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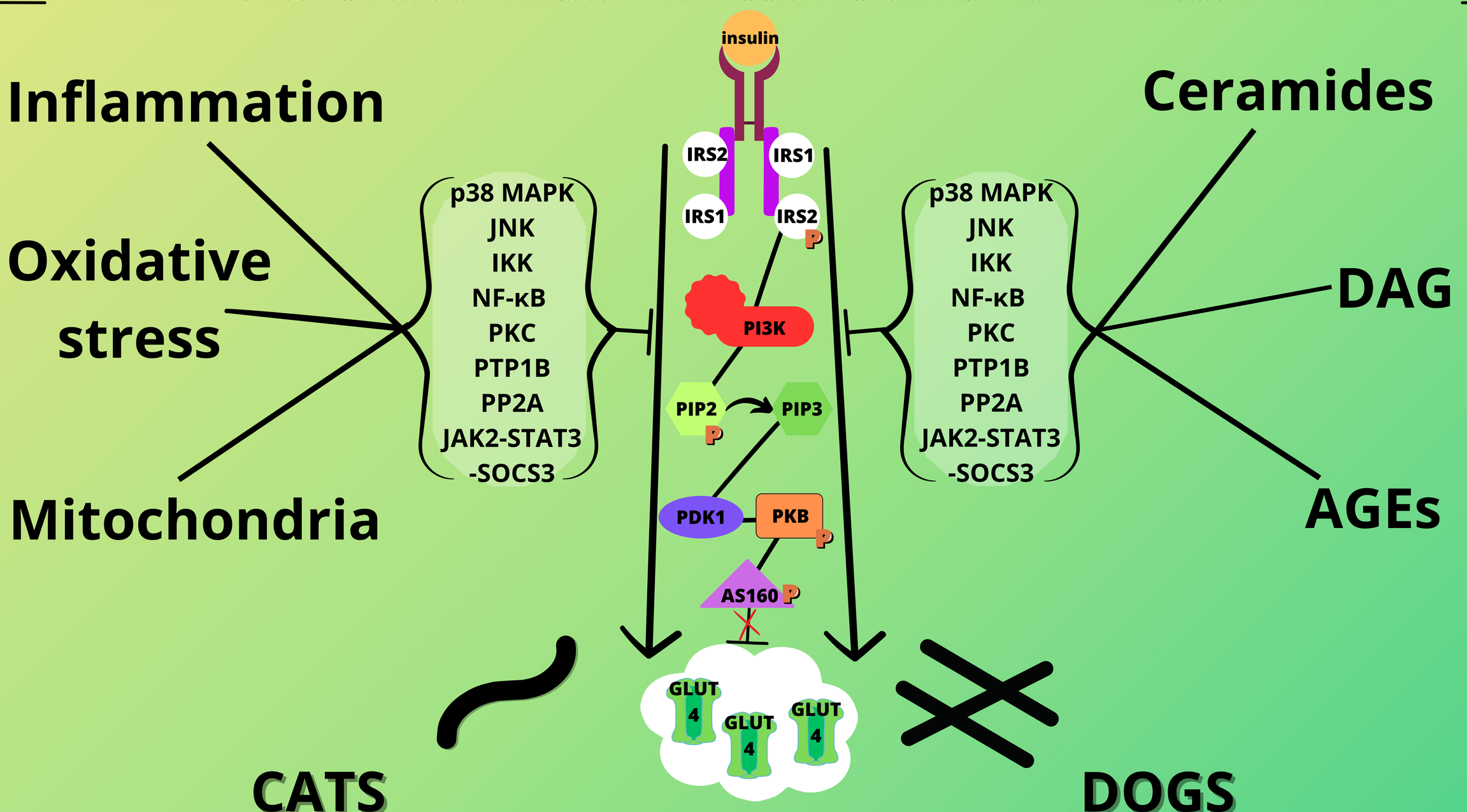
Molecular mechanisms of acquired insulin resistance in humans, dogs, and cats

Objectives:

1. Give a basic explanation of the insulin signal transduction.
2. Explain the main processes and molecules implicated in the development of insulin resistance in humans.
3. Compare the main reasons for acquired insulin resistance in dogs and cats with the ones in humans.



CATS

PERIPHERAL INSULIN RESISTANCE + HEPATIC INSULIN SENSITIVITY

→ BETA CELL DYSFUNCTION

→ HYPERGLYCAEMIA

→ BETA CELL FAILURE + HYPOINSULINEMIA

→ DIABETES MELLITUS

DOGS

CONGENITAL /IMMUNE-MEDIATED BETA CELL LOSS

→ HYPOINSULINEMIA

→ HYPERGLYCAEMIA

→ DIABETES MELLITUS

INSULIN RESISTANCE

→ HYPERINSULINEMIA

→ HYPERGLYCAEMIA

→ BETA CELL LOSS

→ (DIABETES MELLITUS)

Conclusions:

1. The key molecules in order of appearance in insulin signalling are the ones displayed above.

2. Insulin resistance in humans is caused by obesity and inflammation, ceramides and DAG, mitochondrial malfunction, oxidative stress, and AGEs.

3. Insulin resistance in cats is similar to the one in humans, since obesity is the main driving force. In dogs, insulin resistance is observed less and its development to DM has not been proven.