

C001549

Strain Datasheet



DIO-B6-M Mouse

Product ID: C001549

Common Name: DIO-B6-M

Background: C57BL/6Cya

🔗 Strain Description

Obesity is a chronic, recurrent disorder characterized by excessive body weight and fat accumulation. Beyond its impact on physical appearance, obesity poses significant risks for developing a spectrum of complications, including cardiovascular diseases (CVD), gastrointestinal disorders, type 2 diabetes (T2D), musculoskeletal conditions, respiratory disorders, and other related pathologies. Diet-induced animal models, such as the Diet-Induced Obesity (DIO) mouse model, are designed to mimic human obesity through excessive fat accumulation driven by a high-fat diet. These models are indispensable for preclinical studies assessing the efficacy of therapeutic interventions targeting obesity and its associated complications.

The DIO-B6-M model represents a Diet-Induced Obesity (DIO) mouse model, generated by subjecting male C57BL/6Cya mice to a 60% high-fat diet (HFD). These mice exhibit significant weight gain, elevated random blood glucose levels, increased populations of NK cells and macrophages, and elevated blood lipids and liver function markers. This model is highly valuable for investigating metabolic diseases, such as obesity, diabetes, and inflammation, and for evaluating the efficacy of potential therapeutic agents in preclinical studies. The effectiveness of diet-induced obesity (DIO) modeling can be

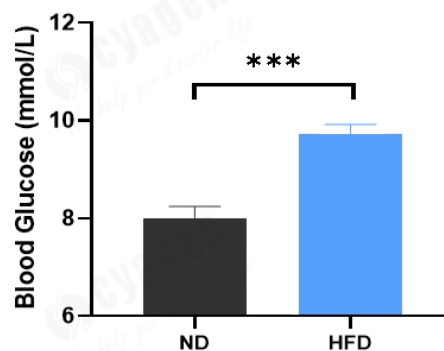
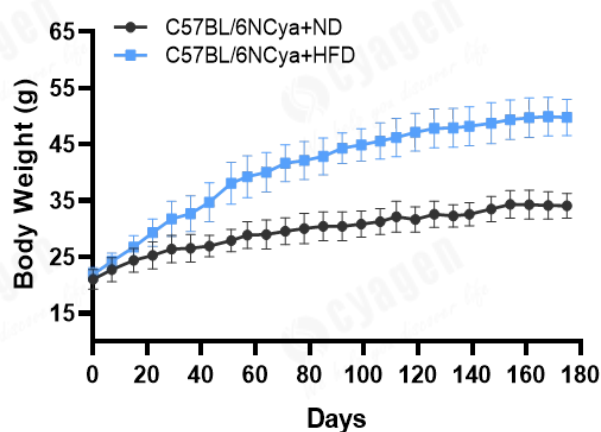
influenced by various factors including diet, strain, condition, and husbandry practices. Some variability between model batches may occur; please contact us for further information.

Application Area

- ① Research on diet-induced obesity, diabetes, inflammation, fatty liver, and other metabolic disorders;
- ② Preclinical evaluation of anti-obesity drugs.

Validation Data

1. Body Weight Changes and Blood Glucose Assay in Mice Fed a 60% High-Fat Diet (HFD)



High fat feeding weeks	35-40g	40g-45g	45g-50g	50g-55g
12w	15%	60%	25%	0%
16w	0%	35%	50%	15%
20w	0%	10%	60%	30%
24w	0%	10%	35%	55%

Figure 1. Weight changes and blood glucose measurements in DIO-B6-M mice ($n_{ND}=10$, $n_{HFD}=20$).

Male C57BL/6NCya mice, aged 4 weeks, were fed a 60% high-fat diet after a 1-week adaptation period.

Body weight was periodically monitored, and random blood glucose levels were measured after 25 weeks of high-fat feeding. The results reveal that compared to the normal diet group (ND), the 60% high-fat diet group (HFD) displayed significant weight gain, with an average body weight of approximately 50g after 25 weeks of high-fat feeding. Additionally, random blood glucose levels were significantly higher in the HFD group compared to the ND group at 25 weeks (Data presented as Mean $\pm$ SD; *** $p<0.001$).

2. Body Composition

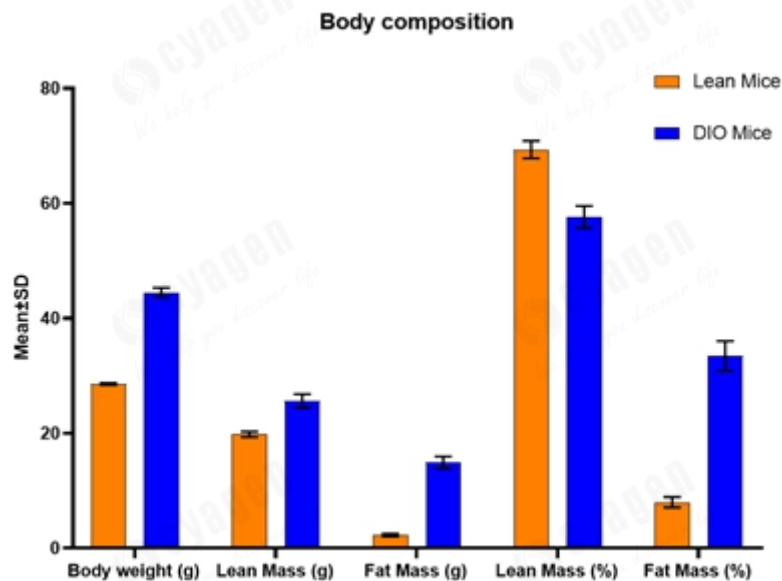


Figure 2. Body composition in Lean and DIO mice. Body composition analysis was performed during diet treatments using a Conscious Small Animal Body Composition Analyzer to assess the fat mass and lean mass of each mouse (n=4).

3. Immune Cell Profiling in Peripheral Blood

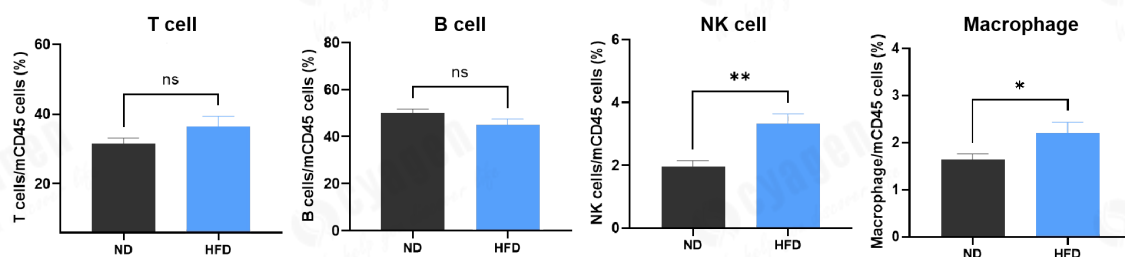


Figure 3. Flow cytometry analysis of immune cells (T cells, B cells, NK cells, and macrophages) in peripheral blood of normal diet (ND) and 60% high-fat diet (HFD) fed mice after 25 weeks (n=10).

The results indicate that DIO-B6-M mice exhibit a significant increase in NK cells and macrophages after

25 weeks of high-fat feeding, suggesting an enhanced inflammatory response (Mouse weight range for analysis: 50–55g; Data presented as Mean±SD; * $p < 0.05$, ** $p < 0.01$).

4. Blood Biochemistry

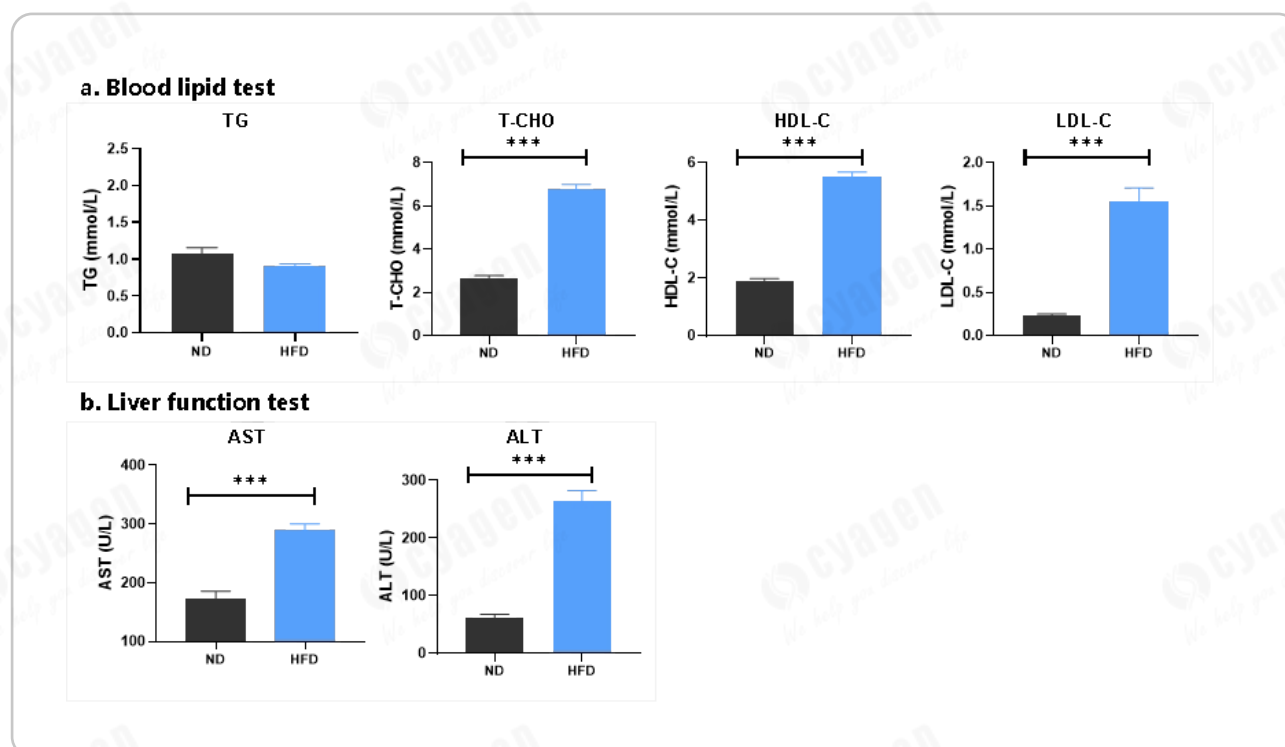


Figure 4. Blood lipid and liver function indicators in normal diet (ND) and 60% high-fat diet (HFD) fed mice after 25 weeks of dietary induction* ($n_{ND}=10$, $n_{HFD}=20$). The results show that After 25 weeks, DIO-B6-M mice exhibited significant elevations in T-CHO, HDL-C, LDL-C, AST, and ALT levels compared to the ND group (Data presented as Mean±SD; ** $p < 0.01$, *** $p < 0.001$).

***TG:** Triglycerides; **T-CHO:** Total cholesterol; **HDL-C:** High-density lipoprotein cholesterol; **LDL-C:** Low-density lipoprotein cholesterol; **AST:** Aspartate aminotransferase; **ALT:** Alanine aminotransferase.

5. Semaglutide Efficacy Validation

(1) Pharmacodynamic studies based on DIO-B6-M mice

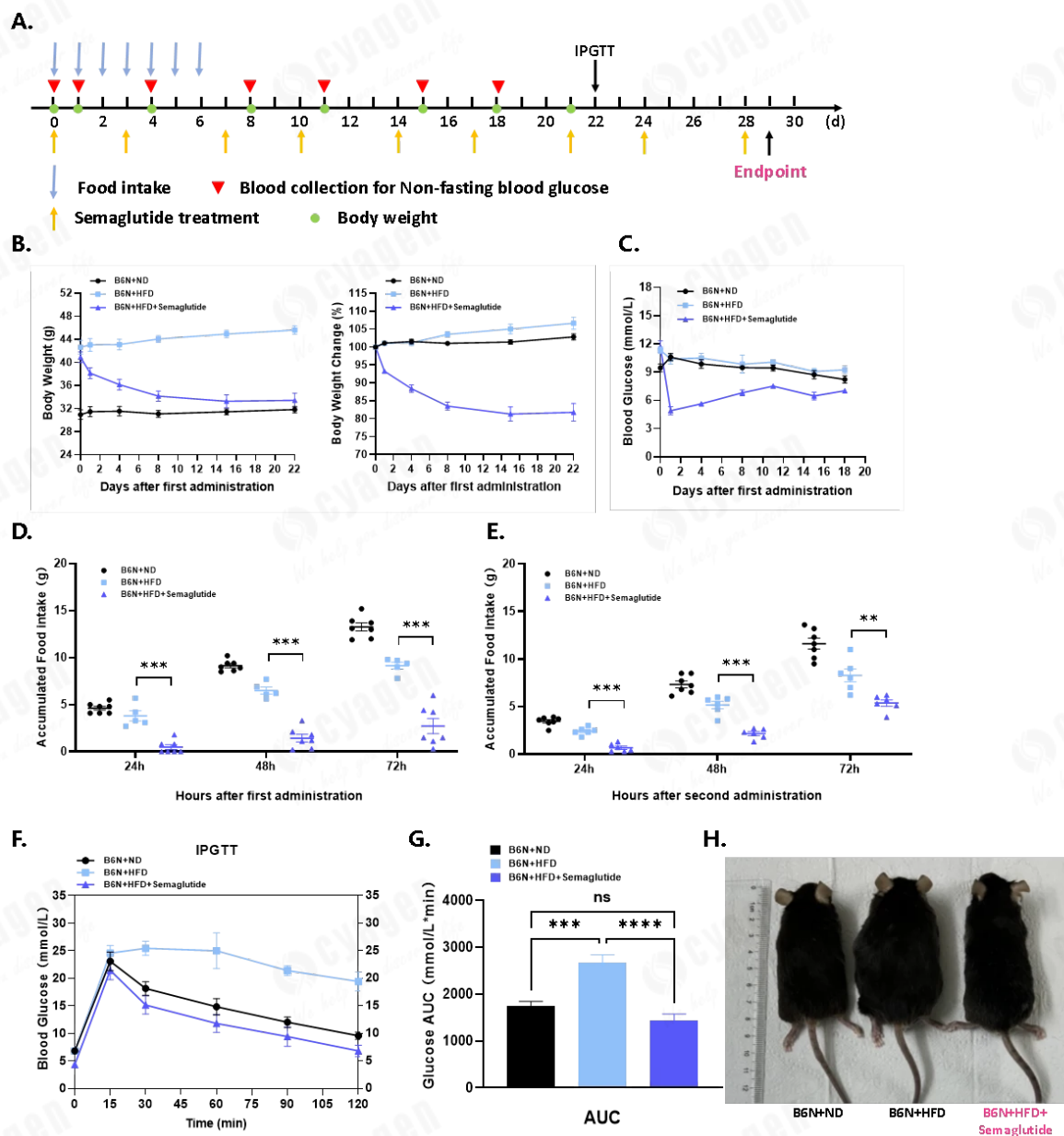


Figure 5. The efficacy of Semaglutide in reducing body weight and blood glucose in DIO-B6-M mice, as well as improving glucose tolerance.

A: After 12 weeks of a 60% high-fat diet, DIO-B6-M mice received subcutaneous injections of 30 nmol/kg Semaglutide twice weekly (30–90 minutes before the dark cycle). Control groups (B6N+ND and B6N+HFD) received equivalent doses of a control solvent. Weight, food intake, and blood glucose levels

were monitored regularly.

B~E: Semaglutide treatment significantly reduced body weight, blood glucose, and food intake in DIO-B6-M mice (n=6).

F~G: Semaglutide significantly improved glucose tolerance in DIO-B6-M mice, with the area under the IPGTT curve (AUC) comparable to the B6N+ND group and substantially lower than the B6N+HFD group (n=6).

H: At the experimental endpoint, DIO-B6-M mice treated with Semaglutide had a leaner body type compared to the B6N+HFD group, with minimal differences compared to the B6N+ND group.

**Semaglutide is an anti-obesity drug with a relatively long half-life [1].*

6. Pharmacodynamic studies based on DIO+CCl₄-induced MASH mice

(1) Modeling Method

C57BL/6J mice are fed a 60% high-fat diet (HFD, Research&Diets #D12492) for 12–16 weeks to successfully establish a diet-induced obesity (DIO) model, characterized by obesity and hyperlipidemia. Subsequently, carbon tetrachloride (CCl₄) is administered for 4–6 weeks to induce liver fibrosis. Semaglutide is subcutaneously injected three times per week. At the study endpoint, parameters such as body composition, serum lipids, and liver pathology are analyzed. Results show significant improvements, including reductions in hyperlipidemia, hepatic lipid accumulation and fibrosis.

(2) Validation Data

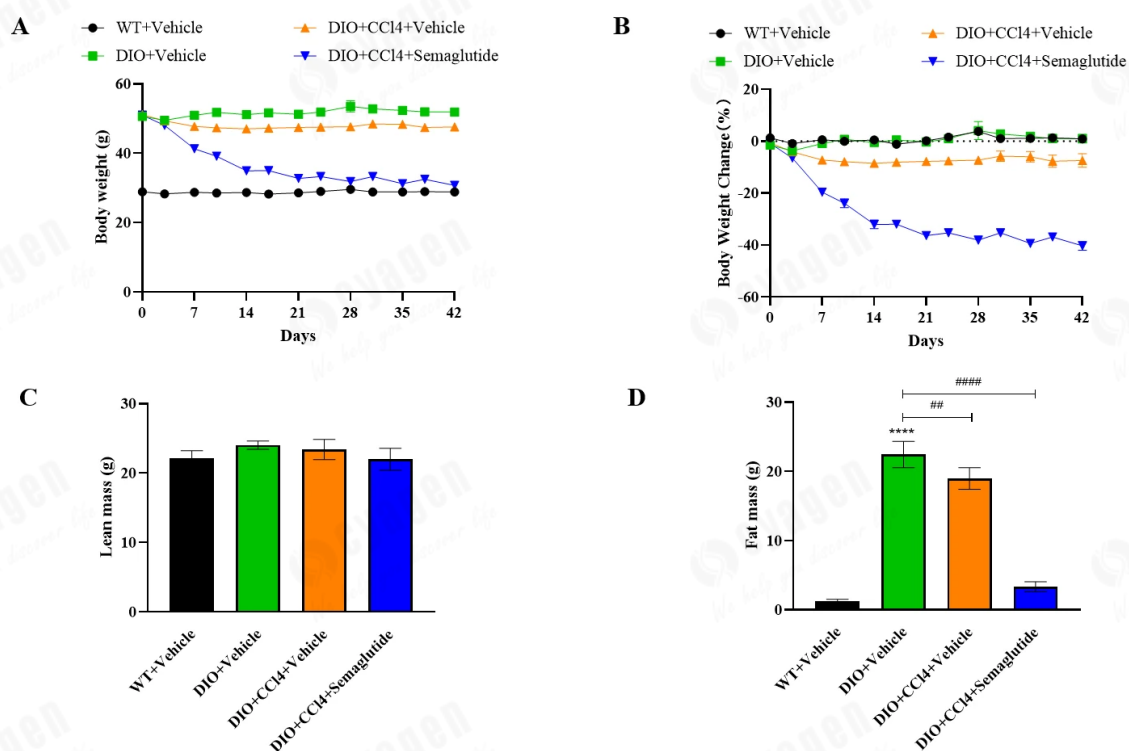


Figure 6. Body Weight and Body Composition Analysis.

Body weight was measured every two days. Semaglutide significantly reduced body weight and fat mass in mice. Data are presented as mean $\pm$ SEM, $n = 5$.

* $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$ compared to the normal diet control group,

$P < 0.05$ and ## $P < 0.001$ compared to the high-fat diet + CCl₄ group, using one-way ANOVA.

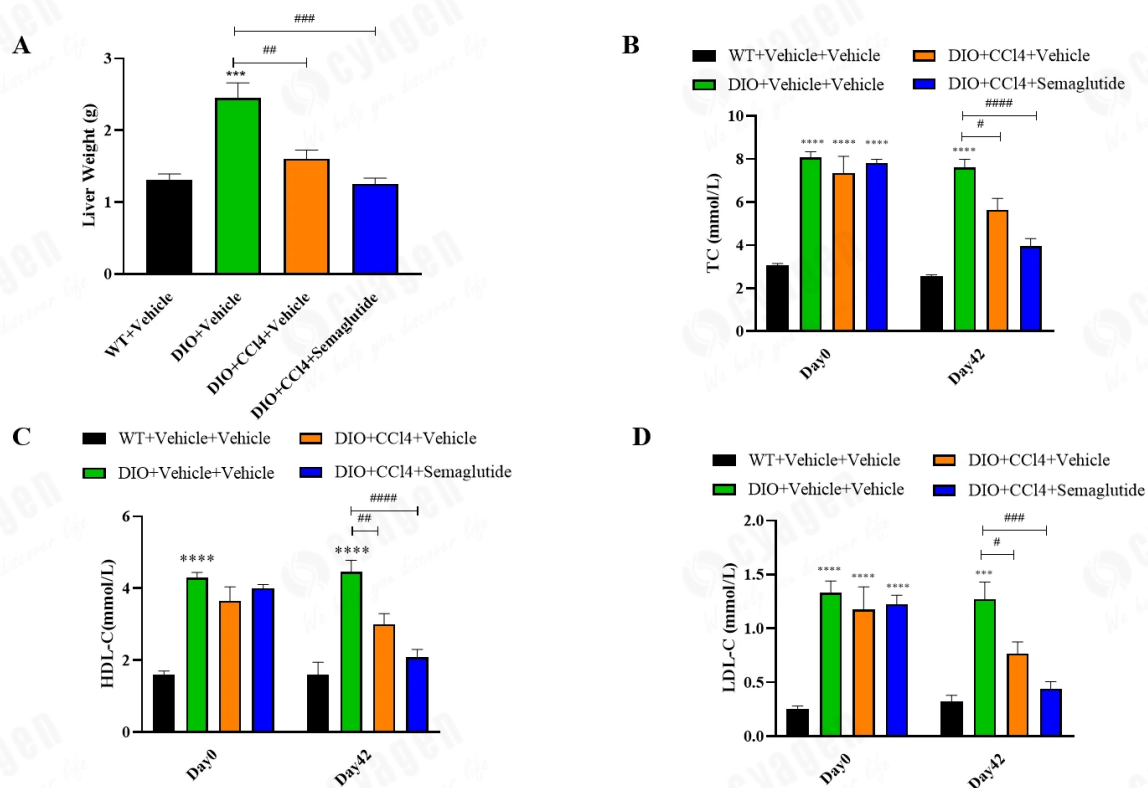


Figure 7. Liver Weight and Serum Lipid Analysis.

Liver weight was measured at the study endpoint, and the Semaglutide group showed a significant reduction in liver weight. After treatment, Semaglutide group significantly alleviated the hyperlipidemia phenotype induced by HFD. Data are presented as mean $\pm$ SEM, $n = 5$.

* $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$ compared to the normal diet control group,

$P < 0.05$ and #### $P < 0.01$ compared to the high-fat diet + CCl₄ group, using one-way ANOVA.

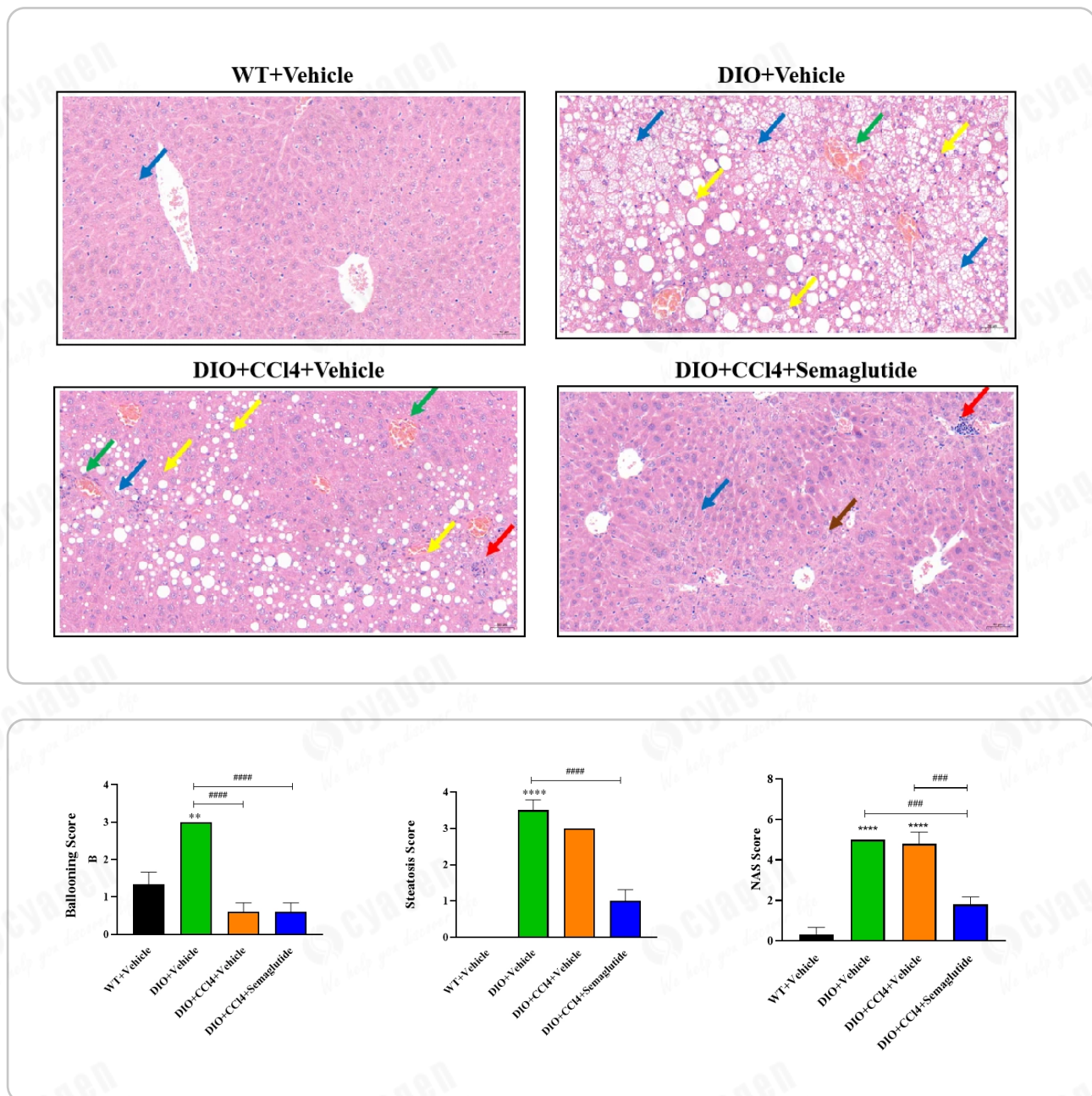


Figure 8. H&E Staining and Histopathological Analysis.

Liver tissues were collected at the study endpoint for histopathological analysis. Compared to the DIO model group, Semaglutide treatment reduced ballooning degeneration and steatosis. Based on composite scoring, the Semaglutide group showed a significant reduction in the NAFLD Activity Score (NAS) compared to the DIO and DIO + CCl₄ groups.

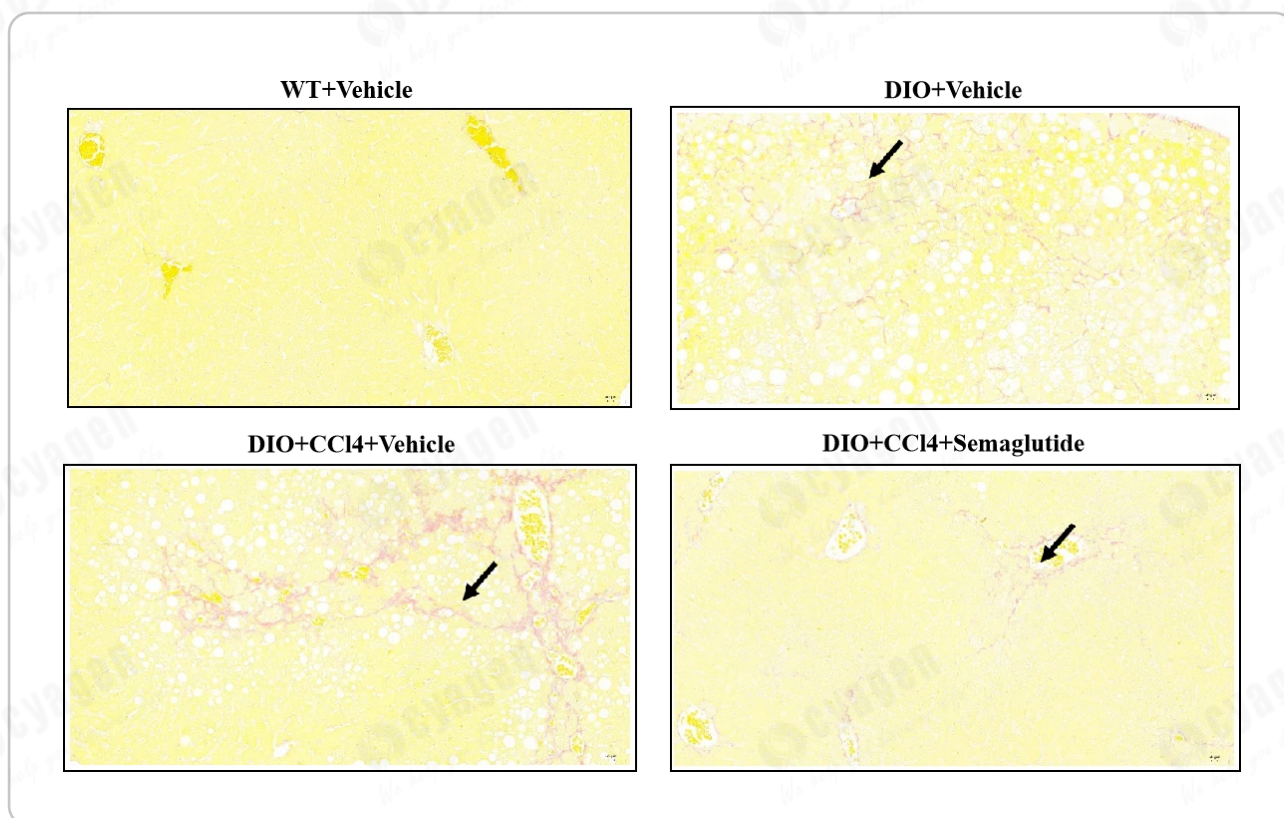
Yellow arrows indicate steatosis, blue arrows indicate hepatocellular ballooning, red arrows indicate

lymphocyte infiltration in various liver regions, green arrows indicate congestion in central and portal veins, and brown arrows indicate occasional fibroblast proliferation.

Data are presented as mean $\pm$ SEM, n = 5.

*P < 0.05, **P < 0.01, and ***P < 0.001 compared to the normal diet control group;

#P < 0.05 and ###P < 0.01 compared to the high-fat diet + CCl₄ group, using one-way ANOVA.



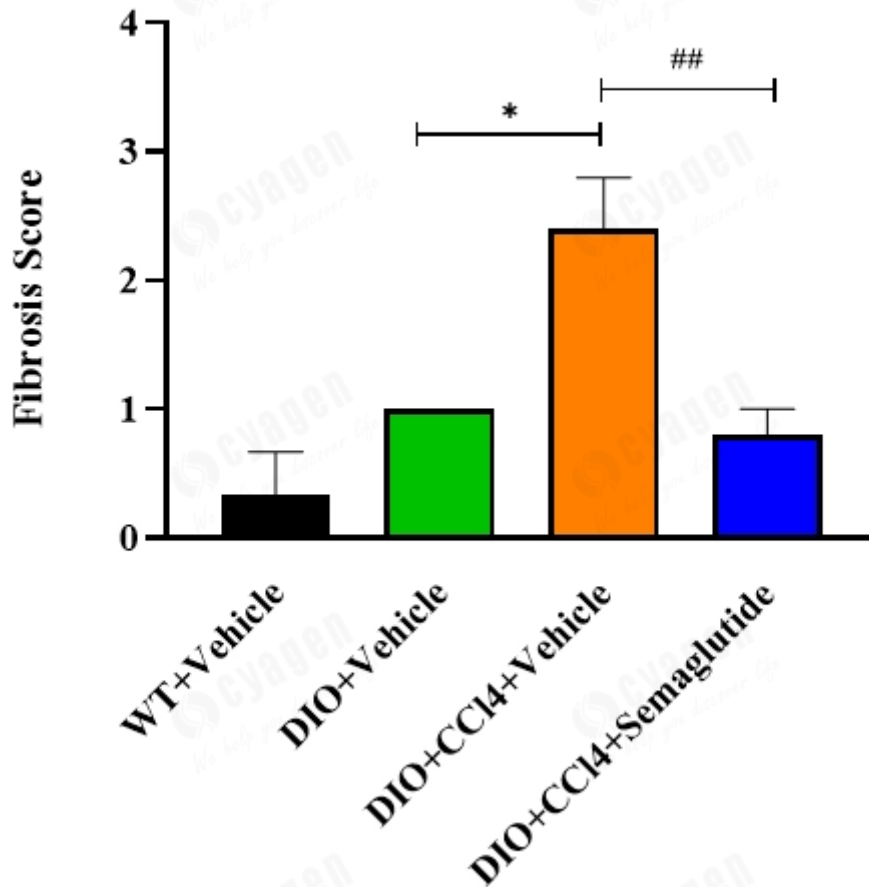


Figure 9. Sirius Red Staining and Pathological Analysis.

Sirius Red staining revealed that the CCl₄ model group exhibited significantly increased fibrosis compared to the DIO model group. Semaglutide significantly reduced CCl₄-induced liver fibrosis.

Black arrows indicate increased collagen fiber proliferation around the central veins in liver tissue.

Data are presented as mean $\pm$ SEM, n = 5.

*P < 0.05, **P < 0.01, and ***P < 0.001 compared to the normal diet control group;

#P < 0.05 and ###P < 0.01 compared to the high-fat diet + CCl₄ group, using one-way ANOVA.

(3) Conclusion of the DIO + CCl₄-Induced MASH Mouse Model

Mice fed a high-fat diet (HFD) for 12–16 weeks (DIO) showed increased body weight and liver weight compared to mice fed a standard diet. Serum levels of TC, HDL-C, and LDL-C were significantly elevated in DIO mice, effectively simulating MASH-like symptoms.

Combining DIO with carbon tetrachloride (CCl₄) accelerated and worsened the pathological progression of the MASH model. CCl₄ shortened the modeling period and exacerbated liver fibrosis in DIO mice.

This model is widely used in preclinical pharmacodynamic studies to evaluate the therapeutic and protective effects of new drugs against MASH. Semaglutide demonstrated both protective and therapeutic effects in the DIO + CCl₄-induced MASH model, effectively reducing steatosis and fibrosis.

(4) Notes

The data presented in this manual were obtained under the internal facility conditions of Cyagen and are for reference only. Actual disease progression in mice may vary, please use this model appropriately based on specific experimental requirements.

Husbandry

Temperature: 20–26 C

Humidity: 40–70 %

Diet: 60% high-fat diet

Modeling Period: Begin high-fat feeding at 4–5 weeks of age, following a 1-week adaptation period (see Table 1). Transition to a complete 60% high-fat diet.

Feed Storage: Store the high-fat diet at –20°C and replace the feed in cages twice a week to prevent spoilage.

Handling Guidelines: Handle mice with care, minimizing noise, vibration, and disturbances to reduce stress, which can help DIO mice maintain appropriate weight.

Bedding Choice: Avoid corn cob bedding, which may cause mice to feel satiated without consuming calories, potentially hindering weight gain. Use wood shavings and nesting paper, changing them weekly in sync with weighing to minimize disturbance.

Assist Dental Health: Due to the softer texture of high-fat diet pellets, provide wooden blocks or similar items in cages to help mice maintain dental health.

Greasy Fur Issue: Late-stage obesity in high-fat-fed mice may lead to slightly greasy fur. Providing nesting material can alleviate this. Some hair loss may occur but typically does not affect weight gain.

Day	Diet
Days 1-3	ND : HFD = 2 : 1
Days 4-5	ND : HFD = 1 : 1
Days 6-7	ND : HFD = 1 : 2

Table 1. High-Fat Diet Adaptation Conditions.

Reference

- [1]. Christou GA, Katsiki N, Blundell J, Fruhbeck G, Kiortsis DN. Semaglutide as a promising antiobesity drug. *Obes Rev.* 2019 Jun;20(6):805–815.

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