NATURAL MUTANTS

GENETICALLY ENGINEERED MODELS (GEM)

WILD TYPE

NATURAL IMMUNO-DEFICIENT

RAT
Outbred

Sprague Dawley® Hairless Rat

Strain name: Rj:SDH-Dsg4

Type: Mutant outbred rat

Origin: Bayer Schering Pharma AG (Germany) - 2008

Colour and related genotype: Albino rat - Tyr^c/Tyr^c

Breeding: Good breeder, mating scheme: homozygous ♂ x heterozygous ♀ (Homozygous female has a deficient lactation)

Presentation of the model

R. W. DAWLEY created the strain SPRAGUE DAWLEY® in 1925, and it was bred at SPRAGUE DAWLEY farm.

The hairless mutation appeared in a SPRAGUE DAWLEY® colony in 2004; Bazzi et al. studied the development of the hair follicle in individuals that displayed the hairless phenotype. “Hairless” rats have hair shafts shaped like a lance head (“lanceolate”).

This characteristic which presents similarities with other rodents’ hair, led Bazzi et al. to study the gene responsible for this phenotype. During their research, they identified the desmoglein-4 gene (Dsg-4) in chromosome 18.

The nature of the mutation has been shown to be a deletion of 9 exons. The desmogleins (Dsgs), cadherin-type cell adhesion proteins, are involved in the cell’s adhesion process and in the mechanisms of epithelial cell stability and integrity. The mutation may disturb the extracellular interactions of the protein by a defect of fixation of calcium on its calcic reception sites.

There is no observable abnormality in the first stages of hair follicle morphogenesis.
There are however, severe impairments of next steps of internal epithelial sheath and of the formation of the hair shaft.
These are due to a bad proliferation of the hair matrix and to an abnormal differentiation in the pre-cortex region.
This leads to a decrease in size of hair bulbs and to the formation of dysmorphic hair shafts.

Animals with the hairless phenotype show abnormalities in hair and vibrissae growth, and a thickened epidermis, while having a functional immune system (they are immunocompetent). This phenotype appears at the age of 4 weeks and becomes permanent at about 8 – 9 weeks.

Homozygous females have a deficient lactation that prevents them from nursing their young.

Reproductive data*	
Monogamous mating	
Litter size at birth	5.66 (homozygous mutants)
Weaning %	92 (homozygous mutants)
Productivity index	1.39 (homozygous mutants)
Sterility %	1
Gestation time	Between 20 and 23 days

* JANVIER LABS 2011 Data, for an indicative basis

Main application and research fields

COSMETOLOGY DERMATOLOGY

PHARMACOLOGY TOXICOLOGY BY DERMAL ROUTE

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