



p53 knockout rat

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| Model | p53 knockout rat |
| Strain | HsdSage:SD- Tp53 ^{tm1Sage} SD |
| Location | U.S. |
| Availability | Cryopreserved |

Characteristics/husbandry

- + Monoallelic 11 base pair deletion in Tp53
- + Broad tumor spectrum
- + High degree of tumor malignancy
- + Background Strain: Sprague-Dawley

Zygosity genotype

- + Cryopreserved as heterozygous embryos

Research use

- + Xenografts
- + Vaccine development
- + Cancer
- + Autoimmune disease
- + Infectious disease
- + Hematopoiesis

Origin

The p53 knockout rat model was originally created at SAGE Labs, Inc. in St. Louis, MO and distributed out of the Boyertown, PA facility. The line continues to be maintained through the original SAGE Labs animal inventory acquired by Envigo.

Description

Homozygous null Tp53 rats display onset of tumors at ~4 months of age. A high degree of malignancy is observed across a broad spectrum of tumors. Heterozygous rats have a delayed onset of spontaneous tumors, making them valuable for carcinogenicity screening, as well as studying efficacy of chemopreventive and therapeutic treatment.

p53 is a tumor suppressor protein encoded by the Tp53 gene. Its role in cell cycle regulation and stabilization for preventing genome mutation is observable among a wide variety of multicellular organisms, including humans, rodents, frogs, and fish. Heterozygous rats deficient in p53 protein are prone to spontaneous tumors, making them valuable for in vivo screening of carcinogenicity, as well as studying chemopreventive and therapeutic treatment.

Citations

Dai MS, Hall SJ, Vantangoli Policelli MM, Boekelheide K, Spade DJ. Spontaneous testicular atrophy occurs despite normal spermatogonial proliferation in a Tp53 knockout rat. *Andrology*. 2017 Nov;5(6):1141-1152.

McCoy A, Besch-Williford CL, Franklin CL, Weinstein EJ, Cui X. Creation and preliminary characterization of a Tp53 knockout rat. *Dis Model Mech*. 2013 Jan;6(1):269-78.

Zungu-Edmondson M, Shults NV, Wong CM, Suzuki YJ. Modulators of right ventricular apoptosis and contractility in a rat model of pulmonary hypertension. *Cardiovasc Res*. 2016 May 1;110(1):30-9.

Figure 1. Weight and age comparison chart

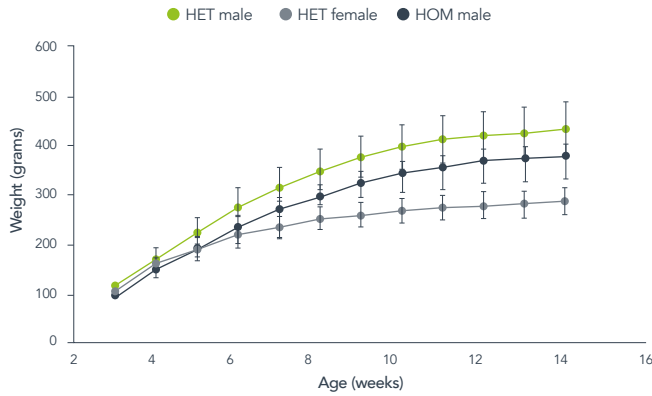


Figure 2. Survival rates of both heterozygous and homozygous p53 null rats (n = 30)

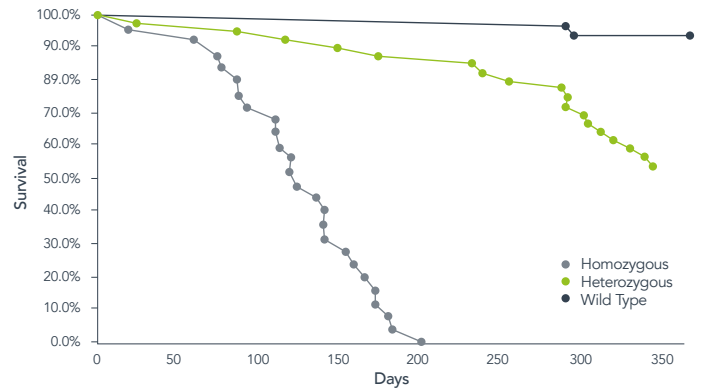


Table 1. Tp53 (+/-) Tumor Spectrum

| ID | Sex | Days Survived | Lesions Identified | Metastasis |
|--------|-----|---------------|--|-----------------|
| Hom 1 | F | 21 | died and not examined | NA |
| Hom 2 | M | 61 | epitheloid hemangiosarcoma – hip | - |
| Hom 3 | F | 76 | lymphoblastic lymphoma of B-cell origin | multiple organs |
| Hom 4 | F | 78 | glioblastoma – brain | - |
| Hom 5 | M | 87 | malignant meningioma (meningeal sarcoma) – brain | - |
| Hom 6 | M | 88 | pulmonary carcinoma – lung | kidney |
| Hom 7 | M | 93 | epitheloid hemangiosarcoma – face | - |
| Hom 8 | M | 110 | lymphoblastic lymphoma of B-cell origin | multiple organs |
| Hom 9 | F | 112 | epitheloid hemangiosarcoma – back | - |
| Hom 10 | M | 114 | rhabdomyosarcoma – thoracic wall | - |
| Hom 11 | F | 120 | diffuse astrocytoma – brain | - |
| Hom 12 | M | 120 | pleomorphic astrocytoma – brain | - |
| Hom 13 | M | 124 | diffuse astrocytoma – brain | - |
| Hom 14 | M | 136 | malignant meningioma (meningeal sarcoma) – brain | - |
| | | | osteosarcoma – scapula | lung |
| Hom 15 | M | 141 | lymphoblastic lymphoma of B-cell origin | multiple organs |
| | | | rhabdomyosarcoma – back | - |
| Hom 16 | M | 141 | osteosarcoma – spine | - |
| Hom 17 | F | 142 | mammary adenocarcinoma – mammary gland | - |
| | | | epitheloid hemangiosarcoma – pancreas | - |
| Hom 18 | F | 154 | lymphoblastic lymphoma of B-cell origin | multiple organs |
| | | | mammary carcinoma – mammary gland | - |
| | | | Zymbal's gland carcinoma – ear canal | - |
| Hom 19 | M | 160 | malignant meningioma (meningeal sarcoma) – brain | - |
| | | | osteosarcoma – pelvis | lung |
| | | | pleomorphic sarcoma – thoracic wall | - |
| Hom 20 | F | 166 | pleomorphic astrocytoma – brain | - |
| Hom 21 | M | 172 | osteosarcoma – tibia | - |
| Hom 22 | M | 173 | malignant meningioma (meningeal sarcoma) – brain | - |
| Hom 23 | M | 181 | osteosarcoma – skull | - |
| Hom 24 | F | 183 | mammary adenocarcinoma – mammary gland | - |
| | | | malignant meningioma (meningeal sarcoma) – brain | - |
| | | | osteosarcoma – spine | - |
| | | | pleomorphic sarcoma – back muscle | - |

Table 2. Tp53 (-/-) Tumor Spectrum

| ID | Sex | Days Survived | Lesions Identified | Metastasis |
|--------|-----|---------------|--|------------|
| Het 1 | M | 25 | epitheloid hemangiosarcoma – limb | - |
| Het 2 | M | 87 | malignant meningioma (meningeal sarcoma) – brain | - |
| Het 3 | F | 117 | no cancer detected | - |
| Het 4 | M | 150 | epitheloid hemangiosarcoma – thoracic wall | - |
| | | | diffuse astrocytoma – brain | - |
| Het 5 | M | 175 | liposarcoma – abdomen | lung |
| Het 6 | F | 233 | pleomorphic astrocytoma – brain | - |
| Het 7 | M | 239 | malignant meningioma (meningeal sarcoma) – brain | - |
| Het 8 | M | 255 | no cancer detected | - |
| Het 9 | M | 289 | olfactory neuroblastoma – brain | - |
| Het 10 | M | 291 | squamous cell carcinoma – hip | - |
| Het 11 | M | 291 | osteosarcoma – spine | - |
| Het 12 | F | 302 | olfactory neuroblastoma – brain | - |
| Het 13 | M | 304 | no cancer detected | - |
| Het 14 | M | 312 | diffuse astrocytoma – brain | - |
| Het 15 | F | 319 | olfactory neuroblastoma – brain | - |
| Het 16 | M | 330 | myosarcoma – thoracic wall | - |
| Het 17 | F | 341 | squamous cell carcinoma – dorsal skin | - |
| | | | adrenal cortical adenoma – adrenal gland | - |
| | | | complex pheochromocytoma – adrenal gland | - |
| Het 18 | M | 344 | squamous cell carcinoma – hip | - |
| | | | Zymbal's gland carcinoma – ear canal | - |
| Het 19 | F | 375 | mammary fibroadenoma – mammary gland | - |

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