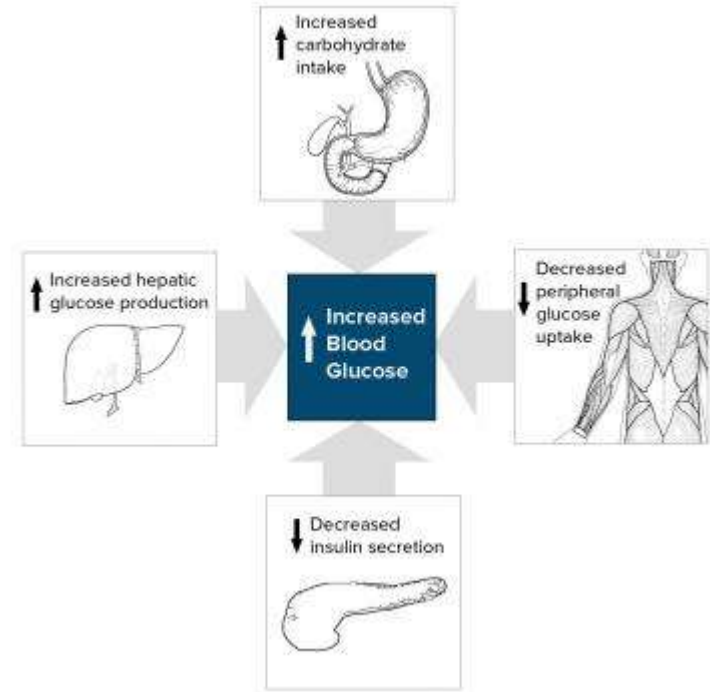

The Effects of Exercise on Diabetes Mellitus Type 2

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Senior Honors Project

Diabetes Mellitus Type 2

- ❑ Chronic Hyperglycemia
- ❑ Insulin Resistance

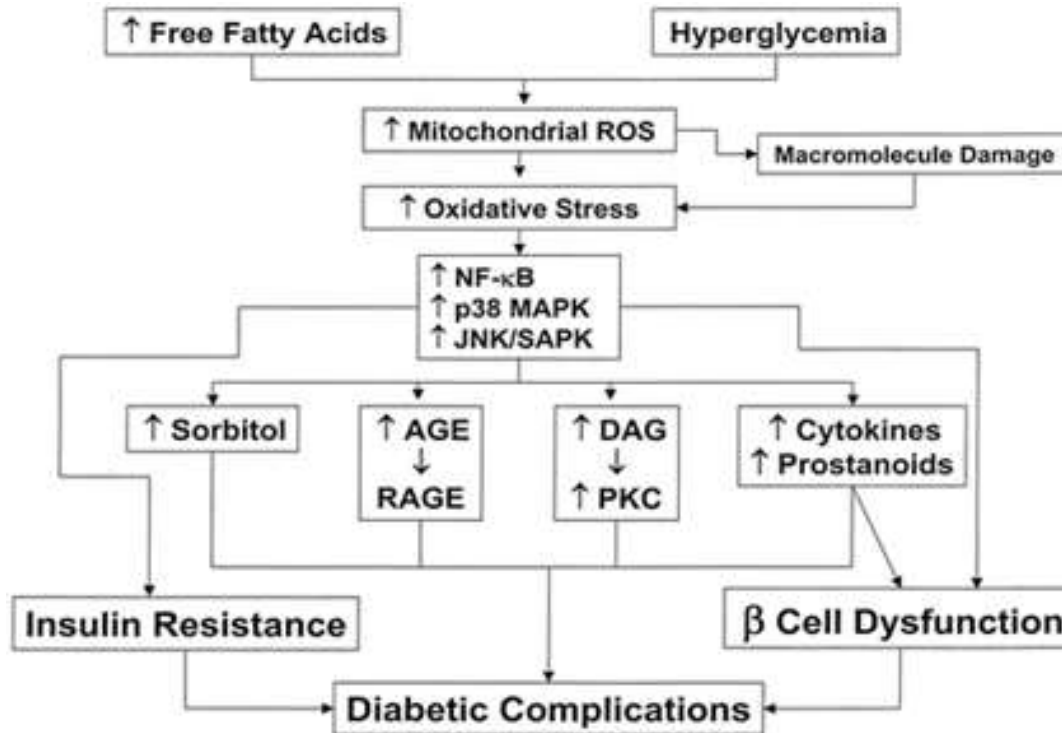


Insulin Resistance

- ❑ Both a risk factor and a symptom
- ❑ Overproduction of insulin leads to desensitization of the cells.
- ❑ 200 or more units of insulin per day to attain glycemic control and to prevent ketosis.
- ❑ Giving more insulin to increase cellular response only increasing insulin resistance.
- ❑ Increased risk of Postprandial Hypoglycemia

Unifying Hypothesis

Biochemical Consequences of Hyperglycemia



Diabetes Mellitus Type 2

Diabetic Complications:

- ❑ Polyuria: increased urine output
- ❑ Polydipsia: Increased thirst
- ❑ Polyphagia: Increased hunger
- ❑ Initial weight loss: Despite increased food intake
- ❑ Later increased fat levels leading to obesity
- ❑ Peripheral Neuropathy: Pain in appendages
- ❑ Hypertension: High blood pressure due to weight gain and electrolyte imbalance
- ❑ Retinopathy: Damaged blood vessels in eyes
- ❑ Fatigue: Lack of glucose uptake for energy
- ❑ Edema: Electrolyte imbalance
- ❑ Delayed/stalled healing
- ❑ Acanthosis nigricans: patches of dark, velvety skin in the folds and creases of their bodies

Literature Reviews

Participants completed specific exercise regimens including:

- Aerobic:
 - Biking
 - Walking
 - Running
- Resistance:
 - Leg extensions
 - Hamstring curls
 - Abdominal and back strengthening exercises
 - Bicep curls and triceps extensions

Measurements:

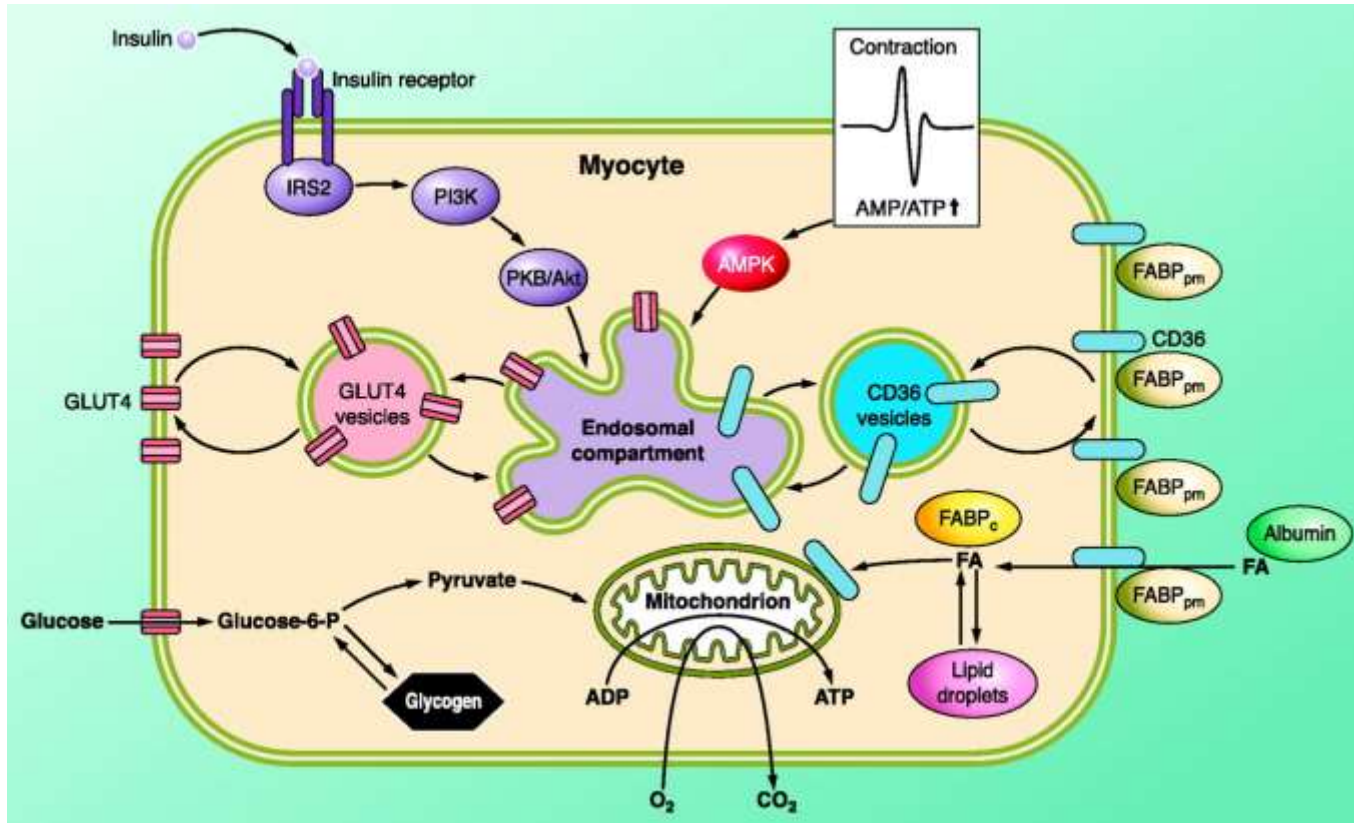
Biochemical:

- Muscle mass
- GLUT4 receptors
- Hypoxia and insulin sensitivity
- Toll like receptors
- Epigenetic testing

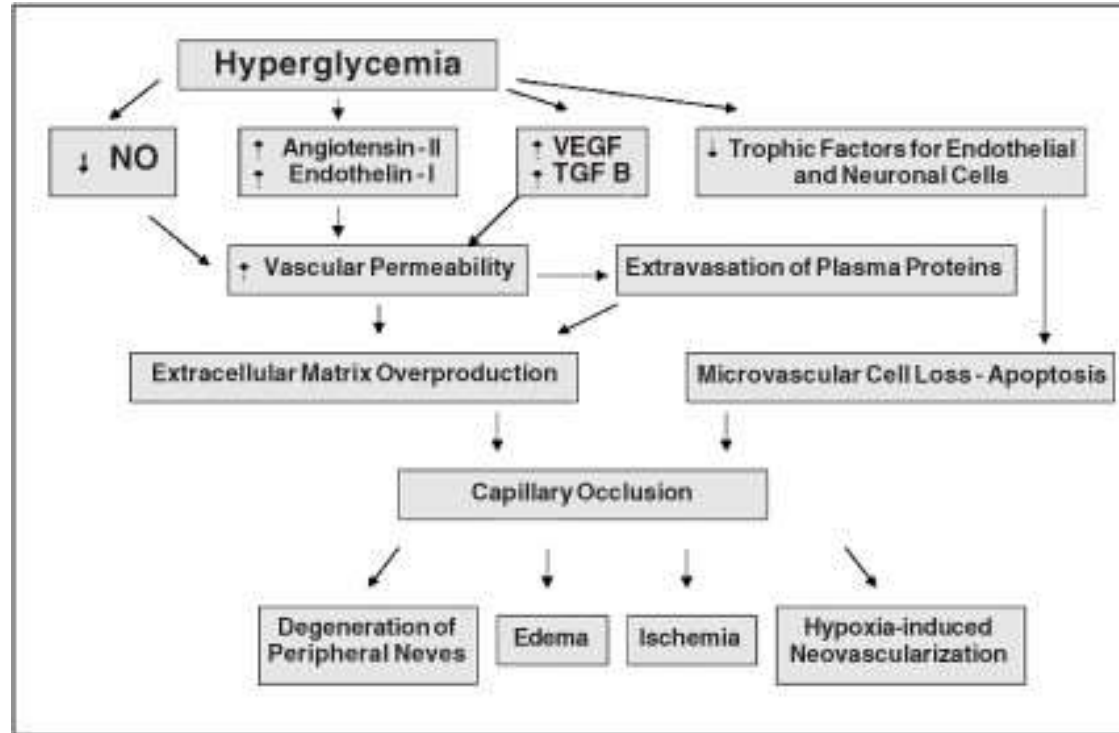
Pathological:

- Peripheral neuropathy
- Endothelial function
- Cardiovascular function
- Plasma Lipocalin-2 involving kidney function
- MMP-9 TIMP-2 involving hypercoagulability

Maintaining Glucose Homeostasis Through Exercise



Pathological consequences of Hyperglycemia



Results

Decreased:

- Resting blood glucose
- Blood pressure
- Adipose tissue levels
- Insulin resistance
- Immune responses
- Inflammatory factors

Increase:

- Muscle mass
- Insulin sensitivity
- VO₂max
- Circulatory function

Conclusions

What does all this mean?

Where do we go from here?

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