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Research Models and Services

Outbred Mice

ICR Mouse

Hsd:ICR (CD-1®)

The Hsd:ICR (CD-1®) mouse model is of Swiss origin and descended from the original two male and seven female albino non-inbred mice, imported by the Rockefeller Institute in 1926 from Lausanne, Switzerland. Descendants were distributed worldwide and the Ha/ICR was established in 1948 at the Institute of Cancer Research (ICR). A portion of the Ha/ICR colony was given to the Roswell Park Memorial Institute (RPMI). Charles River Laboratories (CRL) received their nucleus from RPMI in 1959, and caesarean rederived. Harlan obtained breeding stock from CRL in 1983. Harlan became Envigo in 2015.

Characteristics

- + Coat: Albino
- + Litter average: 11.5
- + Docile disposition
- + Excellent reproductive and maternal characteristics
- + High incidence of retinal degeneration (*Pde6b^{rd1}*; 64)

Research Uses

Oncology

- + Antisense oligonucleotide pharmacokinetics (31)
- + Catalase repression (39)
- + Mucositis protection (35)
- + Neutropenia treatment (8, 61)
- + PEGylated liposome treatment (36)

Toxicology

- + Cardioprotection
 - Sildenafil (59)
- + Cardiotoxicity
 - Sildenafil and doxorubicin (26)

- + Cyclophosphamide-induced bladder damage (7, 29)
- + Domoic acid (14)
- + Genotoxicity
 - Salacia oblonga* extract (27)
- + Hepatotoxicity (50)
 - Retinoic acid (54)
- + High-density lipoproteins
 - Brevetoxin (PbTx-3; 78, 79)
- + Pulmonary emphysema
 - Titanium dioxide (12)

Vaccines

- + Antiepileptic (28)
- + Antifungal (4)

Teratology

- + 2,3,7,8-tetrachlorodibenzo-p-dioxin (69)
- + Biotin deficiency (46, 63)
- + Fluconazole (71)
- + Gestational diabetes (25)
- + Hydrazine (3)
- + Hypoxia (30)
- + MG-132 (43)
- + Neural tube defects (25)
- + Reduced-folate carrier (42)

Nutrition

- + Digestion (32)
- + Energy metabolism (62)
- + Fescue toxicosis (33)
- + Intestinal cytokines (80)
- + Lipid metabolism (24, 82)
- + Low-sodium diet and furosemide (85)



Behavior

- + Bar-related behavior (51)
- + Foraging (62)
- + Maternal (9)
- + Predatory behavior (84)
- + Voluntary wheel-running (57)

Immunology

- + Bradykinin B₂ receptor (45)
- + CD4⁺ and CD8⁺ T cells (47)
- + IL-1 β effects (70, 81)
- + Immunogenicity (10, 11, 36)
- + Immunoprotection (55)
- + Pregnancy development (48)

Virology

- + La Cross virus (6)
- + Mouse hepatic virus (60)
- + Mouse parvovirus (2)
- + Mouse polyoma virus (19)
- + Reovirus type 3 (73)

Bacteriology

- + Enterococci (49, 53)
- + *Listeria monocytogenes* (15)
- + *Staphylococcus aureus* (8)
- + *Streptococcus pneumoniae* (67)

Reproduction and Embryology

- + Assisted reproductive technology (2, 60)
- + Embryo development (1, 65)
- + Folate (63)
- + Folliculogenesis (72)
- + Paternal methylation imprints (41)
- + Pregnancy-related hypotension (77)
- + Selective breeding (40)
- + Subfertility due to β B2-crystallin (20)
- + Zona pellucida binding (38, 68)

Drug Abuse

- + Morphine (13, 75)
- + Ethanol consumption (44, 55)
- + Toluene (76)
- + Nicotine (16, 18)
- + Cocaine (17, 50, 57)

Neurology

- + Adult neurogenesis (37)
- + Diet-induced neuropathy (14)
- + Neuropathic and inflammatory pain (17)
- + Pain management (21)

General studies

- + Acupuncture analgesia (74)
- + Assay development (73)
- + Hypoxia preconditioning (85)
- + Muscle atrophy (66)
- + Population genetics (5)
- + Temperature measurement (52)

References

- Acton, B. M., A. Jurisicova, I. Jurisica, and R. F. Casper. (2004). Alterations in mitochondrial membrane potential during preimplantation stages of mouse and human embryo development. *Molecular Human Reproduction*. 10(1):23-32.
- Agca, Y., B. A. Bauer, D. K. Johnson, J. K. Critser, and L. K. Riley. (2007). Detection of mouse parvovirus in *Mus musculus* gametes, embryos, and ovarian tissues by polymerase chain reaction assay. *Comparative Medicine*. 57(1):51-56.
- Air Force Aerospace Medical Research Laboratory. (1980). *Effects of hydralazine on pregnant ICR mice* (Publication No. AFAMRL-TR-80-19). Springfield, VA: National Technical Information Service.
- Al-Abdely, H. M., L. K. Najjar, R. Bocanegra, and J. R. Graybill. (2005). Antifungal therapy of experimental cerebral phaeoophomycosis due to *Cladophialophora bantiana*. *Antimicrobial Agents and Chemotherapy*. 49(5):1701-1707.
- Aldinger, K. A., G. Sokoloff, D. M. Rosenberg, A. A. Palmer, and K. J. Millen. (2009). Genetic variation and population substructure in outbred CD-1 mice: implications for genome-wide association studies. *PLoS One*: 4(3):e4729.
- Anderson, J. R., J. R. Schneider, P. R. Grimstad, and D. W. Severson. (2005). Quantitative genetics of vector competence for La Crosse virus and body size in *Ochlerotatus hendersoni* and *Ochlerotatus triseriatus* interspecific hybrids. *Genetics*. 169:1529-1539.
- Bon, K., C. A. Lichtensteiger, S. G. Wilson, and J. S. Mogil. (2003). Characterization of cyclophosphamide cystitis, a model of visceral and referred pain, in the mouse: species and strain differences. *The Journal of Urology*. 170:1008-1012.
- Boylan, C. J., K. Campanale, P. W. Iversen, D. L. Phillips, M. L. Zeckel, and T. R. Parr, Jr. (2003). Pharmacodynamics of Oritavancin (LY333328) in a neutropenic-mouse thigh model of *Staphylococcus aureus* infection. *Antimicrobial Agents and Chemotherapy*. 47(5):1700-1706.
- Branchi, I., I. D'Andrea, F. Gracci, D. Santucci, E. Alleva. (2009). Birth spacing in the mouse communal nest shapes adult emotional and social behavior. *Physiology and Behavior*. 96:532-539.
- Chambers, T. J., D. A. Droll, Z. Jiang, W. S. M. Wold, and J. A. Nickells. (2007). JE Nakayama/JE SA14-14-2 virus structural region intertypic viruses: biological properties in the mouse model of neuroinvasive disease. *Virology*. 366:51-61.
- Chambers, T. J., Y. Liang, D. A. Droll, J. J. Schlesinger, A. D. Davidson, P. J. Wright, and X. Jiang. (2003). Yellow fever virus/Dengue-2 virus and yellow fever virus/Dengue-4 virus chimeras: biological characterization, immunogenicity, and protection against Dengue encephalitis in the mouse model. *Journal of Virology*. 77(6):3655-3668.
- Chen, H. W., S. F. Su, C. T. Chien, W. H. Lin, S. L. Yu, C. C. Chou, J. J. W. Chen, and P. C. Yang. (2004). Titanium dioxide nanoparticles induce emphysemalike lung injury in mice. *The Journal of the Federation of American Societies for Experimental Biology*. E1732-E1741.
- Cichewicz, D., and S. P. Welch. (2003). Modulation of oral morphine antinociceptive tolerance and naloxone-precipitated withdrawal signs by oral Δ^9 -tetrahydrocannabinol. *The Journal of Pharmacology and Experimental Therapeutics*. 305(3):812-817.
- Colman, J. R., K. J. Nowocin, R. C. Switzer, T. C. Trusk, and J. S. Ramsdell. (2005). Mapping and reconstruction of a domoic acid-induced neurodegeneration in the mouse brain. *Neurotoxicology and Teratology*. 27:753-767.
- Czaprynski, C. J., N. G. Faith, H. Steinberg, and B. Neudeck. (2003). Sodium pentobarbital anesthesia transiently enhances the severity of infection following intragastric, but not intravenous, inoculation of *Listeria monocytogenes* in mice. *Microbial Pathogenesis*. 35:81-86.
- Damaj, M. I., E. C. K. Siu, E. M. Sellers, R. F. Tyndale, and B. R. Martin. (2007). Inhibition of nicotine metabolism by methoxysalen: pharmacokinetic and pharmacological studies in mice. *The Journal of Pharmacology and Experimental Therapeutics*. 320(1):250-257.
- Damaj, M. I., J. Zheng, B. R. Martin, and M. J. Kuhar. (2006). Intracerebral CART (55-102) attenuates hyperalgesia and allodynia in a mouse model of neuropathic but not inflammatory pain. *Peptides*. 27:2019-2023.
- Damaj, M. I., W. Kao, and B. R. Martin. (2003). Characterization of spontaneous and precipitated nicotine withdrawal in the mouse. *The Journal of Pharmacology and Experimental Therapeutics*. 307(2):526-534.
- Drake III, D. R., L. Knoepp, J. K. Actor, and A. E. Lukacher. (2000). Patterns of expression of viral and cytokine gene transcripts during mouse polyoma virus infection. *Combinatorial Chemistry & High Throughput Screening*. 3:329-341.
- DuPrey, K. M., K. M. Robinson, Y. Wang, J. R. Taube, and M. K. Duncan. (2007). Subfertility in mice harboring a mutation in β 2-crystallin. *Molecular Vision*. 13:366-373.
- Fairbanks, C. A., I. J. Psthums, K. F. Kitto, L. S. Stone, and G. L. Wilcox. (2000). Moxonidine, a selective imidazoline/a2 adrenergic receptor agonist, synergizes with morphine and deltorphin II to inhibit substance P-induced behavior in mice. *Pain*. 84:13-20.
- Farkas, M. H., K. H. Weisgraber, V. L. Shepherd, M. F. Linton, S. Fazio, and L. L. Swift. (2004). The recycling of apolipoprotein E and its amino-terminal kDa fragment: evidence for multiple redundant pathways. *Journal of Lipid Research*. 45:1546-1554.
- Farkas, M. H., L. L. Swift, A. H. Hasty, M. F. Linton, and S. Fazio. (2003). The recycling of apolipoprotein E in primary cultures of mouse hepatocytes: evidence for a physiologic connection to HDL metabolism. *Journal of Biological Chemistry*. 278(11):9412-9417.
- Ferramosca, A., V. Savy, L. Conte, S. Colombo, A. W. C. Einerhand, and V. Zara. (2007). Conjugated linoleic acid and hepatic lipogenesis in mouse: role of the mitochondrial citrate carrier. *Journal of Lipid Research*. 47:1994-2003.
- Fine, E. L., M. Horal, T. I. Chang, G. Fortin, and M. R. Loeken. (1999). Evidence that elevated glucose causes altered gene expression, apoptosis, and neural tube defects in a mouse model of diabetic pregnancy. *Diabetes*. 48:2454-2462.
- Fisher, P. W., F. Salloum, A. Das, H. Hyder, and R. C. Kukreja. (2005). Phosphodiesterase-5 inhibition with Sildenafil attenuates cardiomyocyte apoptosis and left ventricular dysfunction in a chronic model of Doxorubicin cardiotoxicity. *Circulation*. 111:1601-1610.
- Flammang, A. M., G. L. Erexson, M. S. Mecchi, and H. Murl. (2006). Genotoxicity testing of a *Salacia oblonga* extract. *Food and Chemical Toxicology*. 44:1868-1874.
- Fraser, C. M., G. J. Sills, G. Forrest, G. G. Thompson, and M. J. Brodie. (1999). Effects of anti-epileptic drugs on glutamine synthetase activity in mouse brain. *British Journal of Pharmacology*. 126:1634-1638.
- Frasier, L., and J. P. Kehrer. (1993). Effect of indomethacin, aspirin, nordihydroguaiaretic acid, and piperonyl butoxide on cyclophosphamide-induced bladder damage. *Drug and Chemical Toxicology*. 16(2):117-133.
- Furukawa, S., J. P. Tinney, K. Tobita, and B. B. Keller. (2007). Hemodynamic vulnerability to acute hypoxia in day 10.5-16.5 murine embryos. *Journal of Obstetric Gynecology Research*. 33(2):114-127.
- Geary, R. S., R. Z. Yu, T. Watanabe, S. P. Henry, G. E. Hardee, A. Chappell, J. Matson, H. Sasmor, L. Cummins, and A. A. Levin. (2003). Pharmacokinetics of a tumor necrosis factor- α phosphorothioate 2'-O-(2-methoxyethyl) modified antisense oligonucleotide: comparison across species. *Drug Metabolism and Disposition*. 31:1419-1428.
- Gurda, G. T., L. Guo, S. H. Lee, J. D. Molkenkin, and J. A. Williams. (2008). Cholecystokinin activates pancreatic calcineurin-NFAT signaling in vitro and in vivo. *Molecular Biology of the Cell*. 19:198-206.
- Hohenboken, W. D., and D. J. Blodgett. (1997). Growth and physiological responses to toxicosis in lines of mice selected for resistance or susceptibility to endophyte-infected tall fescue in the diet. *Journal of Animal Science*. 75:2165-2173.
- Howell, III, G., L. West, C. Jenkins, B. Lineberry, D. Yokum, and R. Rockhold. (2005). In vivo antimuscarinic actions of the third generation anticholinergic agent, desloratadine. *BMC Pharmacology*. 5:13.
- Huang, F. S., C. J. Kemp, J. L. Williams, C. R. Erwin, and B. W. Warner. (2002). The role of epidermal growth factor and its receptor in chemotherapeutic-induced intestinal injury. *American Journal of Physiology: Gastrointestinal and Liver Physiology*. 282(3):G432-G442.
- Judge, A., K. McClintock, J. R. Phelps, and I. MacLachlan. (2006). Hypersensitivity and loss of disease site targeting caused by antibody responses to PEGylated liposomes. *Molecular Therapy*. 13(2):328-337.
- Kempermann, G., H. G. Kuhn, and F. H. Gage. (1997). Genetic influence on neurogenesis in the dentate gyrus of adult mice. *Proceedings of the National Academy of Science*. 94:10409-10414.
- Kerr, C. L., W. F. Hanna, J. H. Shaper, and W. W. Wright. (2002). Characterization of zona pellucida glycoprotein 3 (ZP3) and ZP2 binding sites on acrosome-intact mouse sperm. *Biology of Reproduction*. 66:1585-1595.
- Kwei, K. A., J. S. Finch, E. J. Thompson, and G. T. Bowden. (2004). Transcriptional repression of catalase in mouse skin tumor progression. *Neoplasia*. 6(5):440-448.
- Leroy, P. H., H. Guderley, J. G. Swallow, and T. Garland. (2003). Artificial selection for high activity favors mighty mini-muscles in house mice. *American Journal of Physiology: Regulatory Integrative Comparative Physiology*. 284:433-443.
- Li, J. Y., D. J. L. Murdoch, G. L. Xu, and C. P. Walsh. (2004). Timing of establishment of paternal methylation imprints in the mouse. *Genomics*. 84:952-960.
- Maddox, M., A. Manlapat, P. Roon, P. Prasad, V. Ganapathy, and S. B. Smith. (2003). Reduced-folate carrier (RFC) is expressed in placenta and yolk sac, as well as in cells of the developing forebrain, hindbrain, neural tube, craniofacial region, eye, limb buds, and heart. *BMC Developmental Biology*. 3:6.
- Mailles, J. B., C. Hilliard, M. Lowery, and S. N. London. (2002). MG-132, an inhibitor of proteasomes and calpains, induced inhibition of oocyte maturation and aneuploidy in mouse oocytes. *Cell and Chromosomes*. 1:2.
- McMillen, B. A., and H. L. Williams. (1997). Role of taste and calories in the selection of ethanol by C57BL/6NHSd and Hsd:ICR mice. *Alcohol*. 15(3):193-198.
- Meini, S., P. Cucchi, F. Bellucci, C. Catalani, S. Giuliani, P. Santicoli, and C. A. Maggi. (2007). Comparative antagonist pharmacology at the native mouse bradykinin B2 receptor: radioligand binding and smooth muscle contractility studies. *British Journal of Pharmacology*. 150:313-320.
- Mock, D. M., N. I. Mock, C. W. Stewart, J. B. LaBorde, and D. K. Hansen. (2003). Marginal biotin deficiency is teratogenic in ICR mice. *Journal of Nutrition*. 133:2519-2525.
- Mott, K. R., Y. Osorio, D. J. Brown, N. Morishige, A. Wahler, J. V. Jester, and H. Ghiasi. (2007). The corneas of naive mice contain both CD4+ and CD8+ T cells. *Molecular Vision*. 13:1802-1812.
- Nahum, R., O. Brenner, M. A. Zahalka, L. Traub, F. Quintana, and C. Moroz. (2004). Blocking of the placental immune-modulatory ferritin activates Th1 type cytokines and affects placenta development, fetal growth, and the pregnancy outcome. *Human Reproduction*. 19(3):715-722.
- Nannini, E. C., S. R. Pai, K. V. Singh, and B. E. Murray. (2003). Activity of Tigecycline (GAR-936), a novel glycylcycline, against enterococci in the mouse peritonitis model. *Antimicrobial Agents and Chemotherapy*. 47(2):529-532.
- Ndikum-Moffor, F. M., and S. M. Roberts. (2003). Cocaine-protein targets in mouse liver. *Biochemical Pharmacology*. 66:105-113.
- Nevison, C. M., J. L. Hurst, and C. J. Barnard. (1999). Why do male ICR(CD-1) mice perform bar-related (stereotypic) behavior? *Behavioural Processes*. 47:95-111.
- Newsom, D. M., G. L. Bolgos, L. Colby, and J. A. Nemzek. (2004). Comparison of body surface temperature measurement and conventional methods for measuring temperature in the mouse. *Comparative Medicine*. 43(5):13-18.
- Pai, S. R., K. V. Singh, and B. E. Murray. (2003). In vivo efficacy of the ketolide ABT-773 (Cethromycin) against enterococci in a mouse peritonitis model. *Antimicrobial Agents and Chemotherapy*. 47(8):2706-2709.
- Parthasarathy, R., B. Gilbert, and K. Mehta. (1999). Aerosol delivery of liposomal all-trans-retinoic acid to the lungs. *Cancer Chemotherapy Pharmacology*. 43:277-283.
- Percival, S. S., and C. A. Sims. (2000). Wine modifies the effects of alcohol on immune cells of mice. *Journal of Nutrition*. 130:1091-1094.
- Rawlins, E. L., and B. L. M. Hogan. (2005). Intercellular growth factor signaling and the development of mouse tracheal submucosal glands. *Developmental Dynamics*. 233:1378-1385.
- Rhodes, J. S., G. R. Hosack, I. Girard, A. E. Kelley, G. S. Mitchell, T. Garland, Jr. (2001). Differential sensitivity to acute administration of cocaine, GBR12909, and fluoxetine in mice selectively bred for hyperactive wheelrunning behavior. *Psychopharmacology*. 158:120-131.
- Rowland, N. E., L. J. Farnbauch, and E. C. Crews. (2004). Sodium deficiency and salt appetite in ICR:CD1 mice. *Physiology & Behavior*. 80:629-635.
- Salloum, F., C. Yin, L. Xi, and R. C. Kukreja. (2003). Sildenafil induces delayed preconditioning through inducible nitric oxide synthase-dependent pathway in mouse heart. *Circulation Research*. 92:595-597.
- Scavizzi, F., and M. Raspa. (2004). Tissue distribution and duration of mouse hepatitis virus in naturally infected immunocompetent ICR (CD-1) and immunodeficient athymic nude-nu mouse strains used for ovarian transplantation and in vitro fertilization. *Laboratory Animals*. 38:189-199.
- Scholz, M., M. Ackermann, F. Emmrich, M. Loeffler, and M. Kamrad. (2009). Effectiveness of cytopena prophylaxis for different filgrastim and pegfilgrastim schedules in a chemotherapy mouse model. *Biologics: Targets & Therapy*. 3:27-37.
- Schubert, K. A., L. M. Vaanholt, F. Stavasiu, G. E. Demas, S. Daan, and G. H. Visser. (2008). Female mice respond differently to costly foraging versus food restriction. *The Journal of Experimental Biology*. 211:2214-2223.
- Sealey, W. M., S. L. Stratton, D. M. Mock, and D. K. Hansen. (2005). Marginal maternal biotin deficiency in CD-1 mice reduces fetal mass of biotin-dependent carboxylases. *Journal of Nutrition*. 135(5): 973-977.
- Serfilippi, L. M., D. R. S. Pallman, M. M. Gruebbel, T. J. Kern, and C. B. Spainhour. (2004). Assessment of retinal degeneration in outbred albino mice. *Comparative Medicine*. 54(1):69-76.
- Sobkowitz, H. M., S. M. Slapnick, and B. K. August. (2003). Reciprocal synapses between inner hair cell spines and afferent dendrites in the organ of corti of the mouse. *Synapse*. 50:53-66.
- Stelzer, J. E., and J. J. Widrick. (2003). Effect of hindlimb suspension on the functional properties of slow and fast soleus fibers from three strains of mice. *Journal of Applied Physiology*. 95:2425-2433.
- Tessier, P. R., M. K. Kim, W. Zhou, D. Xuan, C. Li, M. Ye, C. H. Nightingale, and D. P. Nicolau. (2002). Pharmacodynamic assessment of Clarithromycin in a murine model of pneumococcal pneumonia. *Antimicrobial Agents and Chemotherapy*. 46(5):1425-1434.
- Thaler, C. D., and R. A. Cardullo. (1996). The initial molecular interaction between mouse sperm and the zona pellucida is a complex binding event. *The Journal of Biological Chemistry*. 271(38):23289-23297.
- Theobald, H. M., and R. E. Peterson. (1997). In utero and lactational exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin: effects on development of the male and female reproductive system of the mouse. *Toxicology and Applied Pharmacology*. 145:124-135.
- Tian, Z., X. Shen, H. Feng, and B. Gao. (2000). IL-1 β attenuates IFN- γ -induced antiviral activity and STAT1 activation in the liver: involvement of proteasome-dependent pathway. *The Journal of Immunology*. 165:3959-3965.
- Tiboni, G. M., and F. Giampietro. (2005). Murine teratology of fluconazole: evaluation of developmental phase specificity and dose dependence. *Pediatric Research*. 58(1):94-99.

72. Tong, D., J. E. I. Gittens, G. M. Kidder, and D. Bai. (2006). Patch-clamp study reveals that the importance of connexin43-mediated gap junctional communication for ovarian folliculogenesis is strain specific in the mouse. *American Journal of Physiology-Cell Physiology*. 290:290-297.
73. Uchiyama, A., and D. G. Besselsen. (2003). Detection of Reovirus type 3 by use of a fluorogenic nuclease reverse transcriptase polymerase chain reaction. *Laboratory Animals*. 37:352-359.
74. Wan, Y., S. G. Wilson, J. S. Han, and J. S. Mogil. (2001). The effect of genotype on sensitivity to electroacupuncture analgesia. *Pain*. 91:5-13.
75. Wang, D., K. M. Raehal, E. T. Lin, J. J. Lowery, B. L. Kieffer, and E. J. Bilsky, and W. Sadee. (2004). Basal signaling activity of μ opioid receptor in mouse brain: role in narcotic dependence. *The Journal of Pharmacology and Experimental Therapeutics*. 308(2):512-520.
76. Wiley, J. L., A. S. Bale, and R. L. Balster. (2003). Evaluation of toluene dependence and cross-sensitization to diazepam. *Life Sciences*. 72:3023-3033.
77. Wong, A. Y. H., S. Kulandavelu, K. J. Whiteley, D. Qu, B. L. Langille, and S. L. Adamson. (2002). Maternal cardiovascular changes during pregnancy and postpartum in mice. *American Journal of Physiology: Heart and Circulatory Physiology*. 282:918-925.
78. Woofter, R. T., P. C. Spiess, and J. S. Ramsdell. (2005). Distribution of Brevetoxin (PbTx-3) in mouse plasma: association with high-density lipoproteins. *Environmental Health Perspectives*. 113:1491-1496.
79. Woofter, R., M. Y. B. Dechraoui, I. Garthwaite, N. R. Towers, C. J. Gordon, J. Cordova, and J. S. Ramsdell. (2003). Measurement of Brevetoxin levels by radioimmunoassay of blood collection cards after acute, long-term, and low-dose exposure in mice. *Environmental Health Perspectives*. 111:1595-1600.
80. Wu, Y., K. A. Kudsk, R. C. DeWitt, E. A. Tolley, and J. Li. (1999). Route and type of nutrition influence IgA-mediated intestinal cytokines. *Annals of Surgery*. 229(5):662-668.
81. Xing, L., and D. G. Remick. (2005). Mechanisms of dimethyl sulfoxide augmentation of IL-1 β production. *The Journal of Immunology*. 174:6195-6202.
82. Xu, X., J. Storkson, S. Kim, K. Sugimoto, Y. Park, and M. W. Pariza. (2003). Short-term intake of conjugated linoleic acid inhibits lipoprotein lipase and glucose metabolism but does not enhance lipolysis in mouse adipose tissue. *Journal of Nutrition*. 133:663-667.
83. Yang, Q., B. Dixit, J. Wada, Y. Tian, E. I. Wallner, S. K. Srivastva, and Y. S. Kanwar. (2000). Identification of a renal-specific oxidoreductase in newborn diabetic mice. *Proceedings of the National Academy of Science*. 97(18):9896-9901.
84. Zhang, J. X., L. Sun, and M. Novotny. (2007). Mice respond differently to urine and its major volatile constituents from male and female ferrets. *Journal of Chemical Ecology*. 33:603-612.
85. Zhang, S. X. L., J. J. Miller, D. Gozal, and Y. Wang (2004). Whole-body hypoxic preconditioning protects mice against acute hypoxia by improving lung function. *Journal of Applied Physiology*. 96:392-397.

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