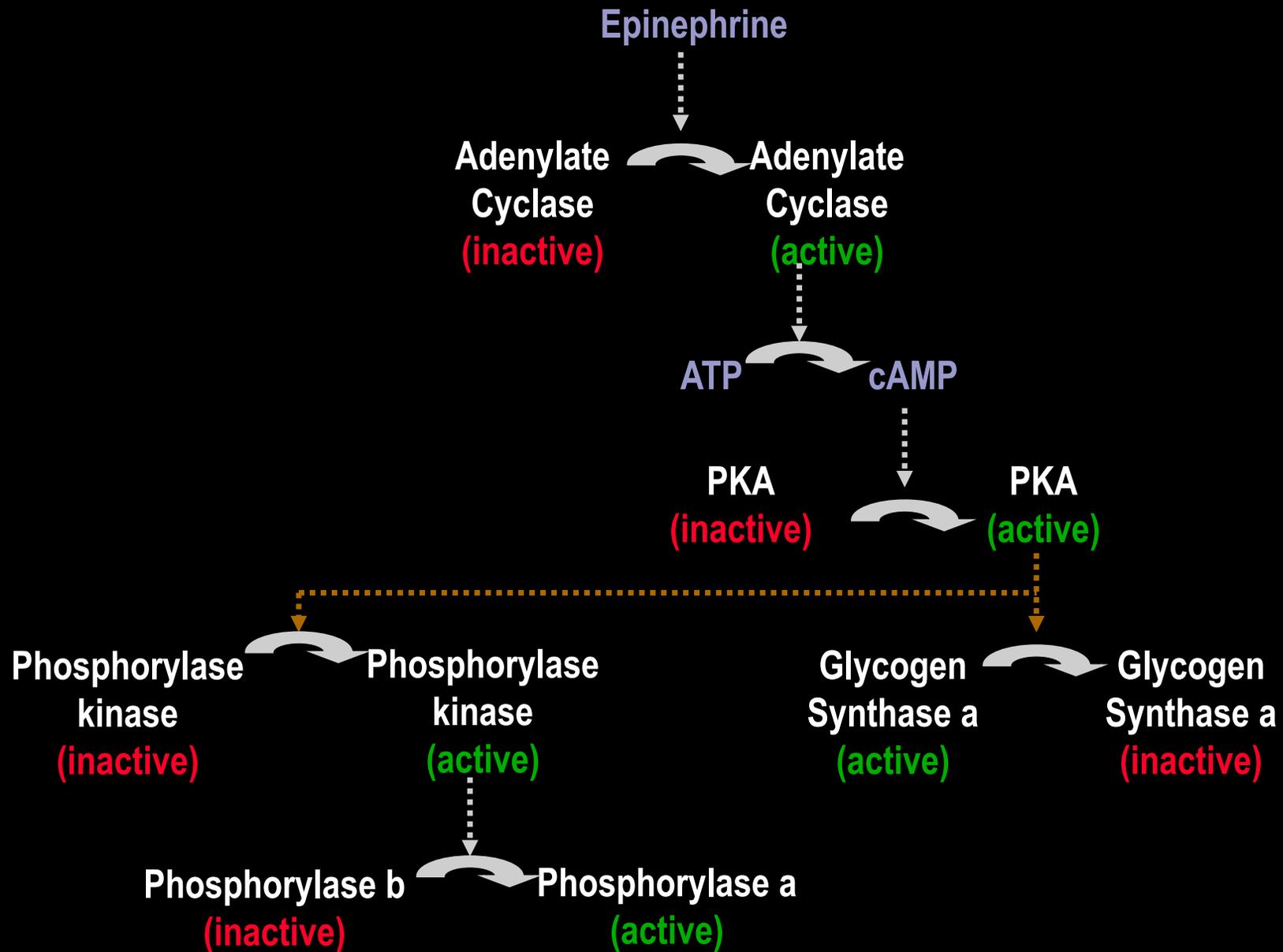
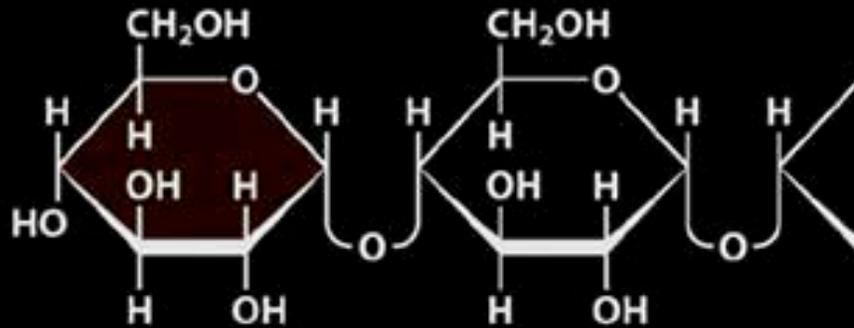


Adrenalin Regulation of Glycogen Metabolism

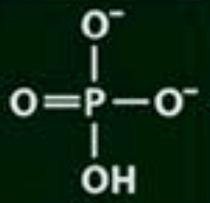


Glycogen Phosphorylase Reaction

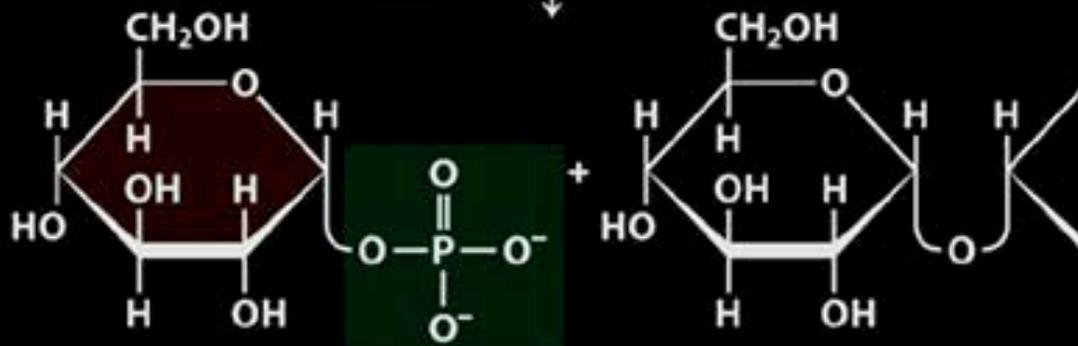
Nonreducing end



Glycogen (starch)
 n glucose units



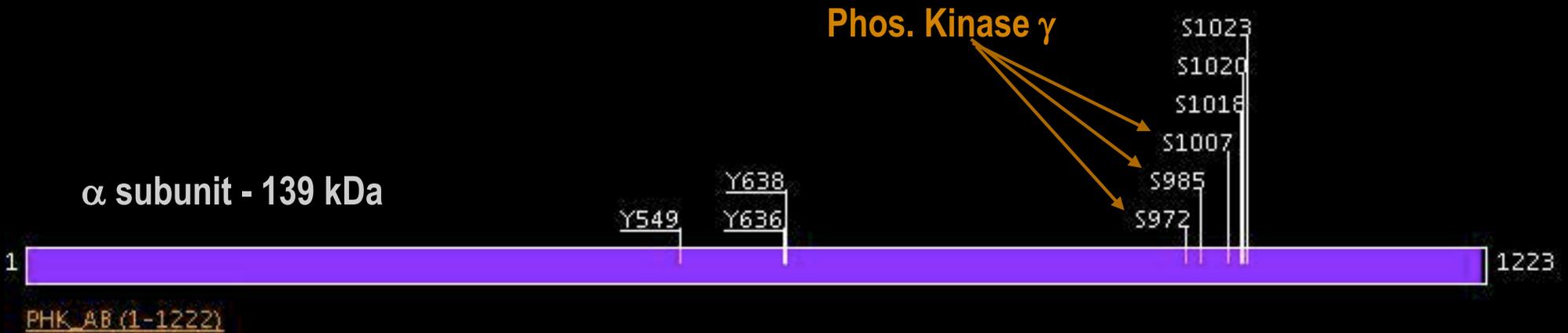
glycogen (starch)
phosphorylase



Glucose
1-phosphate

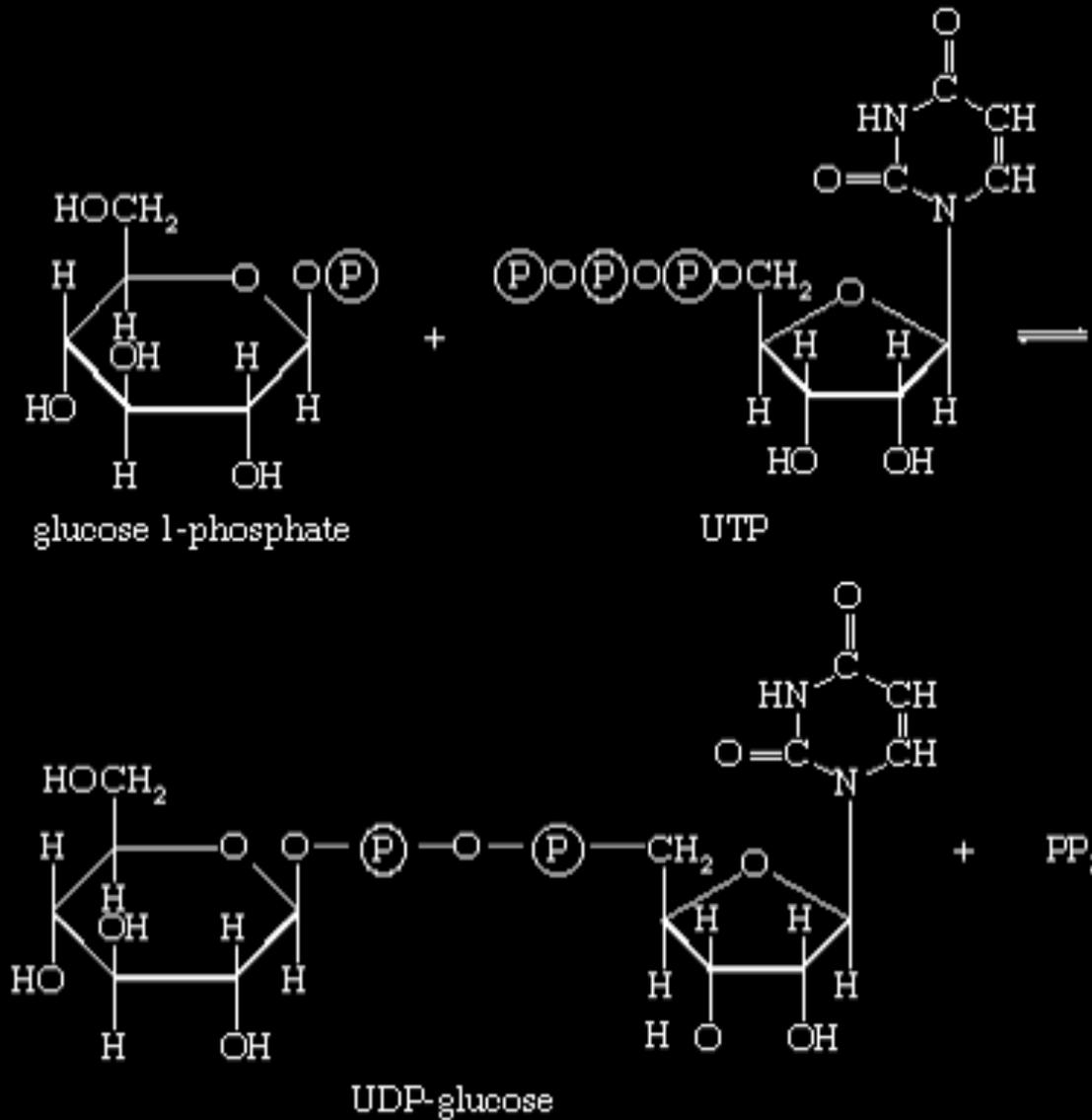
Glycogen (starch)
 $(n-1)$ glucose units

Glycogen Phosphorylase Kinase Phosphorylation

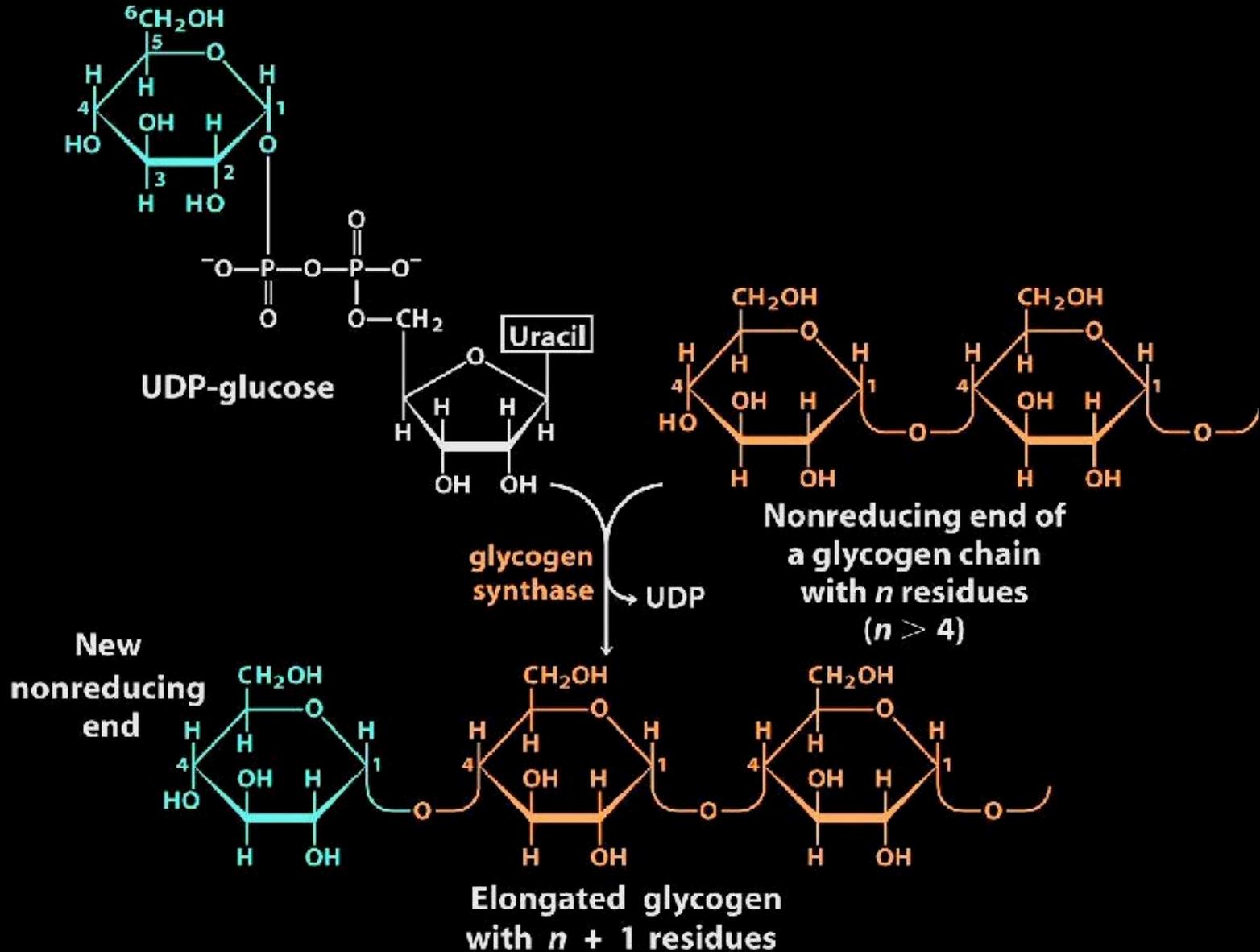


Numbering based on processed formed of these proteins

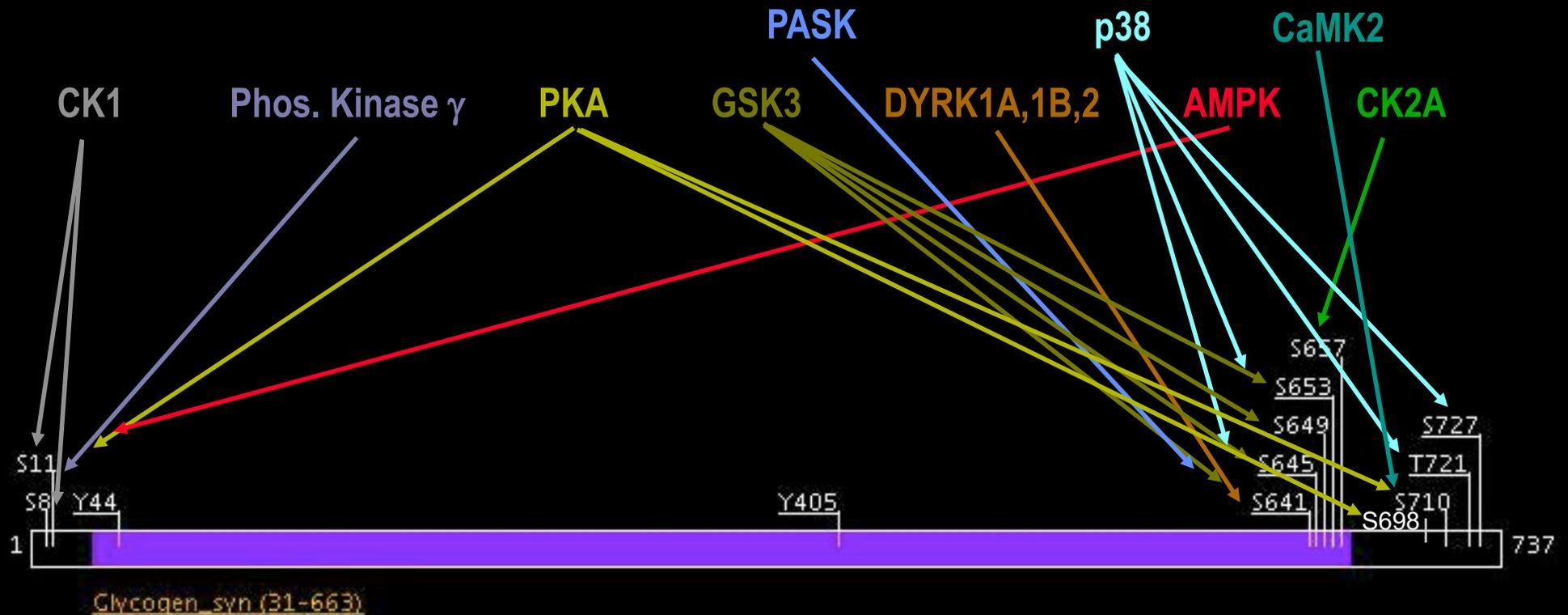
UDP-Glucose Synthesis



Glycogen Synthase Reaction

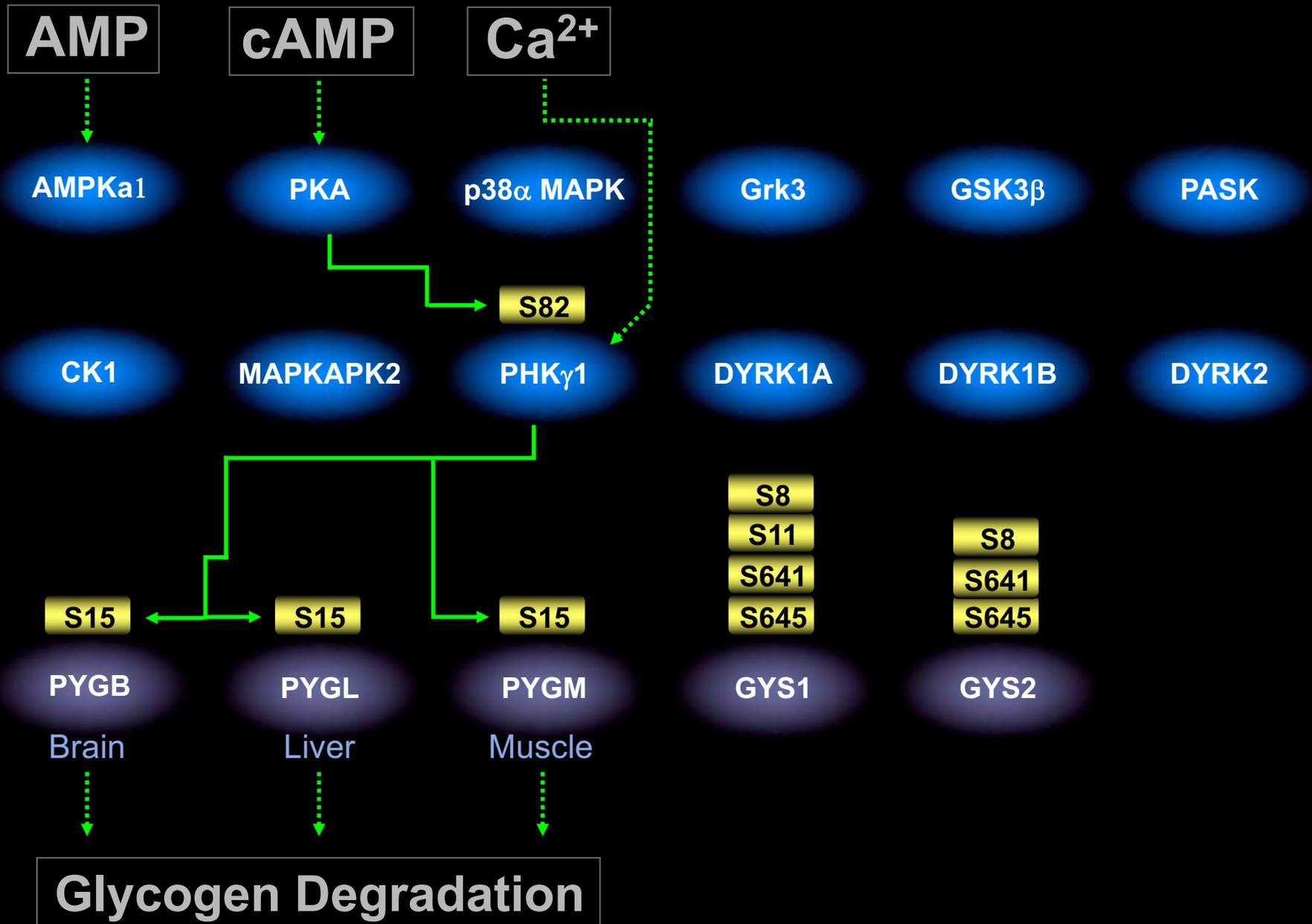


Muscle Glycogen Synthase Phosphorylation

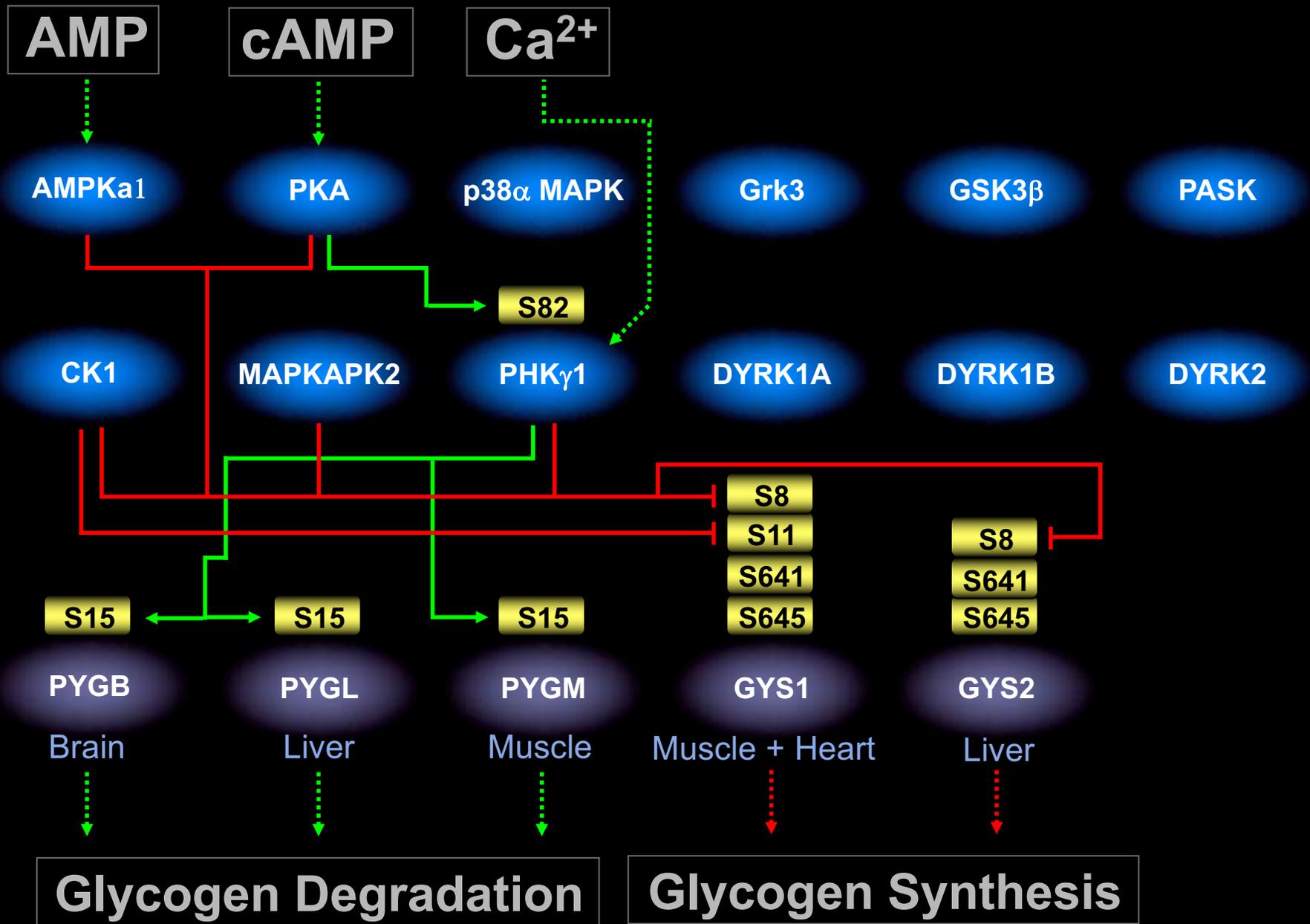


Phosphorylation at most of these sites contributes to inhibition of glycogen synthase activity

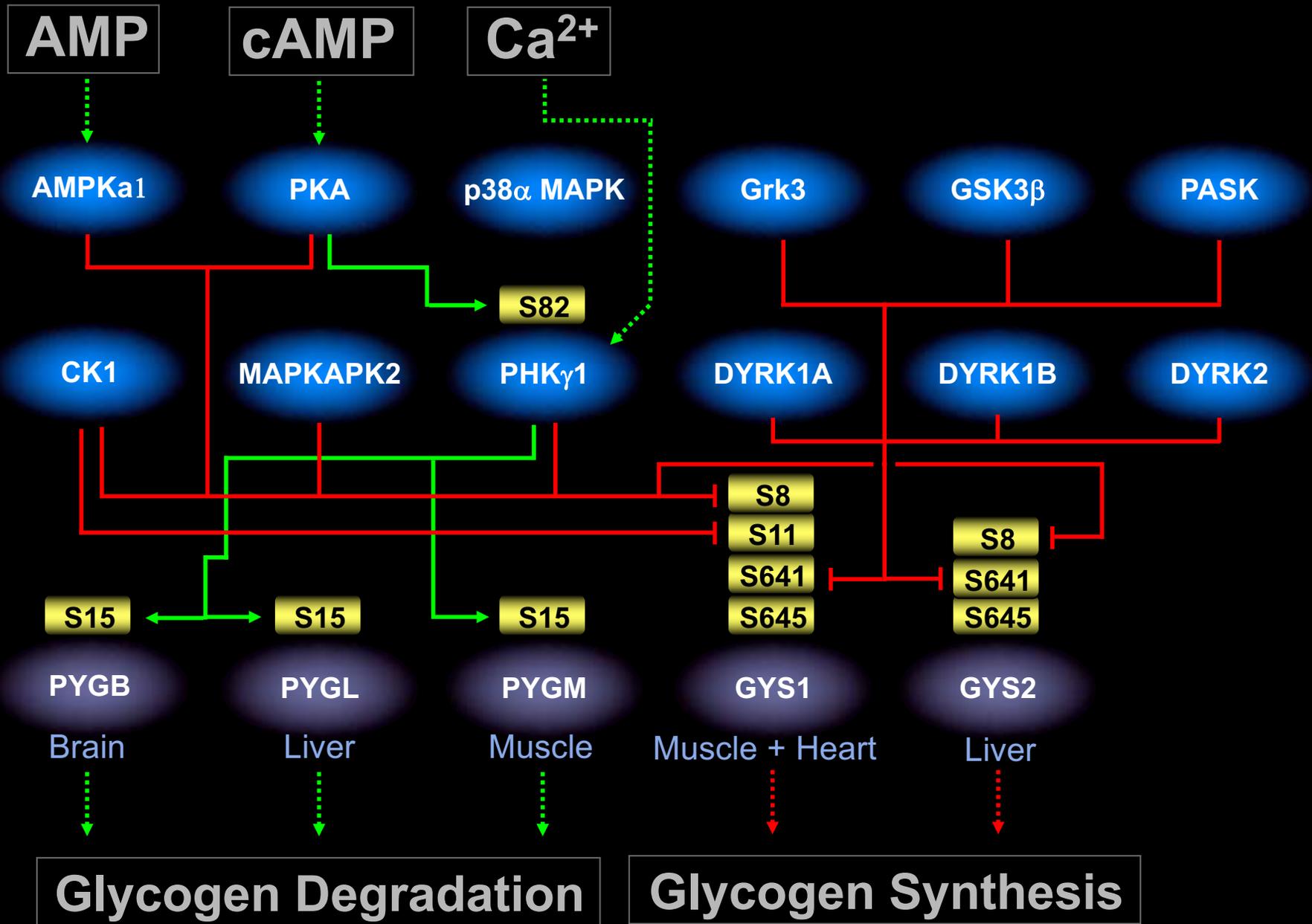
Glycogen Regulation



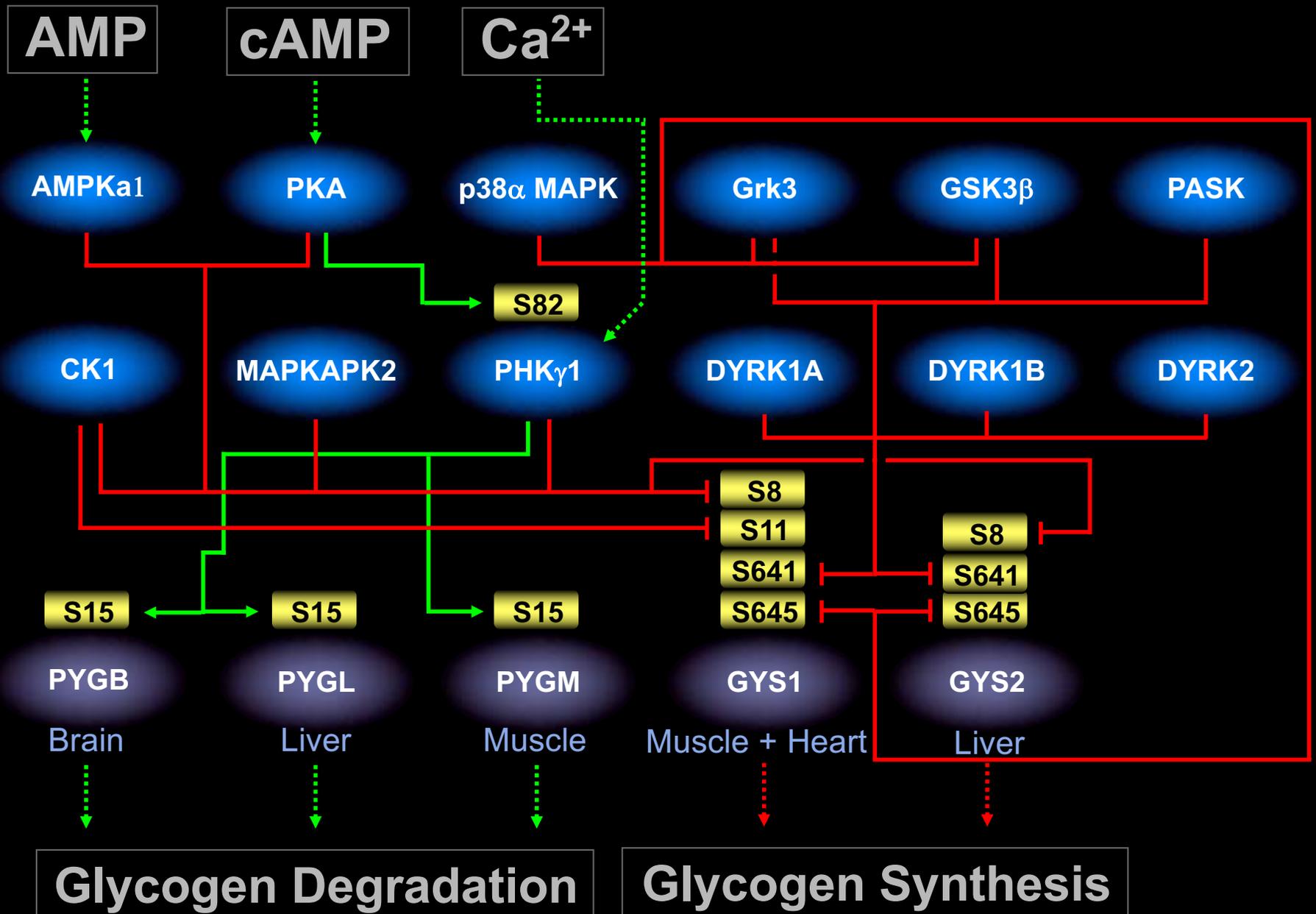
Glycogen Regulation



Glycogen Regulation



Glycogen Regulation



Glycogen Regulation

Substrate Short Name	Substrate Full Name	ProteinType	Substrate Swissprot	Phospho-site	Effect of Phosphorylation	Kinase Affecting	All Kinases Affecting	Phosphatase Affecting
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S11	Phosphorylation inhibits enzyme activity.	CK1	CK1	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	DYRK1A	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	DYRK1B	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	DYRK2	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	Grk3	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	GSK3b	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S641	Phosphorylation inhibits enzyme activity.	PASK	DYRK1A, DYRK1B, DYRK2, Grk3, GSK3b, PASK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S645	Phosphorylation inhibits enzyme activity.	Grk3	Grk3, GSK3b, p38b MAPK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S645	Phosphorylation inhibits enzyme activity.	GSK3b	Grk3, GSK3b, p38b MAPK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S645	Phosphorylation inhibits enzyme activity.	p38b MAPK	Grk3, GSK3b, p38b MAPK	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S8	Phosphorylation inhibits enzyme activity.	AMPKa1	AMPKa1, CK1, MAPKAPK2, PhK-g, PKAc	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S8	Phosphorylation inhibits enzyme activity.	CK1	AMPKa1, CK1, MAPKAPK2, PhK-g, PKAc	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S8	Phosphorylation inhibits enzyme activity.	MAPKAPK2	AMPKa1, CK1, MAPKAPK2, PhK-g, PKAc	
GYS1	Glycogen synthase, muscle	Glycogen synthesis enzyme	P13807	S8	Phosphorylation inhibits enzyme activity.	PhK-g	AMPKa1, CK1, MAPKAPK2, PhK-g, PKAc	

Glycogen Regulation

Substrate Short Name	Substrate Full Name	ProteinType	Substrate Swissprot	Phospho-site	Effect of Phosphorylation	Kinase Affecting	All Kinases Affecting	Phosphatase Affecting
GYS2	Glycogen synthase, liver	Glycogen synthesis enzyme	P54840	S8	Phosphorylation inhibits enzyme activity.	PKACa	AMPKa1, CK1, MAPKAPK2, PhK- γ , PKACa	
PHKG1	Phosphorylase B kinase gamma catalytic subunit 1	Glycogen regulation enzyme	Q16816	S82	Phosphorylation may stimulate kinase activity.	PKACa	PKACa	
PYGB	Glycogen phosphorylase, brain form	Glycogen degradation enzyme	P11216	S15	Glycogen phosphorylase brain form	PhK-g	PhK-g	
PYGL	Glycogen phosphorylase, liver form	Glycogen degradation enzyme	P06737	S15	Glycogen phosphorylase liver form	PhK-g	PhK-g	
PYGM	Glycogen phosphorylase, muscle form	Glycogen degradation enzyme	P11217	S15	Glycogen phosphorylase muscle form	PhK-g	PhK-g	