

# School of Medical and Allied Sciences

Course Code : PCY406

Course Name: Pharmacology II



## Insulin

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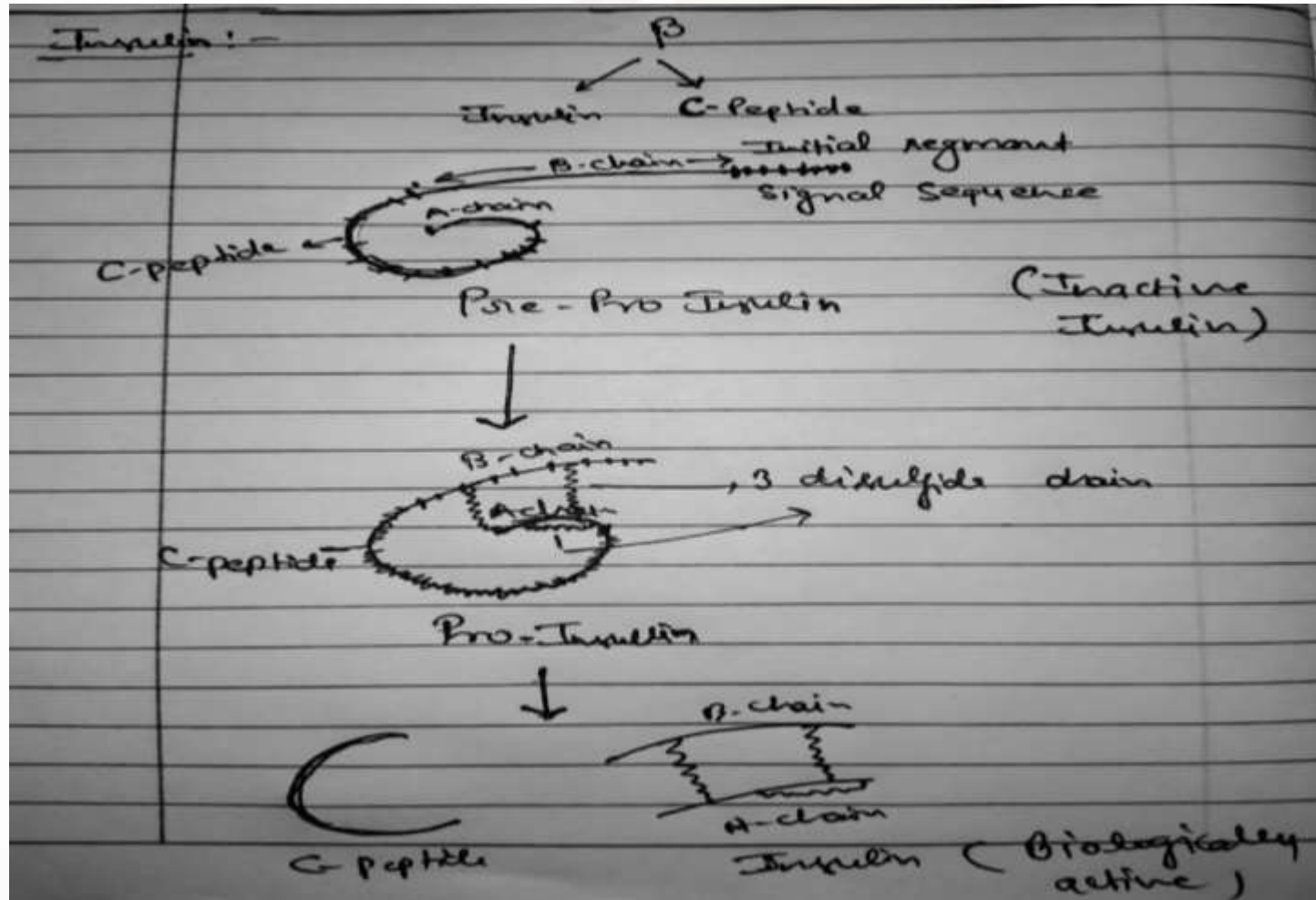
# Insulin

- Insulin is a two chain polypeptide having 51 amino acids and MW about 6000, Synthesized in pancreatic  $\beta$  cells of Pancreas as endocrine function.

## **Physiological function of insulin**

- Insulin increase the uptake/absorption of glucose and glycogenesis in the liver, skeletal muscle etc.
- Insulin inhibits the gluconeogenesis and protein break down means facilitate positive Nitrogen balance.
- Insulin inhibits lipolysis and favours triglyceride synthesis.

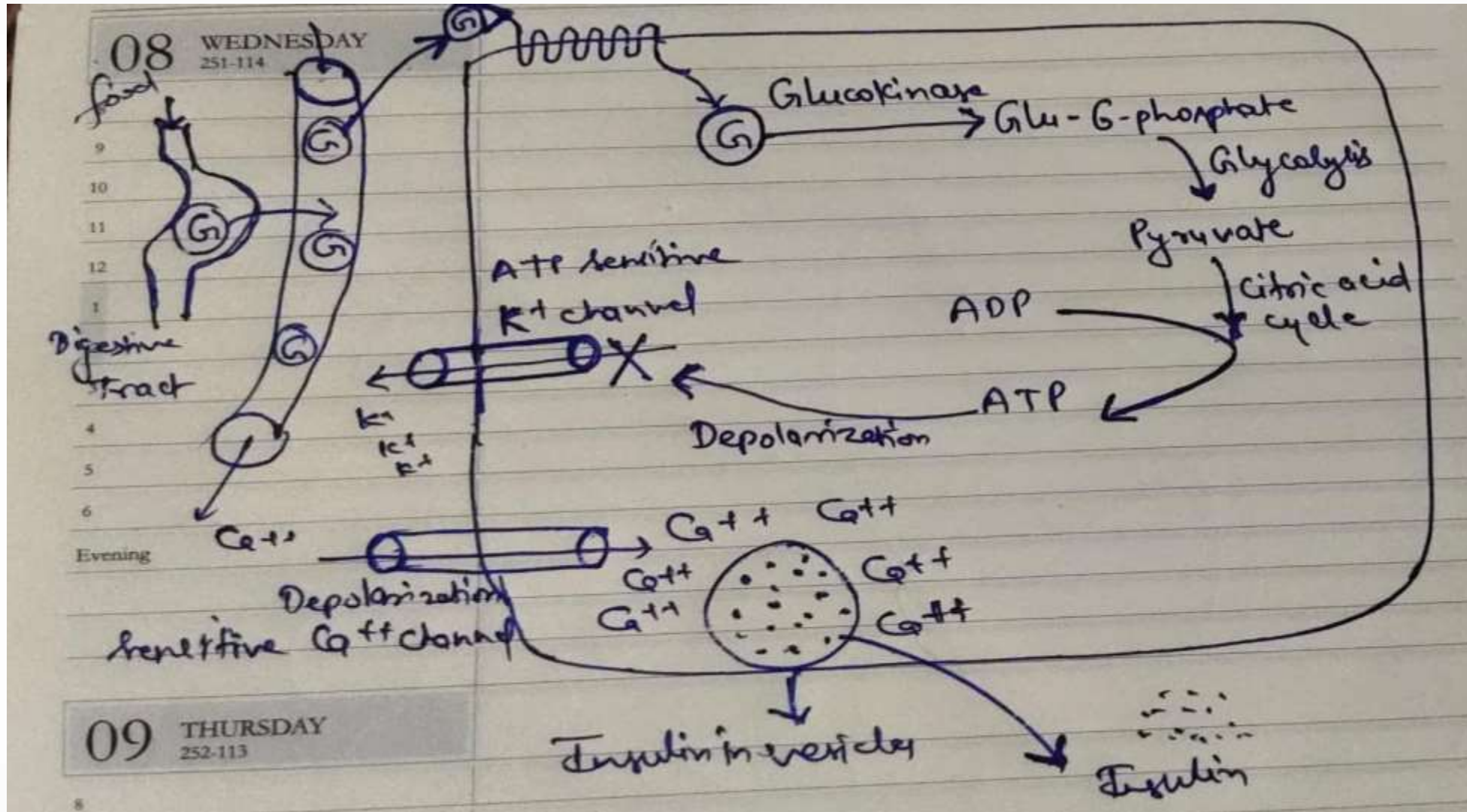
# Synthesis of Insulin:



# Regulation of insulin secretion

- $\beta$ -cell has glucoreceptor which is activated by the glucose  $\rightarrow$  glucose enters in the cells through glucose transporter and indirectly inhibits to the ATP sensitive  $K^+$  channel and intracellular  $Ca^{2+}$   $\rightarrow$  secretion of insulin.
- Somatostatin (GHIH) inhibits insulin as well as glucagon.
- Insulin inhibits the glucagon secretion.
- Glucagon increases/stimulates the release of insulin as well as somatostatin.

# Release of Insulin



# MOA of Insulin

Insulin acts through membrane kinase receptor which has enzymatic activity.

Insulin receptor (heteromeric receptor) consisting of 2 extra cellular  $\alpha$  and 2 transmembrane  $\beta$  subunit linked together by disulfide bonds. Insulin binds with  $\alpha$  subunit then activation of tyrosine kinase which is attached with  $\beta$  subunit  $\rightarrow$  activated tyrosine kinase phosphorylated  $\rightarrow$  metabolic reaction of insulin.

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3. **Dale, M M, H P. Rang, and Maureen M. Dale. '*Rang & Dale's Pharmacology*', 7<sup>th</sup> edition. Edinburgh: Churchill Livingstone, 2007.**
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