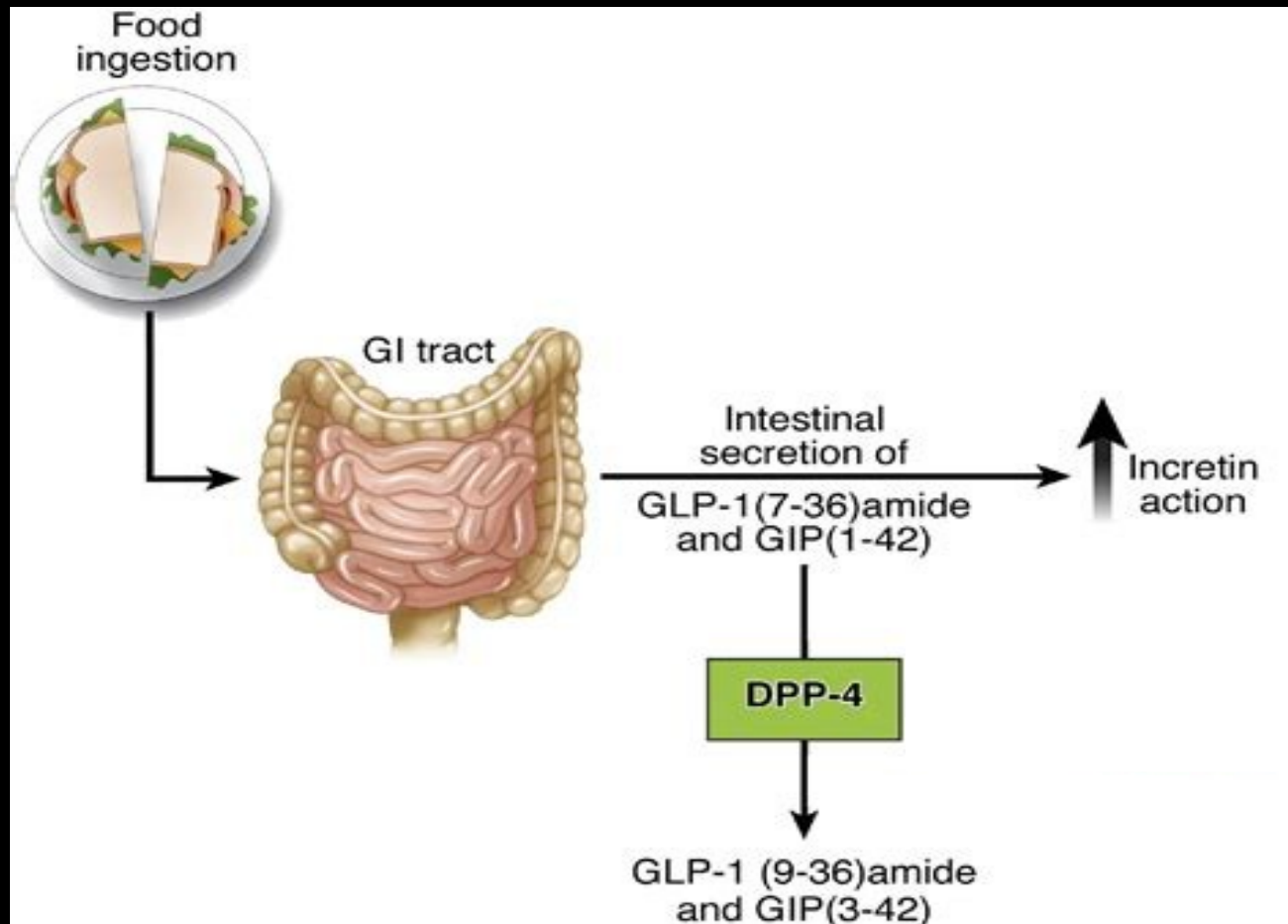
1-42

Type 2 Diabetes Treatment

↑ insulin production

Incretin inactivation

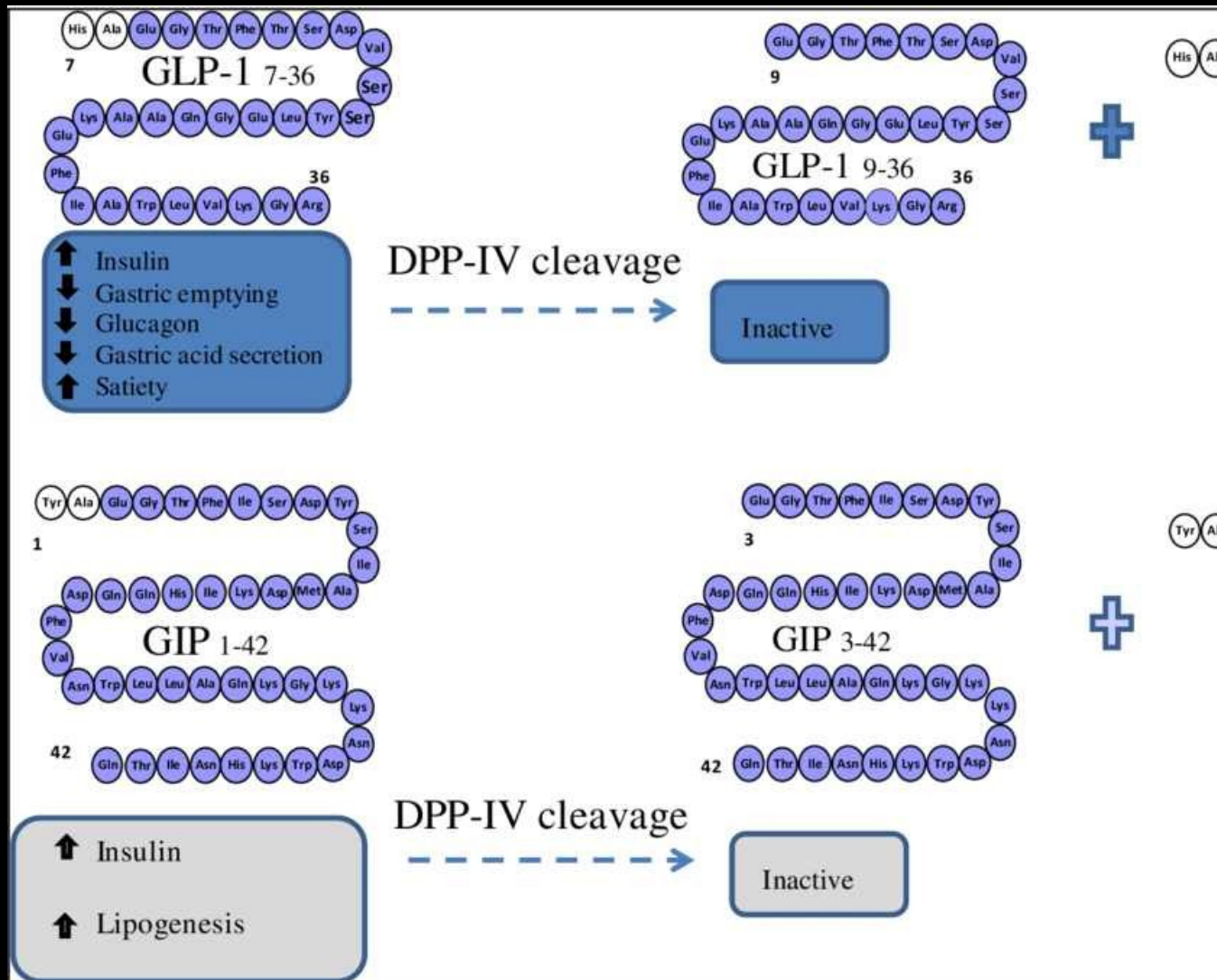
DPP-4 = dipeptidyl peptidase-4



Type 2 Diabetes Treatment

↑ insulin production

Incretin inactivation



Type 2 Diabetes Treatment

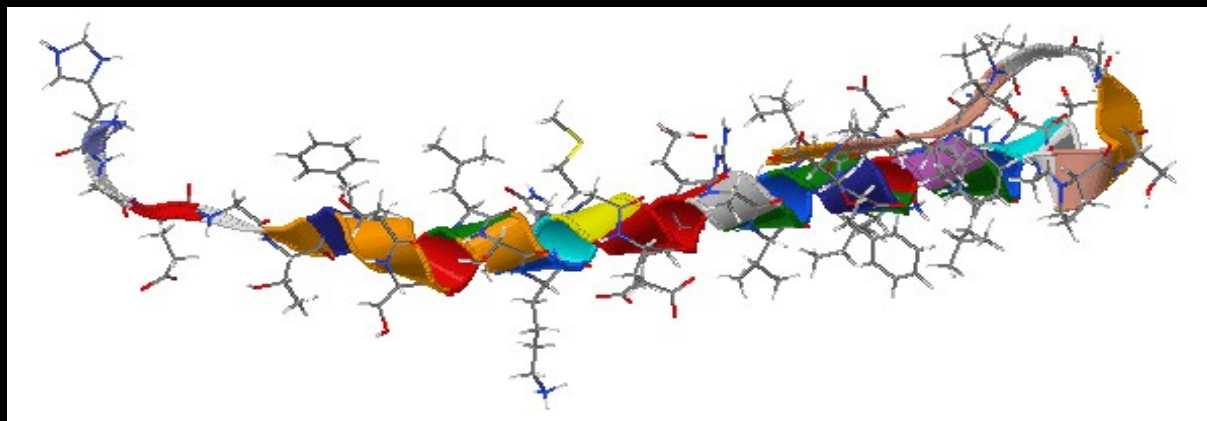
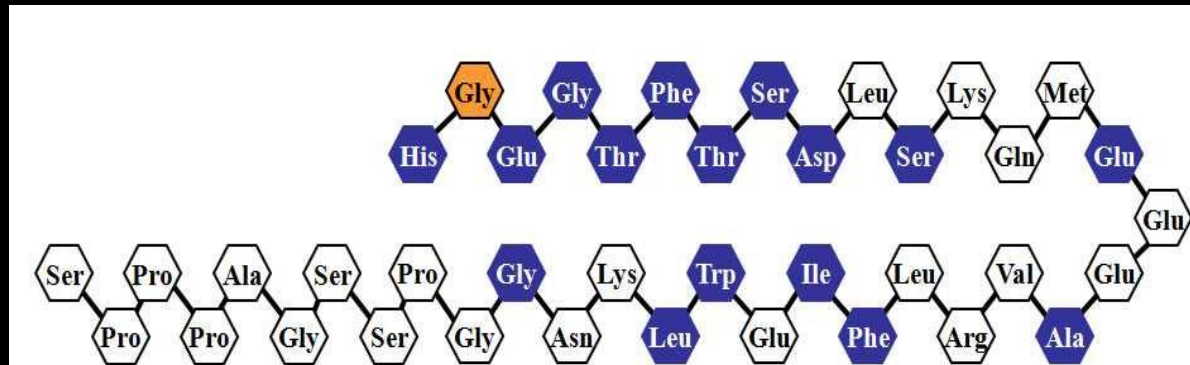
↑ insulin production

GLP-1 & GIP receptor agonists

exenatide (Byetta)

exenatide ER (Bydureon)

2 x daily
injection

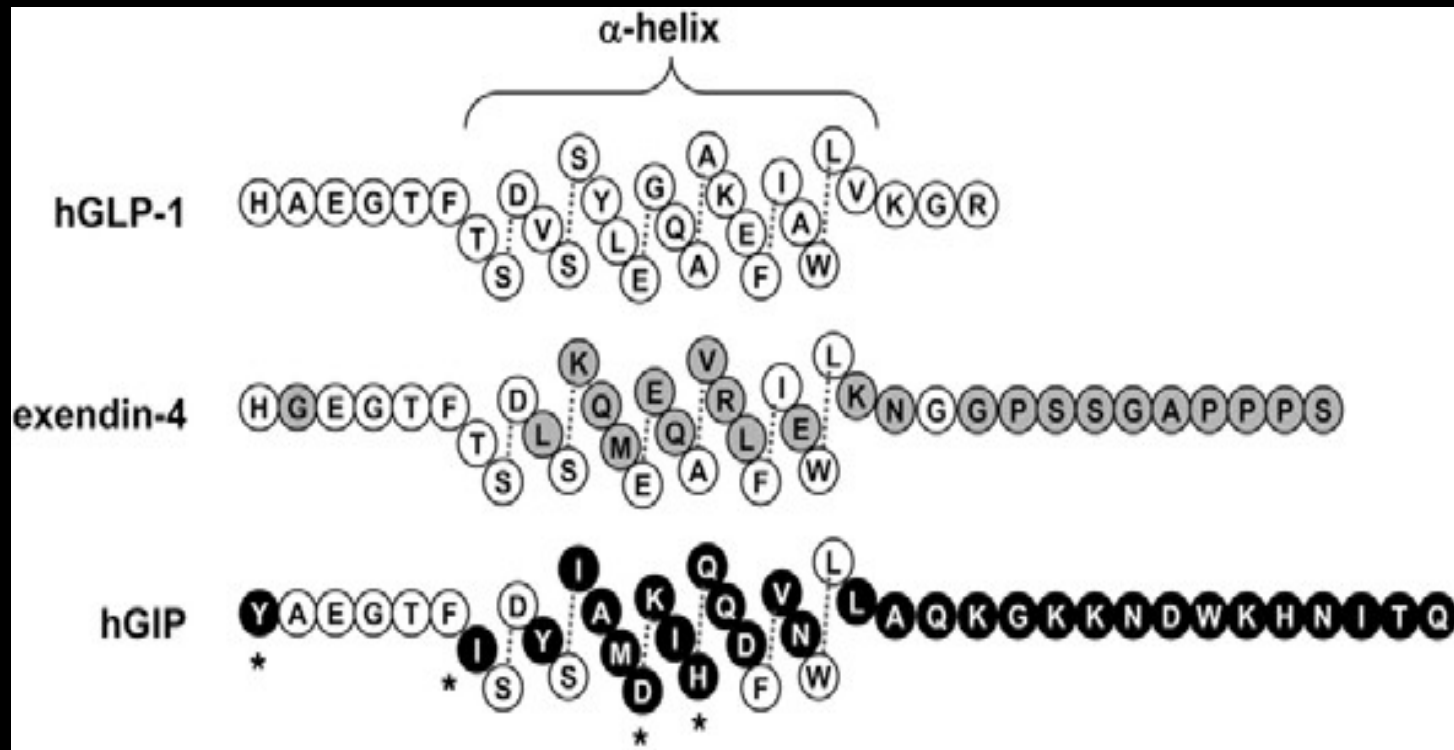


Type 2 Diabetes Treatment

↑ insulin production

GLP-1 & GIP receptor agonists

exenatide

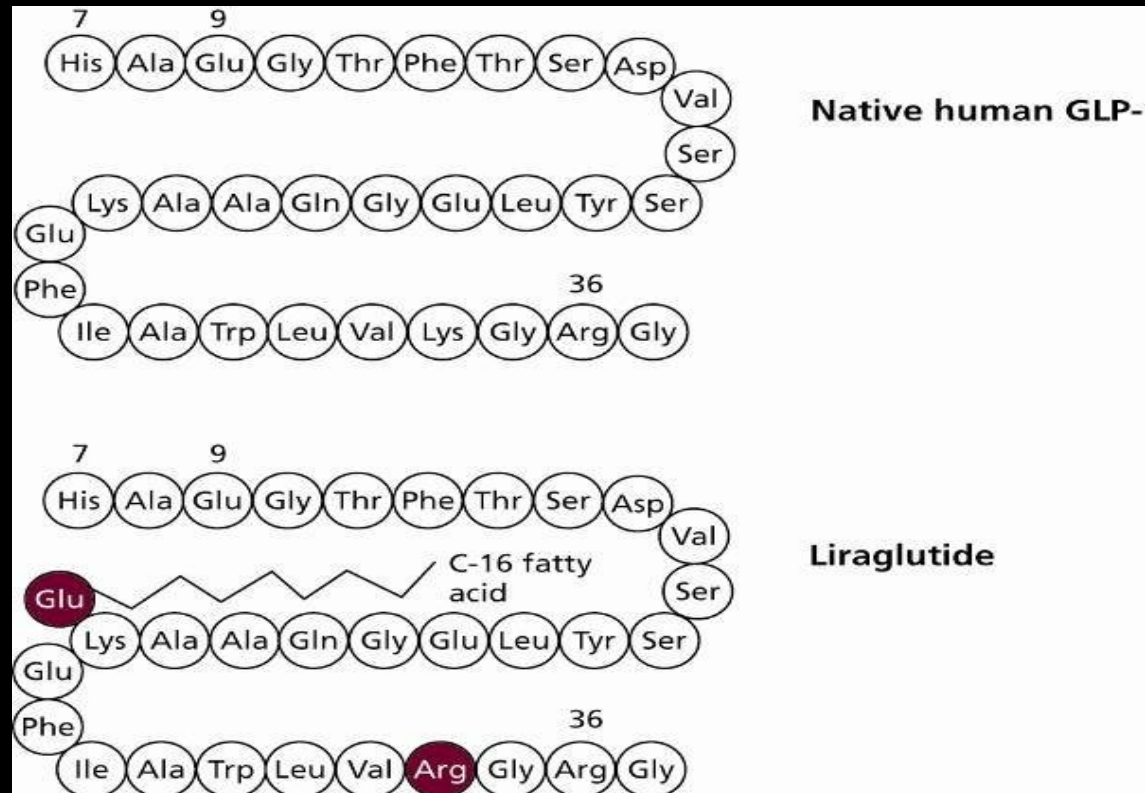


Type 2 Diabetes Treatment

↑ insulin production

GLP-1 & GIP receptor agonists

liraglutide (Victoza)



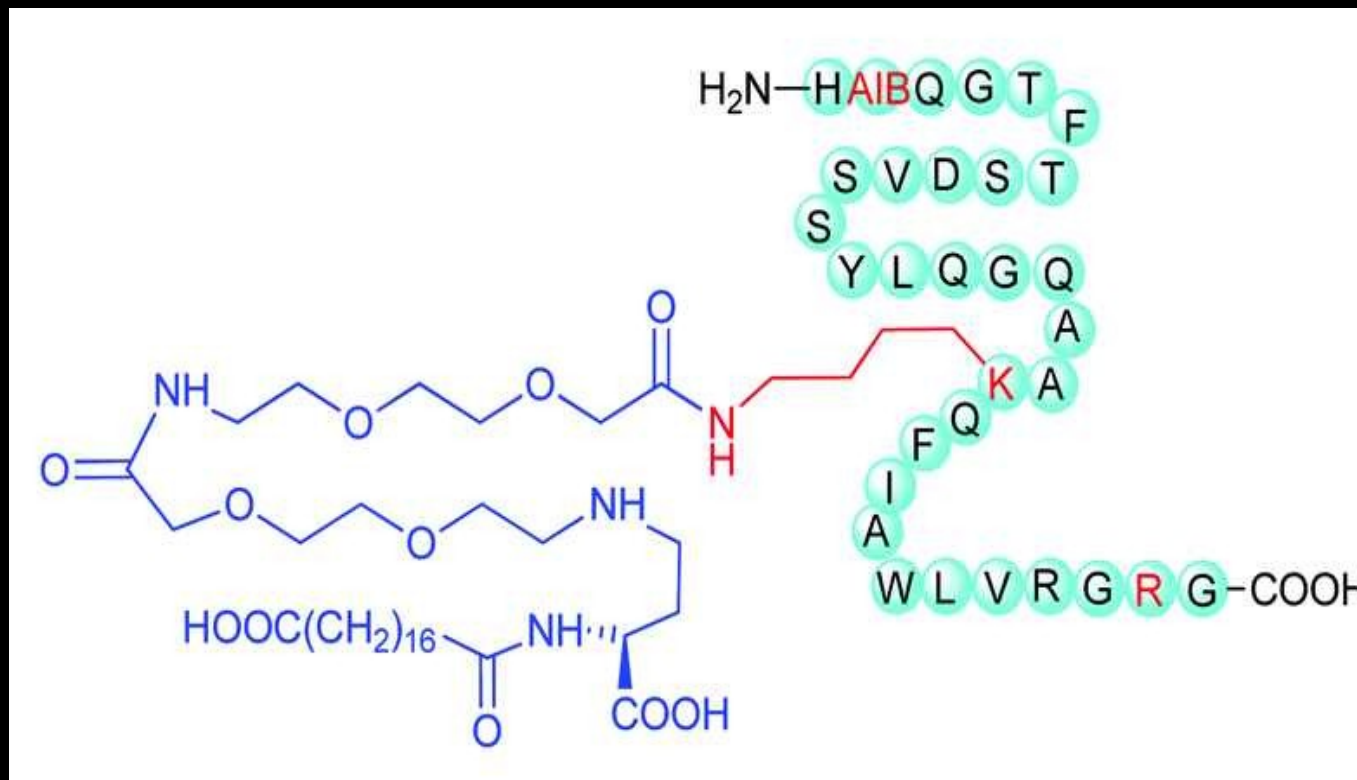
daily
injection

Type 2 Diabetes Treatment

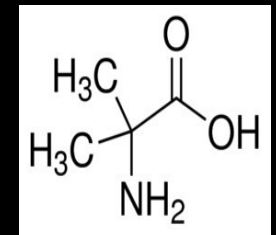
↑ insulin production

GLP-1 & GIP receptor agonists

semaglutide (Ozempic)



weekly
injection



Aib

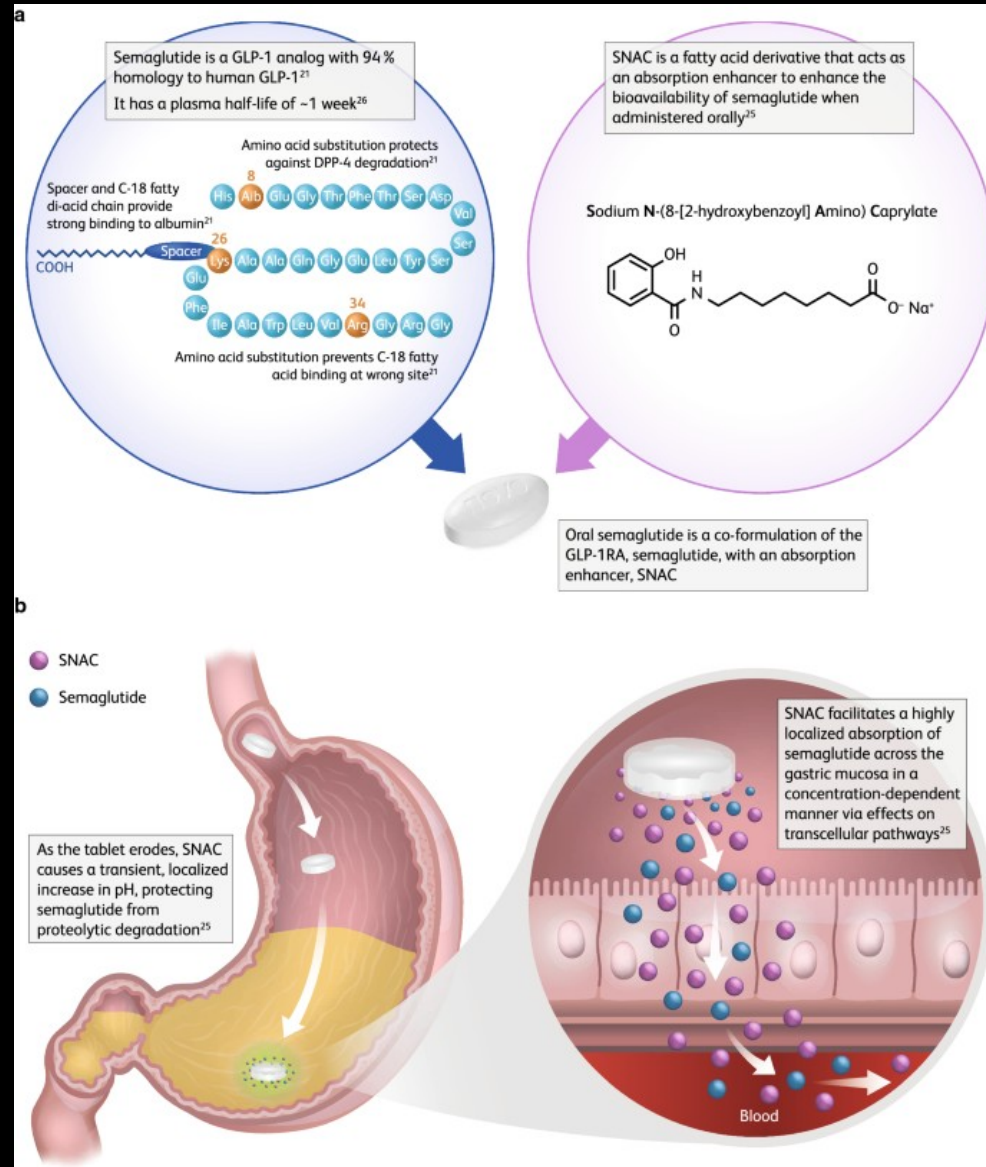
Type 2 Diabetes Treatment

↑ insulin production

GLP-1 & GIP receptor agonists

Semaglutide (Rybelsus)

daily
oral



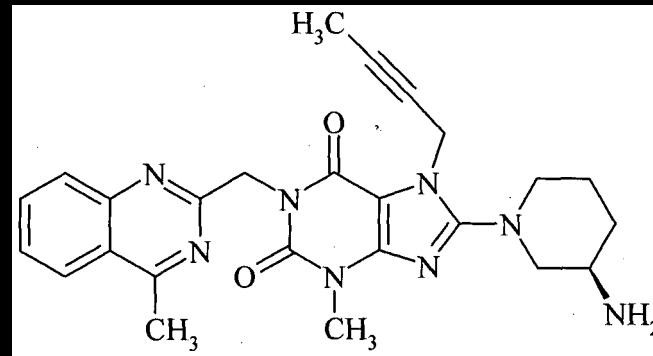
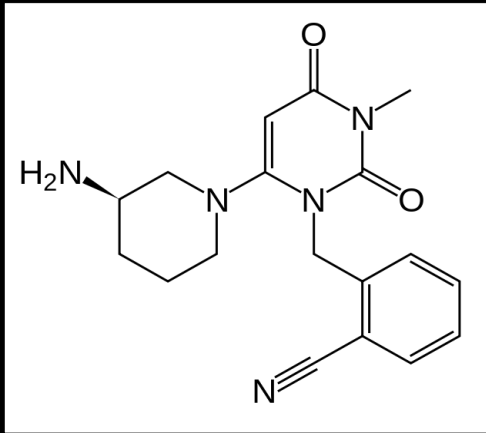
Type 2 Diabetes Treatment

↑ insulin production

DPP-4 inhibitors

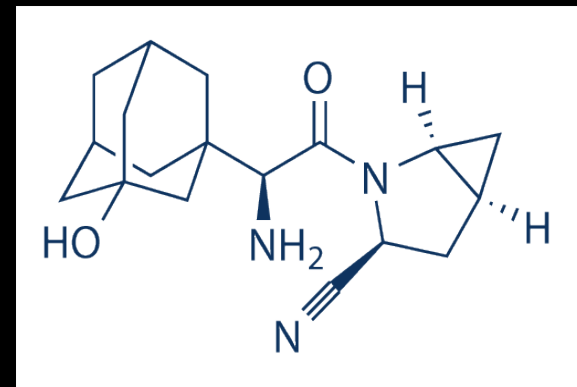
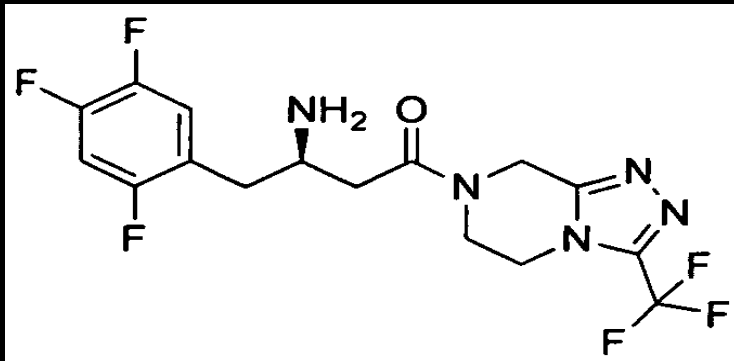
daily
oral

alogliptin (Nesina)



linagliptin (Tradjenta)

sitagliptin (Januvia)



saxagliptin (Onglyza)

Type 2 Diabetes Treatment Strategies

↑ insulin production
target pancreas

↑ insulin sensitivity
target body cells

↑ glucose excretion
target kidneys

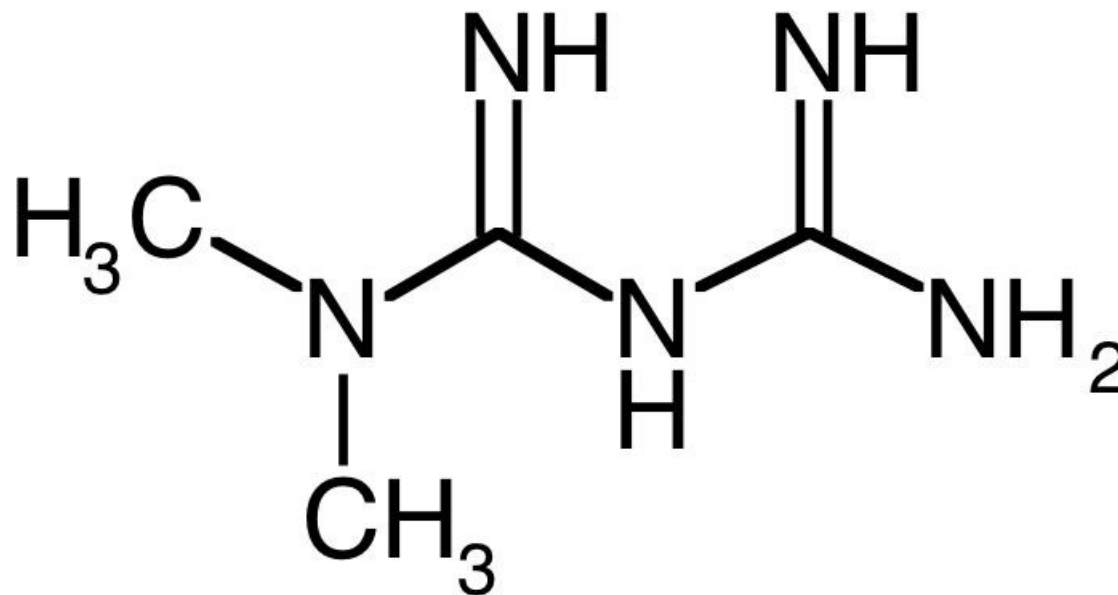
Type 2 Diabetes Treatment

↑ insulin sensitivity

Biguanide

metformin (Fortamet & Glucophage)

oral

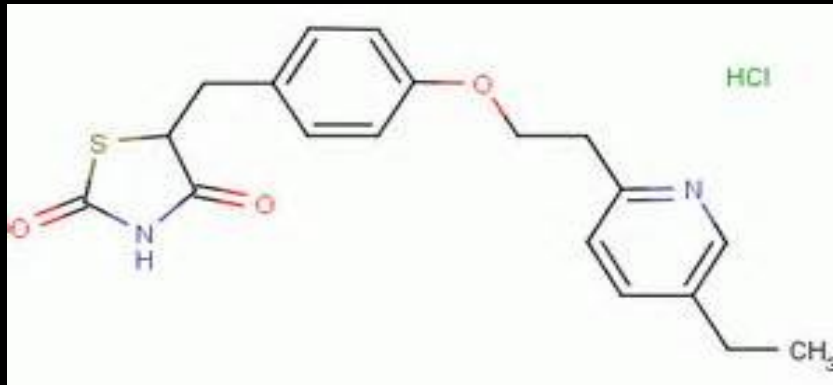


Type 2 Diabetes Treatment

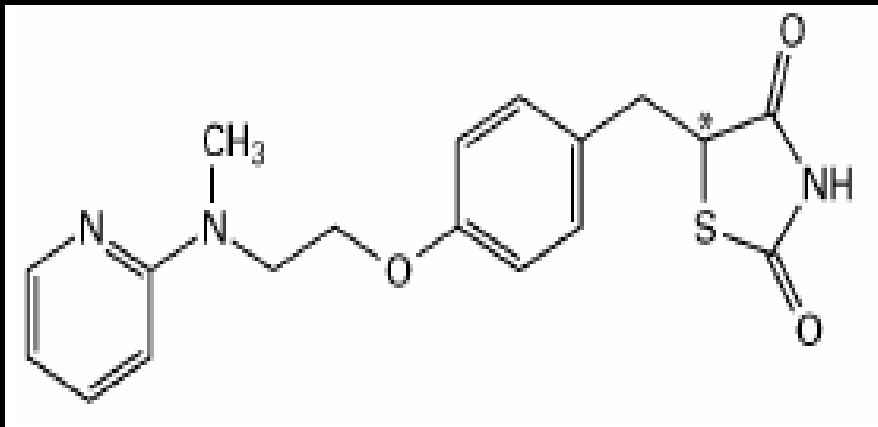
↑ insulin sensitivity

Thiazolidinediones (TZDs)

oral



pioglitazone
(Actos)



rosiglitazone
(Avandia)

Type 2 Diabetes Treatment Strategies

↑ insulin production
target pancreas

↑ insulin sensitivity
target body cells

↑ glucose excretion
target kidneys

Type 2 Diabetes Treatment

↑ glucose secretion

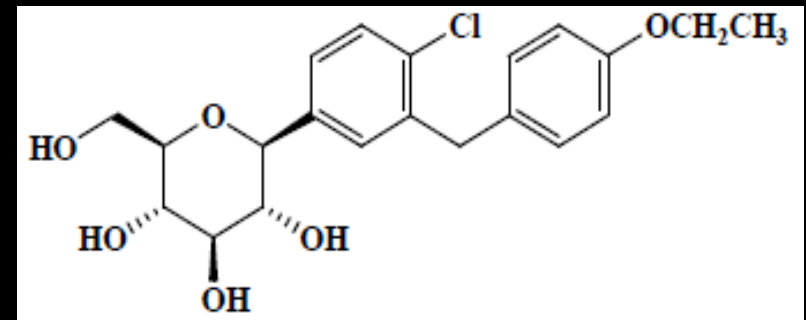
Na-glucose cotransporter 2 inhibitors

oral

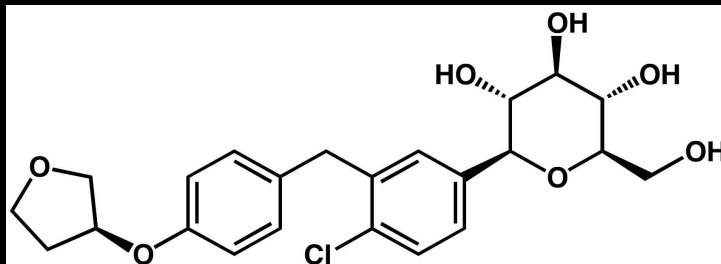


canagliflozin
(Invokana)

dapagliflozin
(Farxiga)



empagliflozin
(Jardiance)



Type 2 Diabetes Treatment Strategies

↑ insulin production
target pancreas

↑ insulin sensitivity
target body cells

↑ glucose excretion
target kidneys

Other

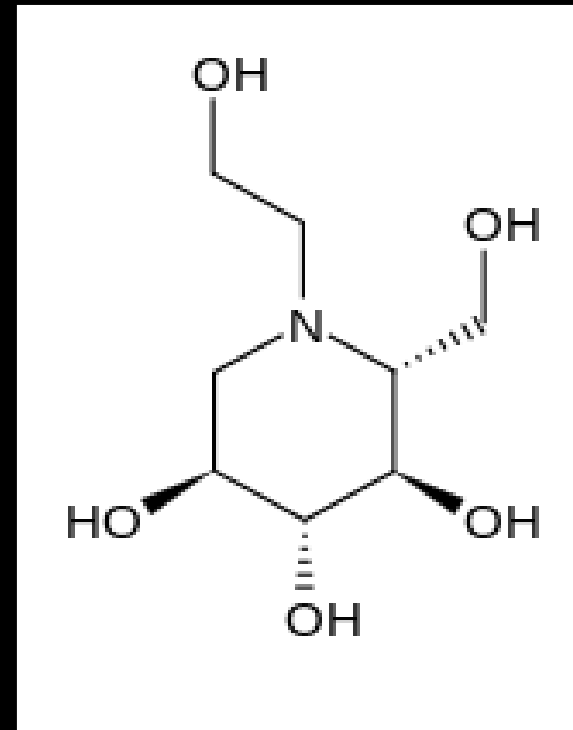
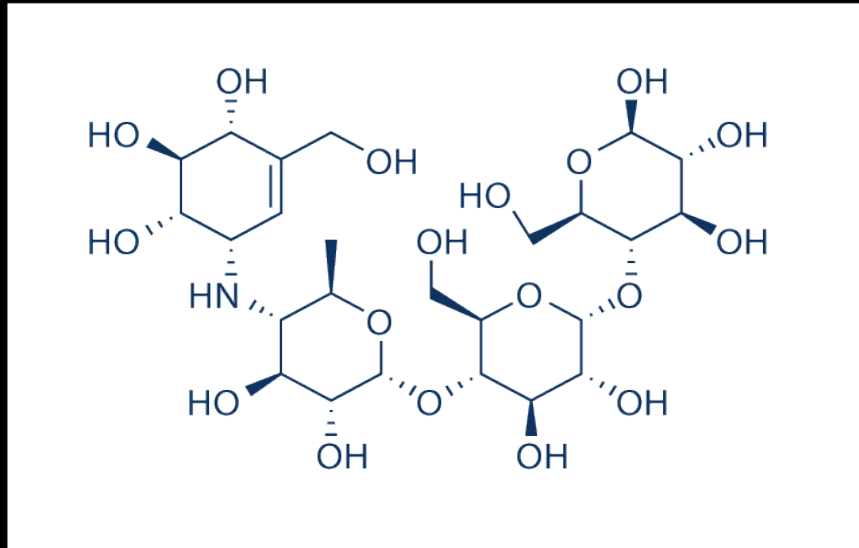
Type 2 Diabetes Treatment

Other

α -Glucosidase inhibitors

oral

acarbose (Precose)



miglitol (Glyset)

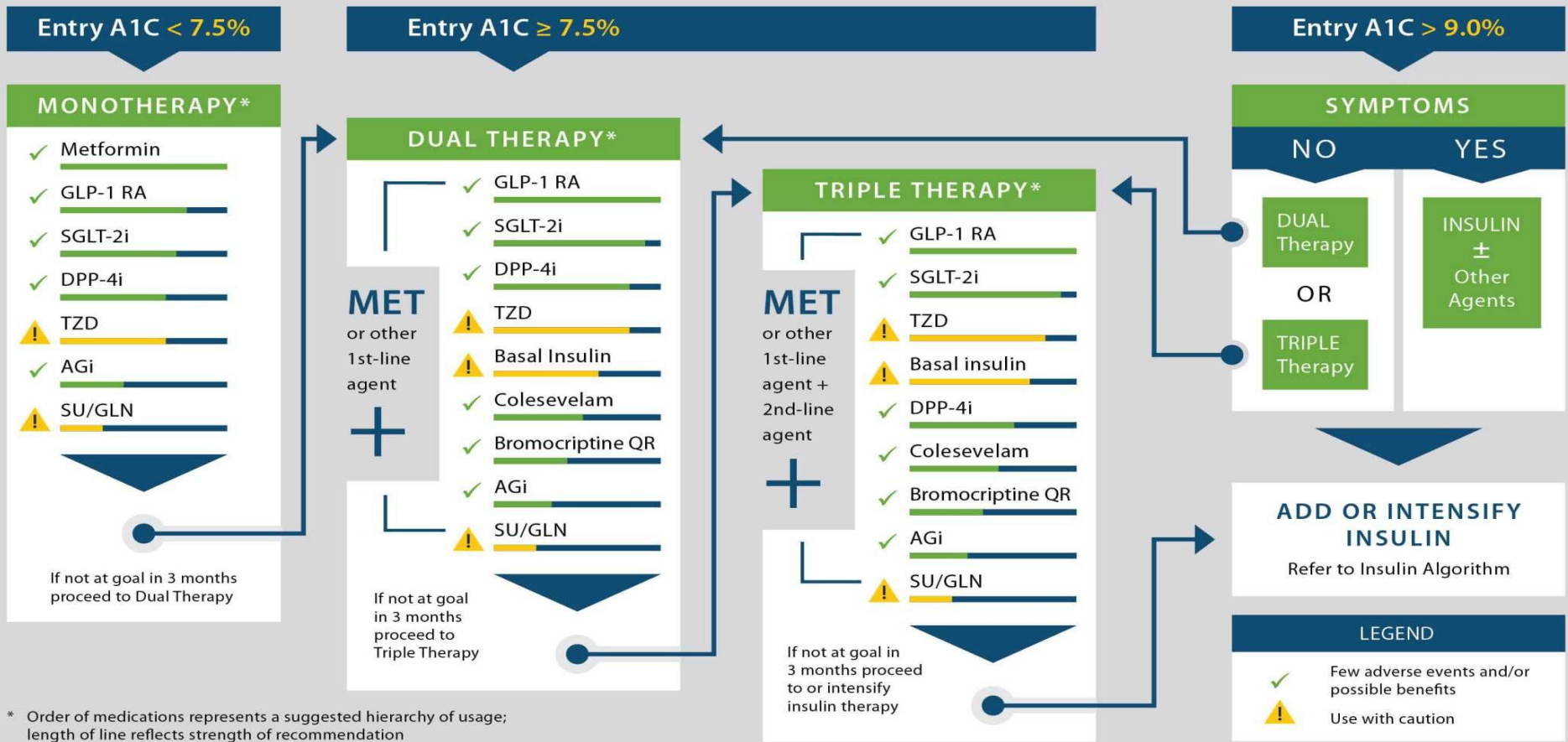
Type 2 Diabetes Oral Medication Combinations



GLYCEMIC CONTROL ALGORITHM



LIFESTYLE THERAPY (Including Medically Assisted Weight Loss)



* Order of medications represents a suggested hierarchy of usage; length of line reflects strength of recommendation

PROGRESSION OF DISEASE