Zucker diabetic fatty (ZDF) rats

Model advantages:
The Zucker Diabetic Fatty (ZDF) rat fed a lipid-rich diet, closely mimics human adult onset of type II diabetes and its related complications. In time, ZDF rats evolve from a model of metabolic syndrome to a type II diabetic rat based on impaired glucose tolerance caused by the inherited obesity gene mutation which leads to insulin resistance.

Pathophysiological features:
Metabolic features

- Age-dependent evolution from insulin resistance to type II Diabetes mellitus (figure 1)
- Variable hyperinsulinemia
- Hyperglycemia
- Hypertriglyceridemia / Hypercholesterolemia

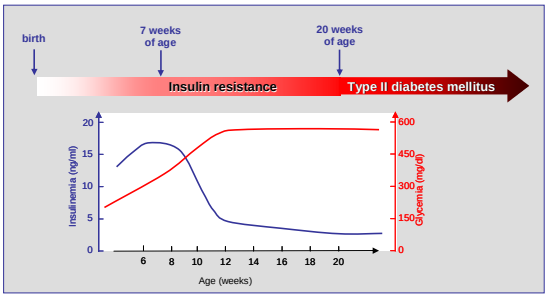

Figure 1: Age-dependent evolution of glucose metabolism in ZDF rats

Cardiovascular features

- Vascular endothelial dysfunction (aorta, superior mesenteric artery, …) from 20 weeks of age (figure 2)

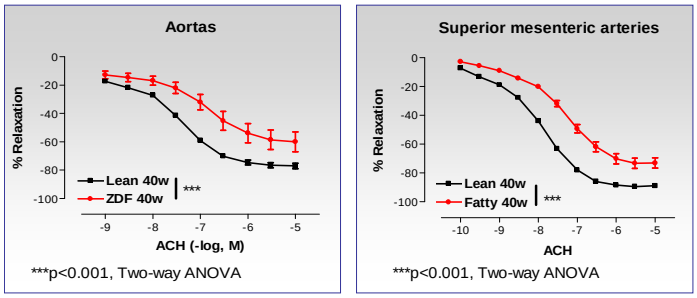

*Figure 2: Comparison of endothelium dependent relaxations in ZDF and in their control (Lean) obtained in in vitro experiments performed in aortic and superior mesenteric artery rings. (2-way ANOVA, ***P<0.001) (Pelvipharm, internal data).*

Other pathophysiological features

- Nephropathy
- Neuropathy
- Blindness
- Impaired wound healing

Summarized methodology:

- ZDF: homozygous for non-functional leptin receptors (ZDF/Gmi fa/fa)
- Lean controls: homozygous for normal receptors remain lean and normoglycaemic (ZDF/Gmi +/?)

Related Pelvipharm bibliography:

Non disclosable information for confidentiality reasons

Links to applicable experimental skills:

- Administration routes / regimen
- Plasma / urine / tissue collection
- In vivo experiments – conscious animals
* Telemetry
* Urine collection - Metabolic cages
* Tail cuff
- Organ bath studies (EFS / Pharmacological studies)
* Animal tissues
- Biochemistry (Plasma / Urine / Tissue)
* Spectrophotometric assays
* Protein expression and activity
- Histology
* Histomorphology
* Histomorphometry
* Oxydative fuorescence
- Immunohistology / Confocal microscopy
* Protein expression – immunohistochemistry / immunofluorescence
* Confocal microscopy