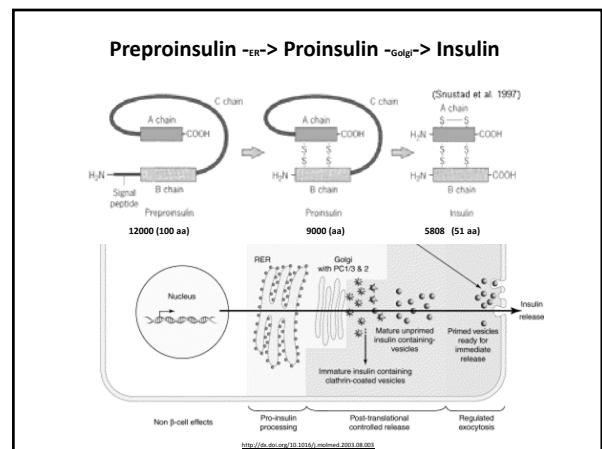
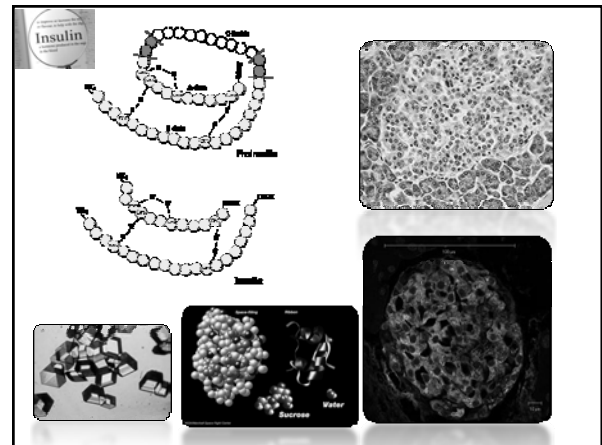




# Diabetes (A Molecular Approach)

Mohammad Reza Bakhtiari *DCLS, PhD*



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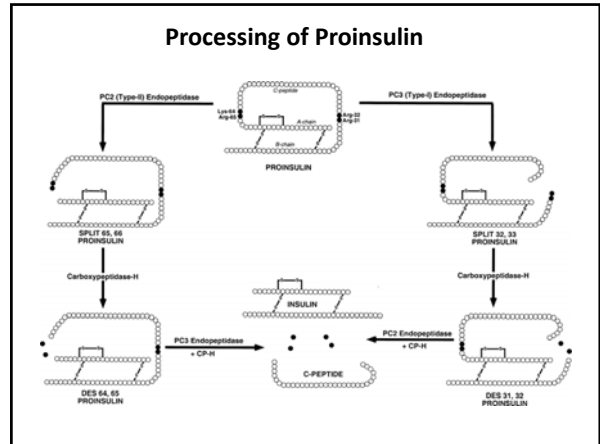
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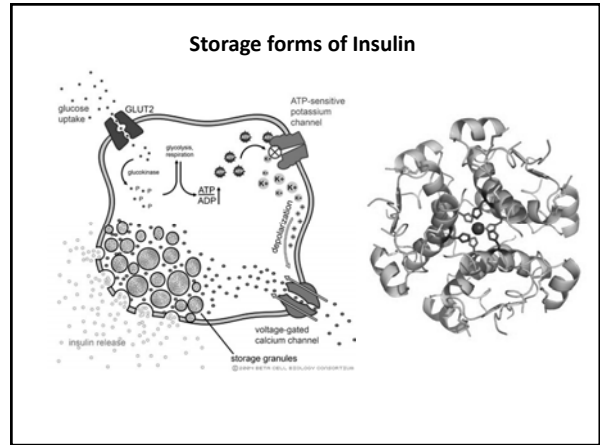
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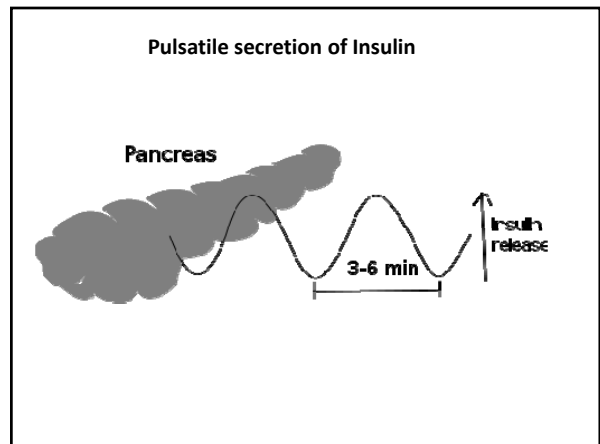
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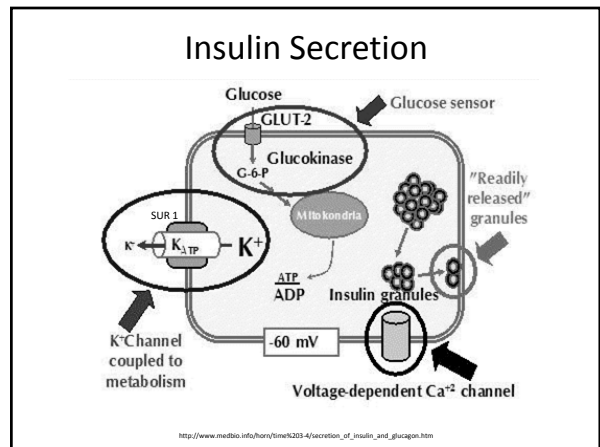
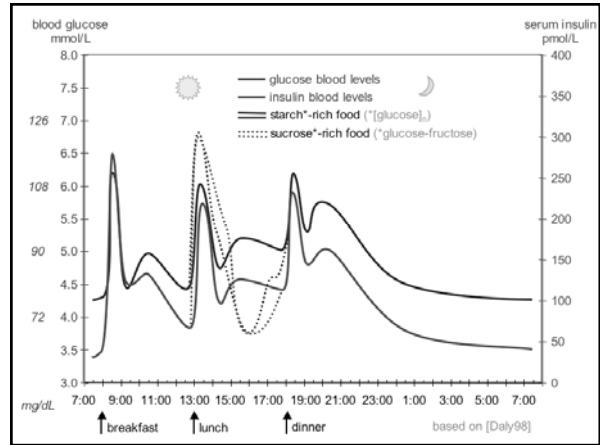
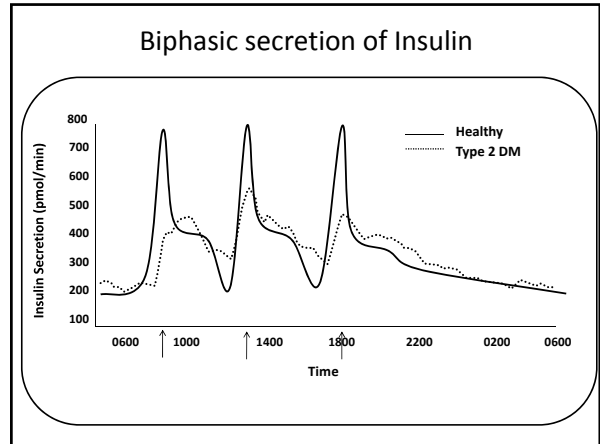
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### Facilitative Human Membrane Glucose Transporters

Name	Tissue	Function
GLUT1 (erythrocyte)	Wide distribution, especially brain, kidney, colon, and fetal tissues	Basal glucose transport
GLUT2 (liver)	Liver, $\beta$ -cells of pancreas, small intestine, and kidney	Non-rate-limiting glucose transport
GLUT3 (brain)	Wide distribution, especially neurons, placenta, and testis	Glucose transport in neurons
GLUT4 (muscle)	Skeletal muscle, cardiac muscle, and adipose tissue	Insulin-stimulated glucose transport
GLUT5 (small intestine)	Small intestine, kidney, skeletal muscle, brain, and adipose tissue	Transports fructose (not glucose)
GLUT6		Pseudogene that is nonfunctional
GLUT7 (microsomal)	Liver	Release of glucose from endoplasmic reticulum

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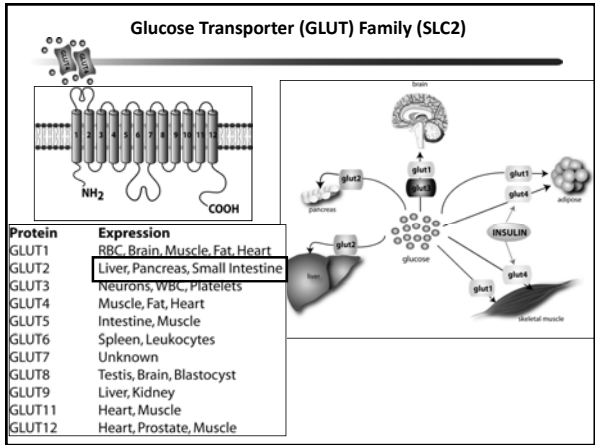
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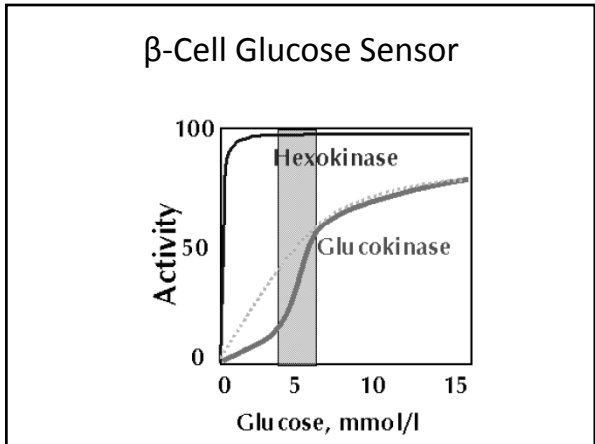
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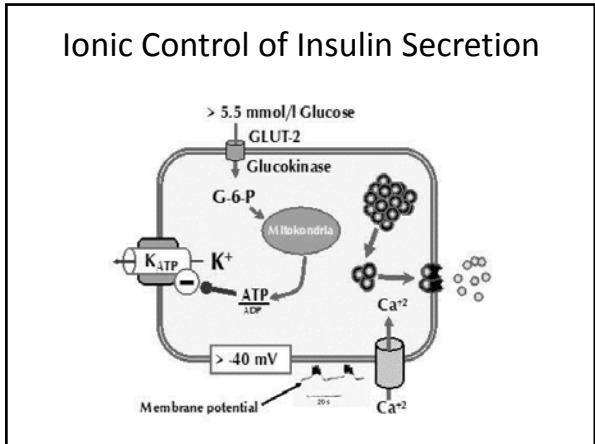
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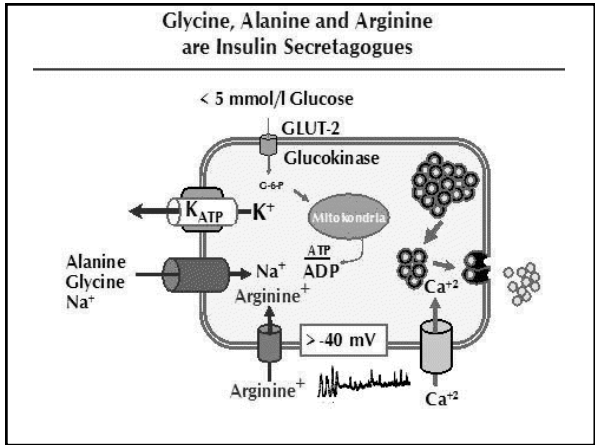
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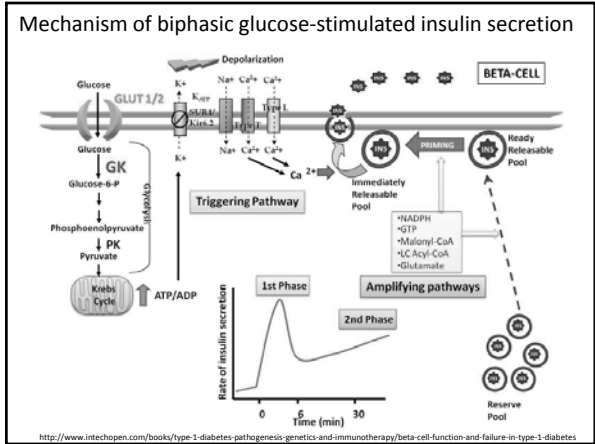
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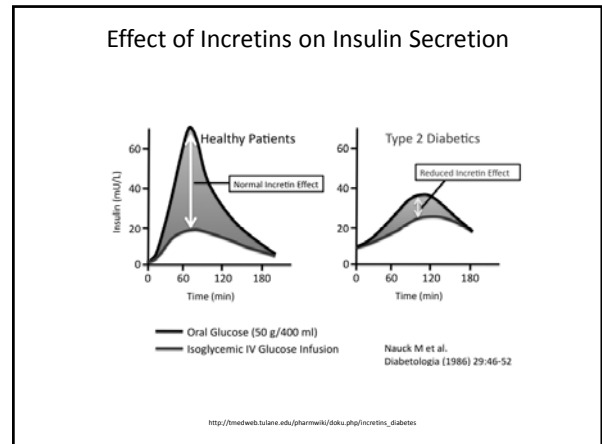
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- ### GLP-1 Actions
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| <p><b>Pancreas</b></p> <ul style="list-style-type: none"> <li>• ↑ Insulin synthesis &amp; secretion</li> <li>• ↓ Glucagon secretion</li> <li>• ↑ β-cell survival</li> </ul> | <p><b>CNS</b></p> <ul style="list-style-type: none"> <li>• ↓ Food intake</li> <li>• ↑ Satiety</li> </ul>   |
| <p><b>Stomach &amp; Intestine</b></p> <ul style="list-style-type: none"> <li>• ↓ Gastric emptying</li> <li>• ↓ Bowel motility</li> <li>• ↓ Acid secretion</li> </ul>        | <p><b>Liver/Fat/Muscle (? Indirect)</b></p> <ul style="list-style-type: none"> <li>• ↑ Glucose uptake</li> <li>• ↑ Glycogen synthesis</li> <li>• ↑ Lipogenesis (in fat)</li> </ul> |
- [http://medweb.tulane.edu/pharmwiki/doku.php/incretins\\_diabetes](http://medweb.tulane.edu/pharmwiki/doku.php/incretins_diabetes)

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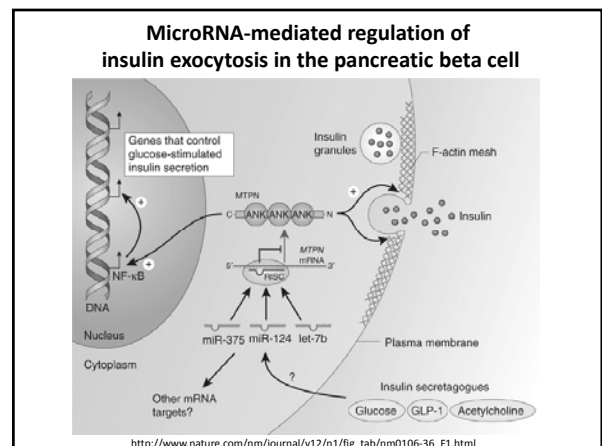
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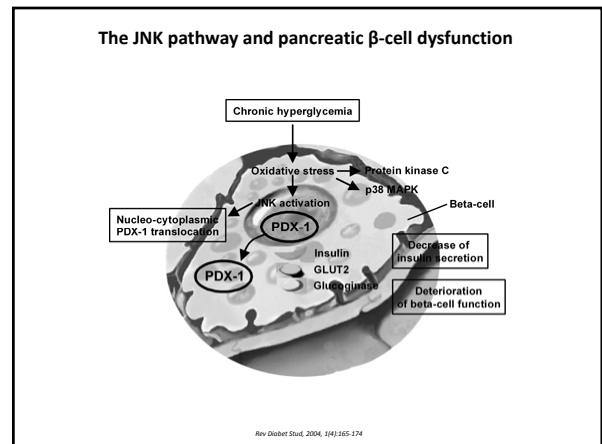
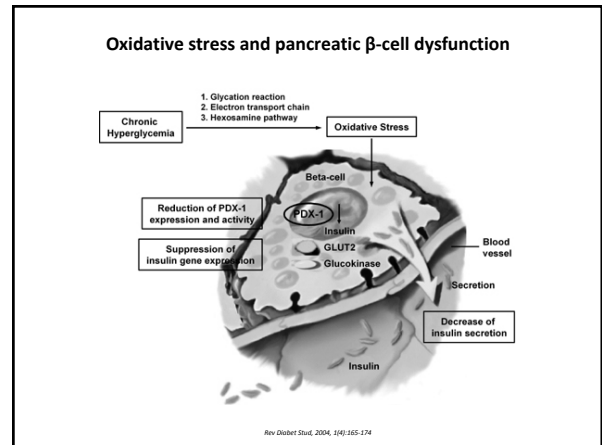
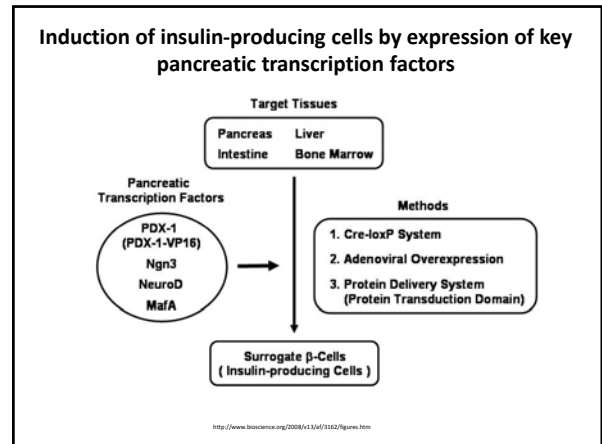
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**Levels of insulin action**

Acute: Glucose and lipid metabolism

Intermediate: Proteins synthesis

Long-acting: Gene expression

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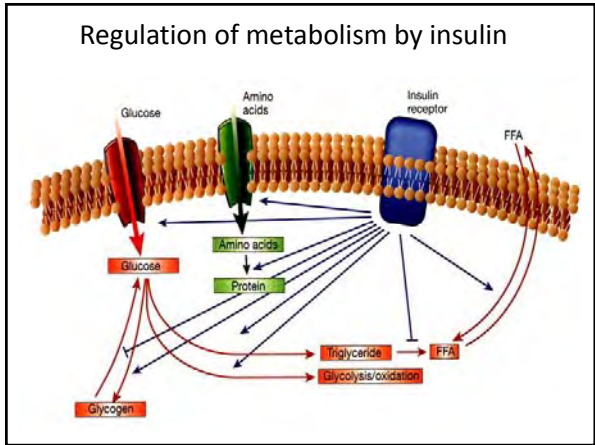
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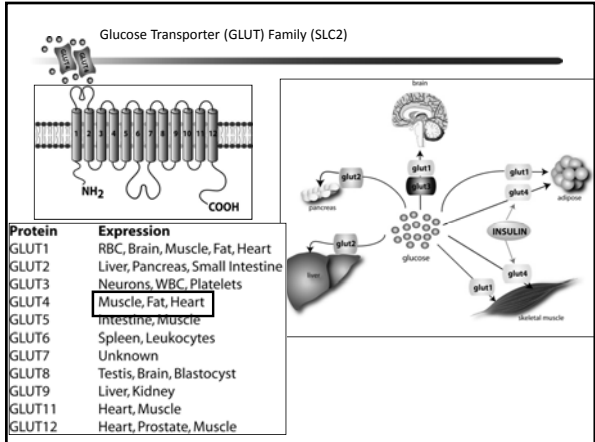
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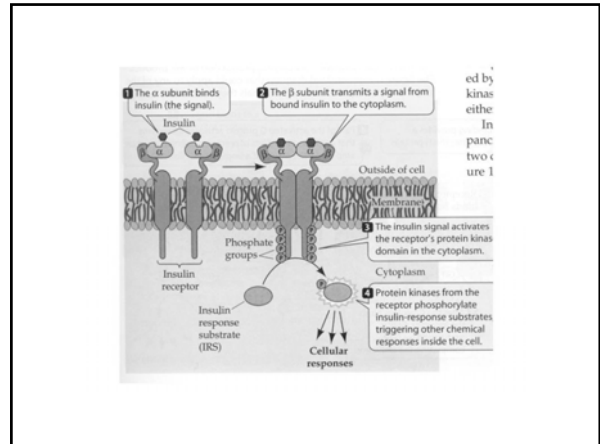
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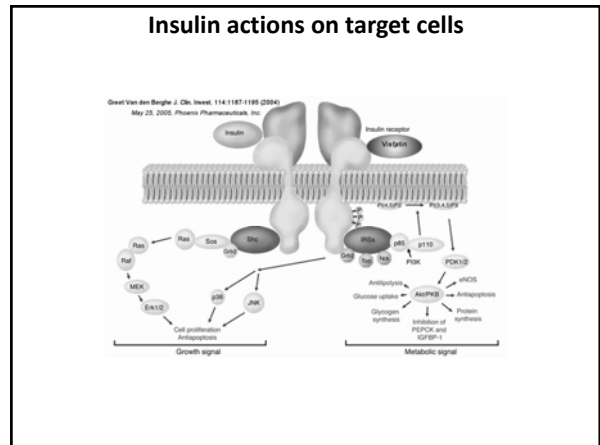
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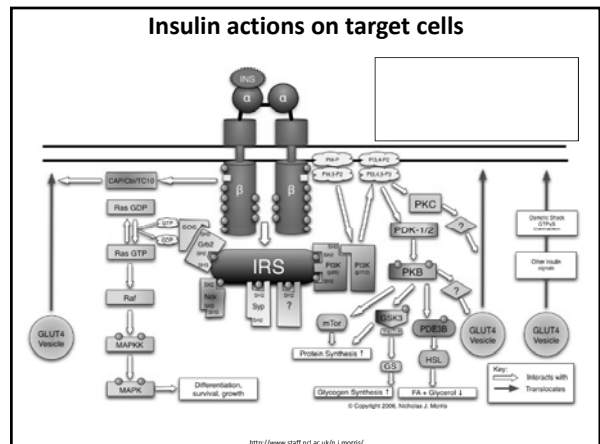
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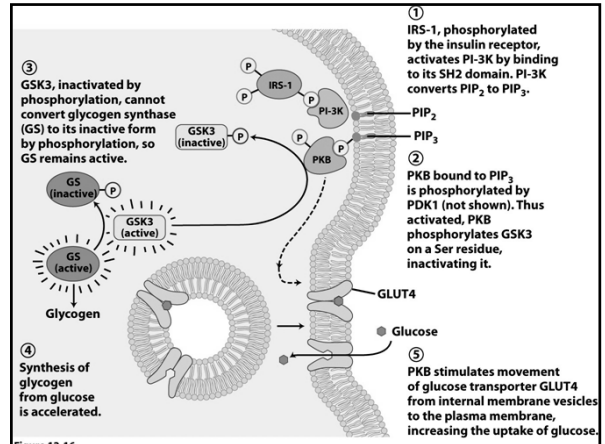
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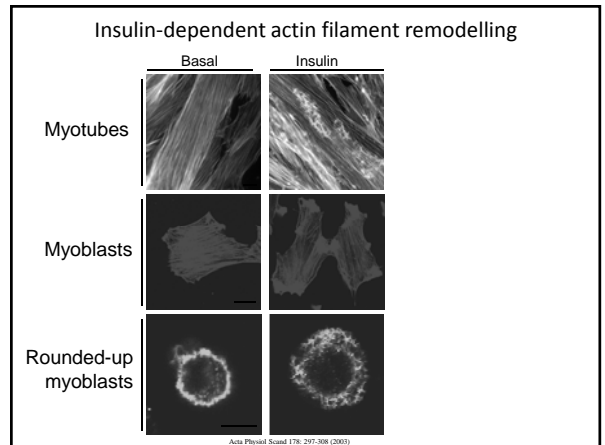
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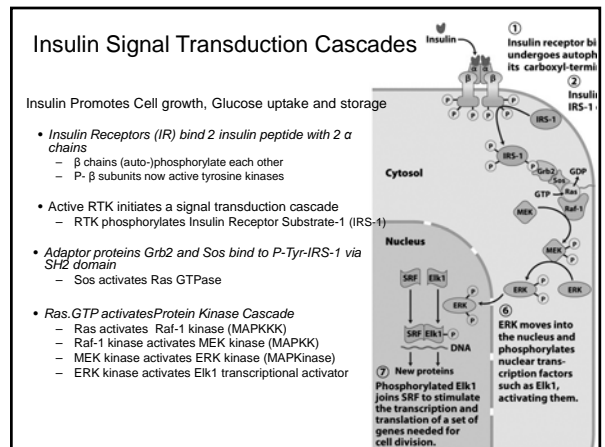
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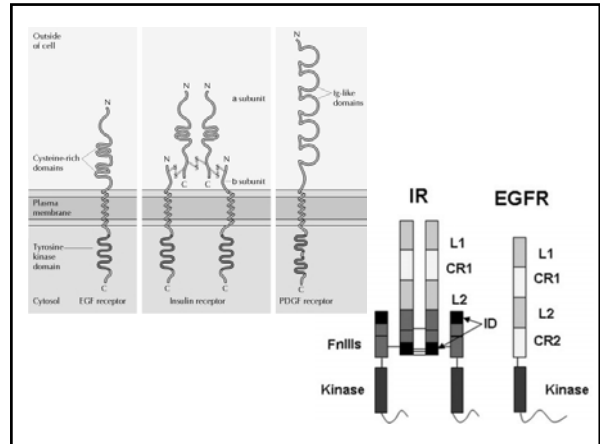
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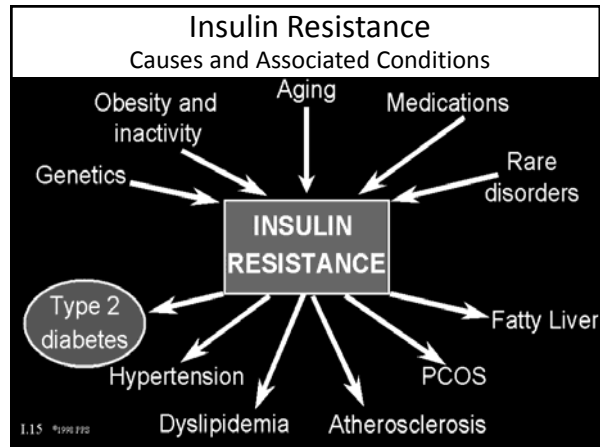
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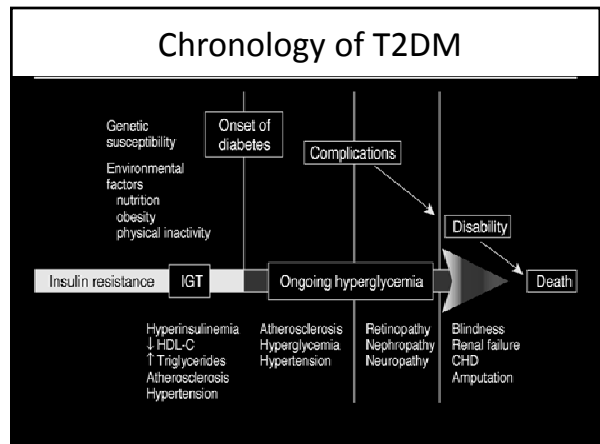
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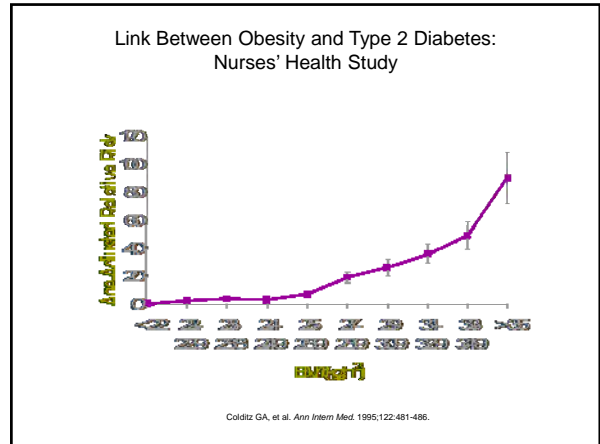
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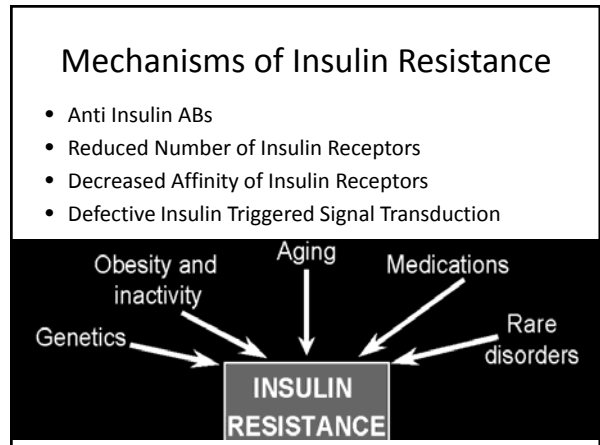
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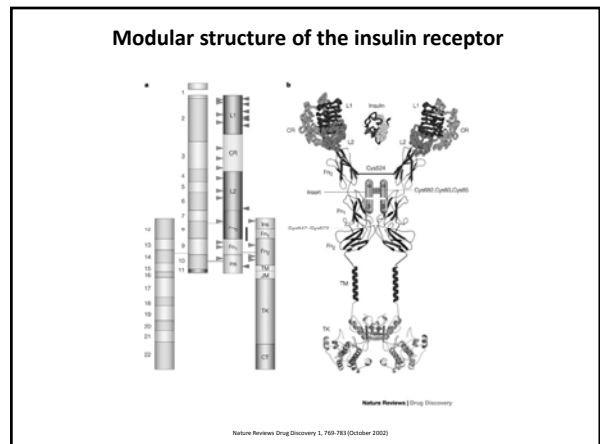
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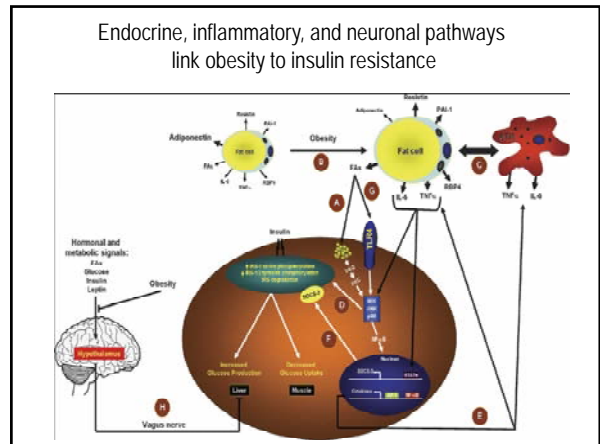
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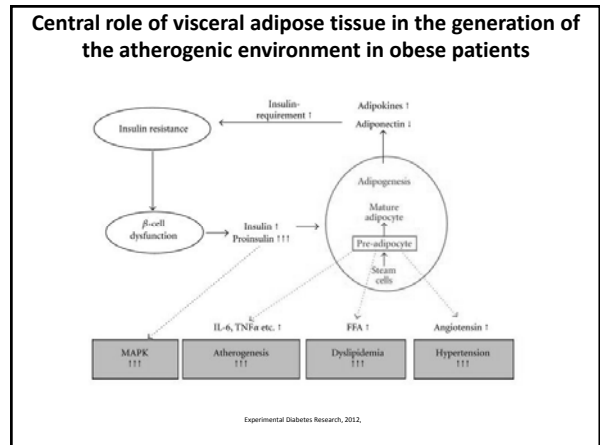
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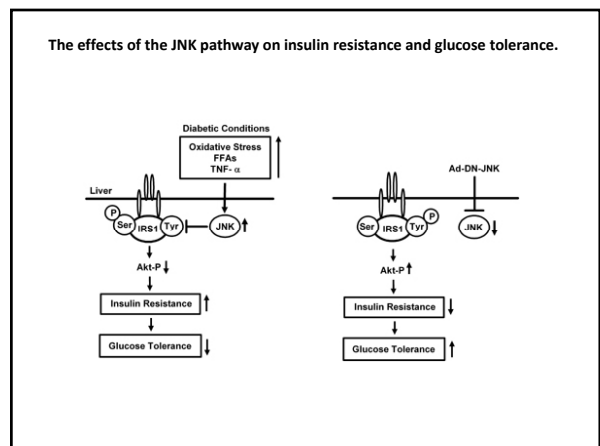
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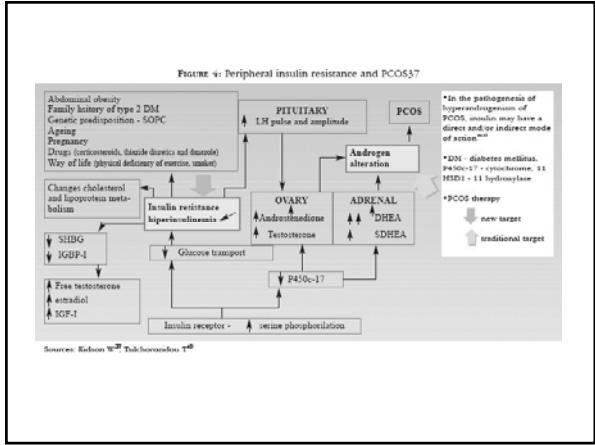
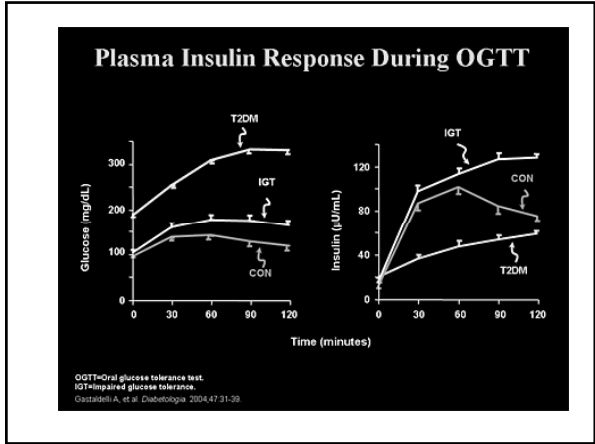
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