The accelerated biopsy-confirmed ob/ob-NASH mouse model with progressive fibrosis.

**Gubra ob/ob diet-induced and biopsy-confirmed mouse model of NASH with progressive hepatic fibrosis**

The Gubra ob/ob-NASH mouse model exhibits key hallmarks of metabolic-associated NASH with progressive liver fibrotic development, uniquely identified by baseline liver biopsy and objectively assessed by individual histopathological pre-to-post changes evaluated by clinical-derived NAFLD Activity Score and Fibrosis Stage.

**Key model traits**
- GAN diet high in fat, fructose and cholesterol for 6-12 weeks before study start.
- Genetically-induced obesity and metabolic disease.
- Accelerated onset of biopsy-confirmed steatosis and fibrosis.
- Rapid progression to bridging fibrosis (stage F3).
- Clinical histopathological endpoints (pre-to-post).
- Prophylactic and therapeutic evaluation of drug efficacy.

### Study outline

**Diet**
- 40% fat (palm oil)
- 40% carbohydrates (20% fructose)
- 2% cholesterol

**Strain**
- Male B6.V-Lepob/JRj mice

**Gubra Amylin NASH (GAN) diet; D09100310 Research diets.**
Hallmarks of NASH and mild fibrosis developed after 6 weeks on diet.

---

**Assay/Histology**

**Chronic repeated dosing (SC/PO, QD/BID)**
- Body weight (QD)
- Food intake (QD week 1-2)
- Food intake (QW (24h) week 3-8/12)

**In vivo study period (GAN diet-maintenance)**
- Chronic repeated dosing (SC/PO, QD/BID)
- Body weight (QD)
- Food intake (QD week 1+2)
- Food intake (QW (24h) week 3-8/12)

**Terminal Biochemistry**
- Liver lipids (TG/TC)
- Liver collagen (HP)

**Liver biopsy histology**
- NAFLD Activity Score (HE) [pre-to-post]
- Fibrosis Stage (PSR) [pre-to-post]
- Morphometric image analysis (post):
  - Steatosis (HE)
  - Inflammation (Gal-3) (IHC)
  - Fibrosis (PSR)
  - Collagen (Col1a1) (HE)
  - Activated stellate cells (α-SMA) (IHC)

**Tissue/Blood samples**
- Liver for RNAseq
- Terminal plasma for sponsor
- Terminal liver for sponsor
Metabolic and biochemical characteristics

Ob/ob-NASH mice develop severe obesity-driven hyperinsulinemia and hepatomegaly with pronounced steatosis and elevated biomarkers of cell injury and fibrosis.

<table>
<thead>
<tr>
<th></th>
<th>CHOW C57</th>
<th>ob/ob-NASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (g)</td>
<td>28.3 ± 0.8</td>
<td>69 ± 1</td>
</tr>
<tr>
<td>Liver weight (g)</td>
<td>1.3 ± 0.1</td>
<td>6.9 ± 0.3</td>
</tr>
<tr>
<td>Plasma insulin (pmol/l)</td>
<td>336 ± 39</td>
<td>2,089 ± 370</td>
</tr>
<tr>
<td>Plasma ALT (U/L)</td>
<td>29.5 ± 1.9</td>
<td>959 ± 93</td>
</tr>
<tr>
<td>Plasma total CK-18 (ng/ml)</td>
<td>0.11 ± 0.02</td>
<td>4.9 ± 0.3</td>
</tr>
<tr>
<td>Liver triglycerides (mg/g tissue)</td>
<td>7.4 ± 0.7</td>
<td>55 ± 0.2</td>
</tr>
<tr>
<td>Liver hydroxyproline (µg/mg tissue)</td>
<td>0.03 ± 0.01</td>
<td>0.1 ± 0.01</td>
</tr>
</tbody>
</table>

Clinical histopathological scores

Application of clinical-derived NAFLD Activity Score (NAS) and Fibrosis Stage (Kleiner, 2005). NAS is a composite score of steatosis, lobular inflammation and ballooning degeneration.

All features are assessed using our in-house developed deep learning based APP (GHOST - Gubra Histopathological Objective Scoring Technology).

Find more information on GHOST here.

Histomorphometric evaluation of steatohepatitis and fibrosis

Terminal endpoints include quantitative assessment of steatosis, inflammation and fibrosis in addition to histopathological scoring (pre-to-post).
Individual pre-to-post NAFLD Activity Score and Fibrosis Stage

Assessment of pre-to-post NAFLD Activity Score and Fibrosis stage allows for evaluation of individual treatment effects on liver histopathology. Effect of 12 weeks of treatment with the FXR-TGR5 agonist INT-767.

Histomorphometric evaluation of steatohepatitis and fibrosis

Quantitative assessment of liver steatosis, inflammation and fibrosis by histomorphometric image analysis. Effect of 12 weeks of treatment with the FXR-TGR5 agonist INT-767.