



# Strain-Specific Genetic Verification

At Charles River, we understand that misbreeding, mix-ups, and genetic contaminations in your experimental animals can prevent you from achieving valid research results. It is important to verify the exact genetic characteristics of your research models and promptly correct any errors that may be present, so you can have confidence that your research results will be accurate.

To help protect your research investment, Charles River Genetic Testing Services makes genetic verification quick and easy. Because we have already validated a set of standard genotyping assays for several popular rat and mouse models, your samples can quickly be analyzed without assay transfer and validation and the associated fees. In addition, we can provide custom-designed assays for any gene of interest.

## Sex Determination for Mice and Rats

Although this is generally easy to do phenotypically, there are circumstances where a genetic assay is needed. Some examples are characterizing ES cells, tissue samples, and cell lines, working with an X-linked trait, or working with a model that has altered secondary sex characteristics.

## MHC Haplotyping for Mice and Rats

The major histocompatibility complex (MHC) is crucial for regulation of immune responses and discrimination between self and non-self. It mediates transplant and graft rejection and detection of infection. The MHC locus is highly polymorphic. Charles River has assays for the major class II haplotypes of both mice and rats.

## Zucker Rats and ZDF Rats

An autosomal recessive fatty mutation in the leptin receptor arose spontaneously in a line of outbred rats maintained by T. and L. Zucker. The mutation causes alternative splicing of the leptin receptor mRNA, and affected animals show reduced leptin receptor levels and reduced binding of leptin. Homozygous *Lep<sup>fa</sup>* animals gain weight and have an obese phenotype by six weeks of age. Zucker Diabetic Fatty (ZDF) rats arose from a Zucker colony. ZDF rats carry the same *Lep<sup>fa</sup>* mutation and also develop non-insulin-dependent diabetes mellitus. This assay identifies homozygous fatty animals before the obese phenotype is displayed and differentiates between lean wild types and lean heterozygous animals.

## Other Genetic Monitoring Services for Mice and Rats:

- Max-Bax<sup>SM</sup> Speed Congenics
- Background Strain Characterization
- PCR Genotyping
- SNP Analysis
- Zygosity Testing
- Expression Testing
- Molecular Phenotyping

## Sample Submission

The preferred sample type is freshly collected tail tissue (0.5 cm in length) in 70% ethanol, although other tissues may be used. Results are reported within two weeks of sample receipt. Please contact us at (518) 286-0016 to discuss alternative sample types.

## SHROB, SHHF, and JCR Rats

These rat strains contain the corpulent mutation from the Koletsky rat. They have a nonsense mutation in the leptin receptor gene, designated *Lepr<sup>cp</sup>*. The truncated protein lacks both transmembrane and cytoplasmic signaling domains, resulting in a null phenotype. This mutation is distinct from the mutation in the Zucker lines. Animals with this mutation exhibit different patterns of phenotypic expression than animals with the *Lepr<sup>fa</sup>* mutation. This assay identifies homozygous fatty animals before the obese phenotype is displayed and differentiates between lean wild types and lean heterozygous animals.

## SCID Mice

The severe combined immunodeficiency (SCID) phenotype is the result of a spontaneous autosomal recessive mutation. Mice with SCID lack functional T and B lymphocytes and circulating immunoglobulin. Some mice exhibit a leaky phenotype, with low levels of T and B cells and circulating immunoglobulin, so it is important to know the genotype. Charles River has validated an assay to quickly and accurately distinguish between animals that are wild type, heterozygous, and homozygous for this point mutation.

## Nude Mice and Rats

Nude mice and rats lack a thymus, are unable to produce T cells, and are immunodeficient. This phenotype results from the spontaneous autosomal *Foxn1<sup>nu</sup>* and *Foxn1<sup>mu</sup>* point mutations in mice and rats, respectively. Our assays determine whether the animals are wild type, heterozygous, or homozygous for the point mutations.

## ob/ob Mice

The hormone leptin regulates levels of body fat and food consumption. In *ob/ob* mice, a point mutation introduces a premature stop codon, resulting in a truncated leptin molecule. These mice have a slowed metabolism and gain weight rapidly, even on a diet that allows weight maintenance in wild type mice. The phenotype of *ob/ob* mice can vary greatly in mice of different background strains.

## db/db Mice

The leptin receptor gene undergoes alternative splicing to generate four membrane-bound and one soluble form. The *db/db* mice have a truncated leptin receptor, and do not respond to exogenously supplied leptin. They are obese like the *ob/ob* mice, but also hyperglycemic and used as a model of Type 2 diabetes.

## NOD Mice

Non-obese diabetes (NOD) in the mouse closely resembles human Type 1 insulin-dependent diabetes mellitus, a complex disease in which many genes and numerous environmental factors contribute to the phenotype. We use a panel of microsatellite markers linked to diabetes susceptibility alleles and modifier loci to determine the presence or absence of each of fifteen loci known to contribute to this trait.

## Pde6b(rd1) Retinal Degeneration Mice

Mice with mutations in the *Pde6b(rd1)* gene, also called rd1 or rodless retina, become blind at an early age, as the retinal rod cells fail to develop. This is an asset when using these mice as a model for human retinitis pigmentosa. Under other conditions, this mutation can be a liability. At least two defects are known: an intron polymorphism and a nonsense mutation. At this time, no single defect has been identified as the causative agent of rodless retina. Our assays test for both the point mutation and the intron insertion.

