

# Diabetic Mouse (db/db)

## BKS.Cg-+ *Lepr<sup>db</sup>*/+ *Lepr<sup>db</sup>*/OlaHsd

Reaching your goals in diabetes and obesity studies can be a challenge or a success depending on the reliability of your research models. The *Lepr<sup>db</sup>* mutation was discovered in 1966 in the inbred BKS mouse strain. This model has since been well characterized as a model of Type 2 diabetes mellitus, exhibiting commonly published metabolic symptoms including hyperglycemia and hyperinsulinemia.

To ensure optimal research outcomes, continue to maintain this model on Teklad Global Diet 2018 (18% Protein Rodent Diet).

### Molecular Characteristics

- *Lepr<sup>db</sup>* is an autosomal recessive mutation on chromosome 4 (14, 24)
- Leptin receptor deficient (2, 4, 23, 27, 32, 41)

### Metabolic Characteristics

- Exhibits obesity (16, 26, 35, 36) at 3-4 weeks of age (14, 24, 29)
- Hyperinsulinemia as early as 10-14 days (14, 16, 24, 26, 29, 30, 35)
- Depletion of islet insulin producing  $\beta$  cells (14, 24)
- Hyperglycemia (7, 16, 18, 26, 35, 40) at 4-8 weeks of age (14, 24, 29)
- Hyperleptinemia (3, 16, 26)
- Hyperphagia (14), polydipsia (14, 24)
- Polyuria, proteinuria (14, 24)
- Hyperlipidemia (17, 18, 40)
- Hypertriglyceridemia (6)
- Insulin resistance (9, 15, 16, 26)
- Hyperglucagonemia (14, 35)
- Decreased metabolic rate (3, 24, 36)

### Immunological Characteristics

- Impaired cellular immunity (2, 4, 23, 25, 27, 41)
- Increased levels of inflammatory cytokines (3)
- Diminished cytokine release (2)
- Hyperglycemia targets glycocalyx permeability (40)
- Nonautoimmune (12)

### Neurological Characteristics

- Peripheral neuropathy (14, 18, 24)
- Degenerating cortical cells (37)
- Defective hypothalamus (14)
- Poor performance in spatial memory tasks (37)

### Cardiovascular Characteristics

- Reduced insulin stimulated glucose uptake in cardiomyocytes (7)
- Cardiac contractile dysfunction (1, 7, 26)
- Decreased cardiac glucose oxidation (1, 16, 26)
- Increased cardiac fatty acid oxidation (1, 15, 16, 26)
- Reduced cardiac efficiency (15, 17)
- Increased susceptibility to ischemia (15, 18, 26)

### Hepatic and Renal Characteristics

- Reduced procollagen, keratin associated protein and keratin complexes gene expression (29)
- Decreased expression of growth hormone (31)
- Increased kidney weight due to hyperfiltration, albuminuria and glomerular hypertrophy (31)

- Thickening of glomerular basement membrane (14)
- Portal endotoxemia (3)
- Hyperphagia (3, 24, 35, 36)
- Disrupted intestinal barrier function (3)
- Decreased levels of forkhead box O1 in kidneys (31)
- Increased nephric and hepatic insulin-like growth factor binding protein 1 mRNA (31)
- Nephropathy (18)
- Enhanced intestinal monoacylglycerol acyltransferase 2 activity (6)
- Pancreatitis (18)
- Increased immunoglobulin and complement in mesangium (14, 24)

### Additional Characteristics

- Infertility (14, 24)
- Diminished growth factor release (2, 29)
- Decreased levels of insulin-like growth factor-1 (2, 31)
- Increased minor glycosylated hemoglobin (14)

### Research Use

- Diabetes mellitus type II (2, 5, 9, 16, 18, 21, 29, 31, 34, 35, 40)
- Obesity (6, 19)
- Tissue repair (29)
- Steatosis (3)
- Leptin endocrinology (4, 8, 27, 28, 31, 36, 37)
- Leptin treatment (10, 11, 36)
- Therapeutics (1, 2, 5, 7, 9, 13, 19, 20, 21, 22, 30, 33, 34, 35, 38, 39)



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