

Taconic Biosciences

Leading the Industry in Animal Model Solutions

Unique Platforms

Expertise

☆ Superior Products

Introduction to **Taconic Biosciences**

- Core Strengths
- ► Expertise
- Superior Products
- Unique Platforms
- Customer-Focused Service Platform





Core Strengths

Expertise Superior Products Unique Platforms Customer-Focused Service Platform



Modeling Our Mission

The right animal model holds endless possibilities for drug discovery and advancements in human health. At Taconic Biosciences Inc., we believe providing our customers with the best animal model solutions is the most effective way to drive critical research from idea to cure.

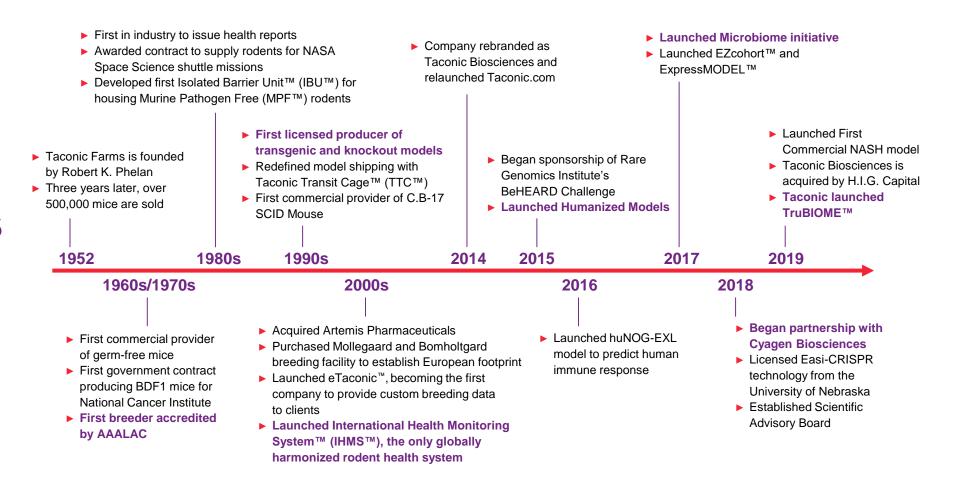
What began as a passionate family business more than 65 years ago has grown to a global ecosystem of laboratories, breeding facilities, distributors, and partners. Each part of our network is on a mission to provide customers with access to the best animal model products and services in the industry. Taconic combines this comprehensive spectrum of capabilities with peer-to-peer scientific expertise to empower customers with solutions.

We are **Models For Life™**





Over 65 Years of Excellence





Global Expertise

Shipping Worldwide to Any Location





Our Customers Are Our Priority

Extensive Resources to Ensure Success





Ecosystem of Support

Cross-Functional Team to Empower Customers with the Best Solution

ACCOUNT MANAGEMENT TEAM

Customer Service Inside Sales Field Sales

SCIENTIFIC EXPERTISE

Field Application Scientists Scientific Program Managers Project Management Geneticists Veterinarians Embryologists

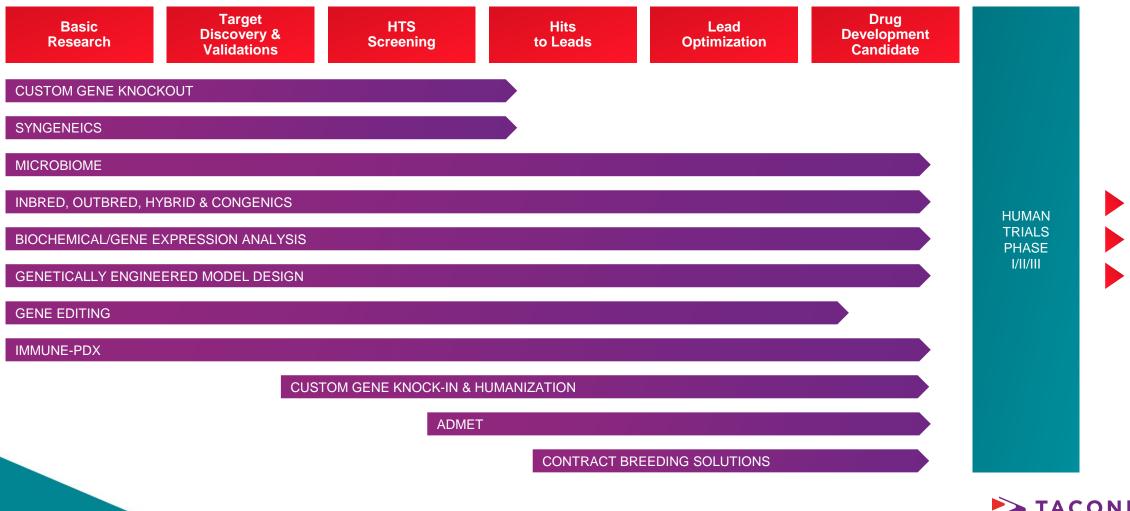
CURATED LIBRARY OF CONTENT

Insight Blog Literature Library White Papers Webinars Publications



Full Spectrum of Solutions

Animal Models and Services for Every Stage of Drug Discovery and Basic Research





High-Value Platform

Full Spectrum of Products and Services

SUPERIOR PRODUCTS

- Standard mice and rat strains
- Immunodeficient mice and rats
- Genetically Engineered Models (GEMs) including easy access to thousands of unique cryopreserved models
- Humanized immune system mice

CUSTOMIZED SCIENTIFIC SERVICES AND EXPERTISE

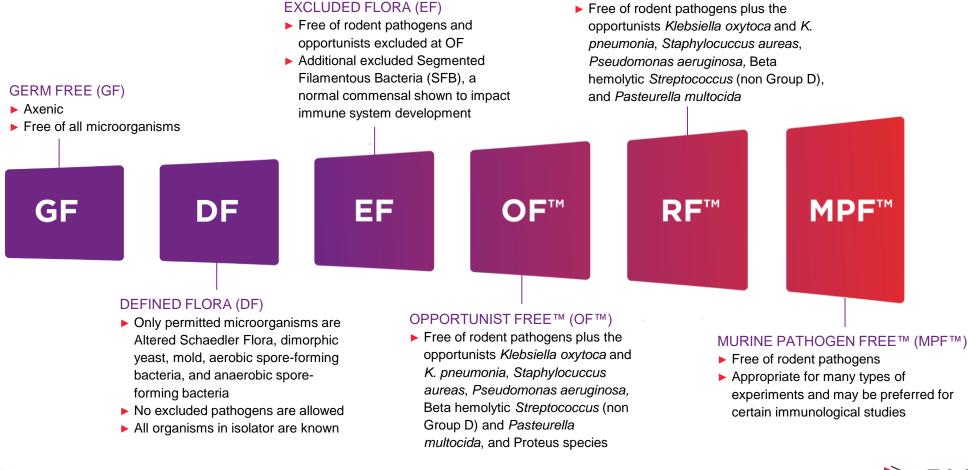
- Gnotobiotic housing and services
- Custom model design
- Full-spectrum model and breeding program management
- Personalized breeding design





Industry-Leading Health Standards

Only Company to Provide Global Harmonization of Health Standards and True Gnotobiotic Profiles





Highest Standards for Definitive Results

Most Comprehensive Genetic and Health Quality Program

HEALTH STANDARDS

- Most options for health standards among all vendors
- Key strains such as B6 are offered at multiple health standards providing experimental choice
- Sole vendor to test and report on Segmented Filamentous Bacteria (SFB)
- Only company to provide global harmonization of health standards and true gnotobiotic profiles

COLONY MANAGEMENT

- Inbred strains refreshed from cryopreserved stock at set intervals to ensure genetic integrity
- Outbred animal stocks bred using defined schemes to maintain diversity over time

GENETICS

- Only company to provide Global Colony Management Harmonization Program that ensures high genetic continuity and stabilization across Taconic sites
- Genetic Monitoring Program employs qualitative and quantitative testing, reducing risk and ensuring quality



Core Strengths

Expertise

Superior Products

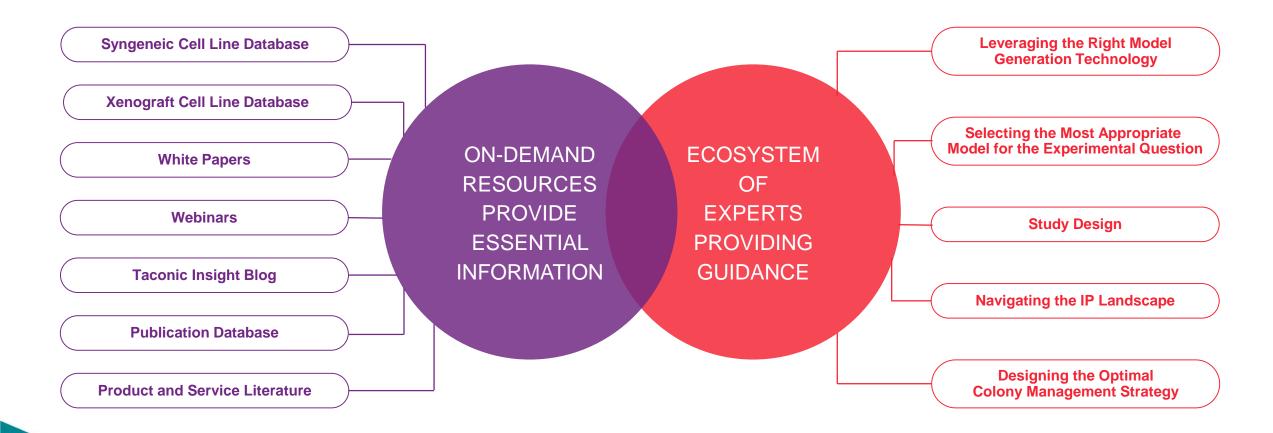
Unique Platforms

Customer-Focused Service Platform



Taconic Empowers Customers

Taconic Empowers Customers to Find the Best Solution





Microbiome Leadership

Over Fifty Years of Providing Germ-Free Models

Microbiome is redefining how researchers are approaching drug discovery and Taconic is leading the way.

GERM-FREE MODELS AVAILABLE:

Black 6 (B6)

- BALB/c
- Swiss Webster
- IL10 Knockout

APPLICABLE AREAS OF RESEARCH

Microbiology

Physiology

Immunology

Metabolism

- Oncology
- Central Nervous System Disorders
- Inflammatory Bowel Disease
- And more

"Seres relies on Taconic's germ-free mice to study the microbiome and our drug candidates."

- SERES THERAPEUTICS



TruBIOME[™]

Custom Microbiome Models

Only Taconic has a comprehensive microbiome portfolio that allows customers to create mice with custom microbiota profiles.

RESEARCHERS CAN LEVERAGE THE MICROBIOME:

- To better understand how the microbial composition of the gut microbiome is impacting their research
- ► To identify new drug targets or microbiome-based therapeutics
- To establish consistency and reproducibility in all experimental mouse studies





Exclusive Immuno-oncology Technologies

Humanized Models Provide Critical Insights into Human Biology

PORTFOLIO IS BUILT ON THE SEVERELY IMMUNODEFICIENT CIEA NOG MOUSE[®] AND INCLUDES SECOND GENERATION NOG MICE AND ENGRAFTED MODELS:

huNOG huNOG-EXL huPBMC-NOG

LIVE INVENTORY AVAILABLE:

- Hundreds of mice are ready to ship
- Available in both US and EU from same vendor

High engraftment rate, with detailed information on each product shipped via Certificate of Analysis (COA)

Syngeneic Tumor Models

Custom Model Generation

KEY FEATURES

- Strains for syngeneic studies
- GEMs for syngeneic modeling, adoptive cell transfer, and T-cell modeling
- Host for patient-derived xenografts (PDX) and chimeric antigen receptor therapies (car-t and car-nk cells)
- HLA models for cancer vaccine research and TCR identification
- ► Humanized immune system engrafted mice



Humanized Immune System Mice

For researchers looking to discover a new drug using humanized models, Taconic uniquely combines access to a robust portfolio with application expertise to ensure correct study design.

Taconic's NOG Portfolio includes a suite of severely immunodeficient mouse models which accept the engraftment of heterologous cells more readily than traditional immunodeficient models, making them exceptional hosts for the production of mice with human immune systems.

ACCESS

- Only vendor to empower customers to obtain models without an MTA or commercial use license
- Off the shelf inventory

ROBUST PLATFORM

- A portfolio of study-ready immune system models and advanced host models for humanization
- Portfolio has broadest potential applications as evidenced by wide adoption by pharma and biotech

APPLICATION EXPERTISE

- PhD field application scientists provide expertise on experimental design and selection of ideal humanized models
- Drug discovery-relevant application data generated via industry collaborations



Exclusive Immuno-oncology Technologies

Easy Access to Relevant Models for Key Applications

"Experimental Pharmacology & Oncology (EPO) GmbH uses 1st and 2nd generation NOG mice provided by Taconic for its preclinical oncology service. These mice are included in novel concepts for the development of personalized treatment options and especially suited for humanization strategies. We are very satisfied with the quality of mice, the reliability of shipment and the high level of scientific support. Further, we very much appreciate the competent and always friendly communication."

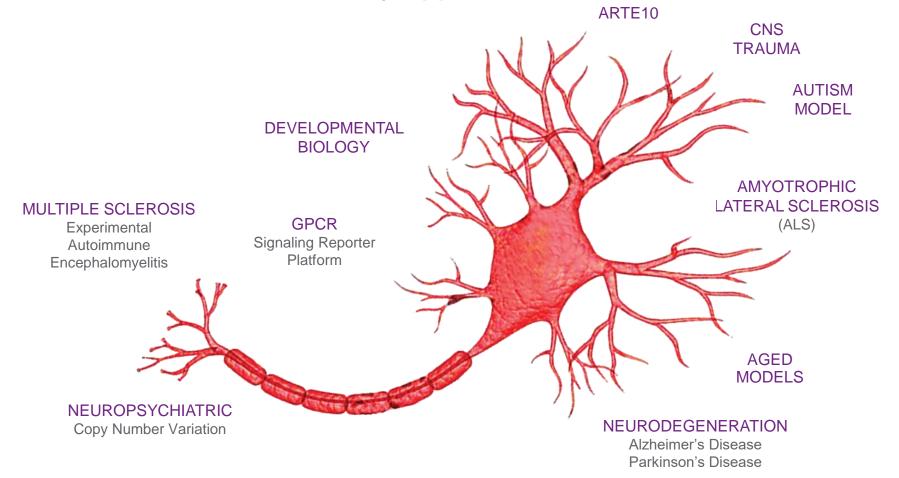
— EXPERIMENTAL PHARMACOLOGY & ONCOLOGY (EPO) GmBH "Working with Taconic has been a great pleasure for Pharmatest. We are impressed with the high-quality services, top-level scientific support, and fast and clear communication. By using humanized mice provided by Taconic, we have been able to establish more predictive animal models to support immuno-oncology therapy development."

- PHARMATEST



Comprehensive Neuroscience Portfolio

Easy Access to Relevant Models for Key Applications





Comprehensive Neuroscience Portfolio

Easy Access to Relevant Models for Key Applications

"Robust, well-validated pre-clinical models of Parkinson's disease are a necessary tool for understanding the biology and possible treatment of this complex disease. With dedicated project management and technical support, Taconic has been a reliable partner in The Michael J. Fox Foundation's efforts to provide the research community with important, field-enabling pre-clinical models. We look forward to continuing to partner with Taconic for custom model generation projects."

- MICHAEL J. FOX FOUNDATION

"Cure Alzheimer's Fund is working closely with Taconic on our Genes to Therapies program, which supports investigations of gene variants impacting risk of Alzheimer's through funded research and the development of specialized genetically engineered mouse strains. The team at Taconic has provided excellent project management and technical support and are vital partners for the success of a complex project involving many custom strains and academic research labs."

- CURE ALZHEIMER'S FUND

"Taconic Biosciences has been an invaluable resource for the entire Alzheimer's disease (AD) research community. As an academic researcher that builds animal models of sporadic AD, I cannot possibly supply the communities needs for these models but instead depend on Taconic to fulfill this role. My hope is that, as new and improved models become characterized and validated, the research community at large will supply these models to Taconic to manage and distribute."

— PATRICK SULLIVAN, PHD Associate Professor of Geriatrics at Major University



Long History of IBD Solutions

Products & Services That Enable Translational Research

Taconic Biosciences offers access to models in all three of the major classes of IBD mouse models, sold with full use rights for drug discovery and development.

STRAINS FOR CHEMICALLY-INDUCED COLITIS

- Standard inbred strains
- Relevant GEM lines
- Human immune system engrafted mice

PAIRED STRAINS FOR ADOPTIVE TRANSFER COLITIS

- BALB/c (BALB or BALJBO) and C.B-17 scid (CB17SC)
- BALB/c (BALB or BALJBO) and Rag2 knockout (601)
- C57BL/6 (B6 or B6JBOM) and Rag2 knockout (RAGN12)

GEM MODELS OF SPONTANEOUS COLITIS

- Mdr1a knockout (MDR1A) available exclusively from Taconic
- II10 knockout on B6 background (16006) — available for drug discovery under a simple label license
- II10 knockout on BALB/c background (15660) — available for drug discovery under a simple label license

THE INFLUENCE OF THE MICROBIOME ON IBD IS WELL-DOCUMENTED.

Only Taconic can offer a full range of health standard options to facilitate microbiome research, including germ-free mice, custom microbiota associations, and germ-free derivations.



Core Strengths

Expertise

Superior Products

Unique Platforms

Customer-Focused Service Platform



Taconic Commercial Model Portfolio

Models to Drive Discovery

Taconic Biosciences is uniquely positioned to enable drug discovery through animal models by being the only company that partners with customers to provide expertise, quality, and availability, along with downstream services.

EXPERTISE AT EVERY STEP

- PhD customer service support (to answer questions)
- Field application scientists (to help design your study)
- Veterinary, genetic, animal health, microbiome experts
- Custom model generation and downstream colony management solutions
- Extensive and curated resources to empower customers to find the best solution

HIGHEST QUALITY STANDARDS IN THE INDUSTRY

- Only company with globally harmonized health standards and genetic integrity
- Only company with a comprehensive microbiome platform
- Rigorous and high-frequency health and genetic monitoring program, with transparency of information
- Data supporting drug discovery applications for key models

AVAILABILITY AND ACCESS TO DRIVE GLOBAL RESEARCH

- Largest genetically engineered rodent model portfolio available to both profit and non-profit organizations in the world
- Worldwide availability through Taconic US and EU production sites and a network of partners
- Unique portfolio of super immuno-deficient models based on the CIEA NOG mouse[®] for immuno-oncology and infectious disease
- Tailored availability options to support everything from spot orders to supply agreements



The Taconic B6™

Provides Superior Versatility and Performance

PREFERRED STRAIN FOR GENETICALLY ENGINEERED MODELS

- Including for the Knockout Mouse Project (KOMP) and International Mouse Phenotyping Consortium
- > Proven more amenable to development of quality embryonic stem cells

PREFERRED STRAIN FOR DIET-INDUCED OBESITY (DIO) GENERATION

- ► The Taconic B6[™] gains weight faster when on high-fat diet
- Local production in the US and EU

AVAILABLE AT A RANGE OF HEALTH STANDARDS

- ► Germ-free
- Positive or negative for SFB
- Ideal for study controls

SUPERIOR REPRODUCTIVE PERFORMANCE COMPARED TO OTHER B6 SUBSTRAINS



The PREMIER B6

Taconic B6™ Provides Superior Versatility and Performance

"The MRC Mary Lyon Centre located at MRC Harwell uses Taconic's inbred mouse lines (specifically C57BL/6NTac) to generate and characterize new mouse models for use in individual research projects, including highthroughput international programs and genome editing efforts."

"Hooke uses the Taconic B6 because we get more consistent disease development for experimental autoimmune encephalomyelitis (EAE) than when using mice from other vendors."

- HOOKE LABORATORIES

"Taconic Biosciences had provided invaluable support to our course on "Mouse Development, Stem Cells & Cancer." It would be difficult to continue to teach this course at the level we currently do without Taconic's expertise and C57BL/6 mice."

- COLD SPRING HARBOR

TACONIC Models For Life.

- MRC HARWELL

Diet-Induced NASH B6

First and Only Commercial Vendor to Offer an Off the Shelf Diet-Induced NASH Model

Off the shelf availability permits researchers to start studies immediately, saving months of conditioning time, and preserving vivarium space for active studies rather than conditioning cohorts.

- Taconic maintains an inventory of C57BL/6NTac male mice conditioned on a modified Amylin liver NASH (AMLN) diet
- ► Uses the Taconic B6[™], which is the preferred C57BL/6 substrain for metabolic and cardiovascular studies
- Mice become obese, get fatty liver, and develop liver inflammation and fibrosis after 26+ weeks on diet, with inter-animal variability observed for development of the inflammation and fibrosis phenotype



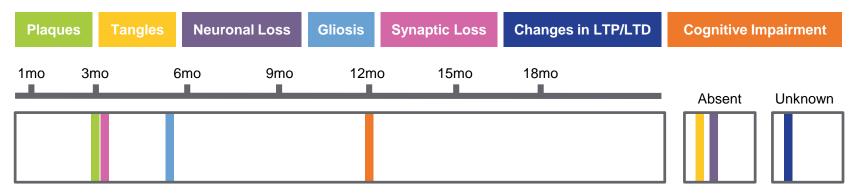


ARTE10 Model

Now Available to Commercial, CRO, & Academic Researchers

- Available for the first time to commercial and academic researchers under easy access terms
 - ▶ No complex license agreement to sign and no license fees
 - ► Simple label license applies to per-head purchases
- The ARTE10 mouse model expresses mutant human versions of both APP and PS1 co-integrated under control of the Thy-1 promoter. It develops robust and early-onset neuropathology.

- ARTE10 is an appropriate preclinical model for:
 - ► Prolonged evaluation of amyloid-lowering or –modifying therapies
 - ► PET imaging superior model for *in vivo* and *ex vivo* imaging with Pittsburgh Compound B (PiB) tracers
 - Amenable for robust electrophysiological studies
 - Age-associated cognitive deficits
 - Neuroinflammation (reactive gliosis surrounding amyloid plaques reported by Willuweit et. Al, 2009)



PHENOTYPIC TIMELINE

Phenotypic characterization diagram and descriptive excerpt from AlzForum (www.alzforum.org)



rasH2 is the Gold Standard Carcinogenicity In Vivo Test

Reduce the In Vivo Portion of Your Study by 75% vs. a Traditional Two-Year Study

FASTER TESTING MEANS:

- Lower costs
- Quicker answers on your compounds
- Less compound administration
- Significantly lower risk of spontaneous tumors, reducing the incidence of false-positives

Approved by the FDA and the International Conference on Harmonisation (ICH) S1B Guideline 1

A substantial amount of phenotypic background data is available for rasH2 demonstrating low incidences of spontaneous tumors and the robustness of the model in identifying carcinogens

rasH2 mice are sold with full research use rights and are readily available in typical study quantities "rasH2 is a thoroughly robust model that provides confidence in carcinogenicity testing and dramatically reduces the timeline, saving both time and money. The reliability and stability of the model provided by Taconic, combined with the design improvements, comprehensive nature of the tumor database and published experience of BioReliance, make rasH2 a dominant and valuable force in carcinogenicity testing."

- BIORELIANCE



The Taconic DIO Mouse Is Preferred

A Long History of Data and Superior Performance

TACONIC'S DIO MOUSE REMAINS A PREFERRED MODEL FOR RESEARCH BECAUSE:

- 1. Taconic was the first in the industry to offer this product.
- 2. The Taconic B6[™] responds better to high-fat diet compared to other strains.

On a high-fat diet, C57BL/6NTac develops more pronounced metabolic syndrome compared to C57BL6/J:

► More insulin resistant

- High cholesterol
- High plasma and pancreatic insulin levels
- Fatter, faster



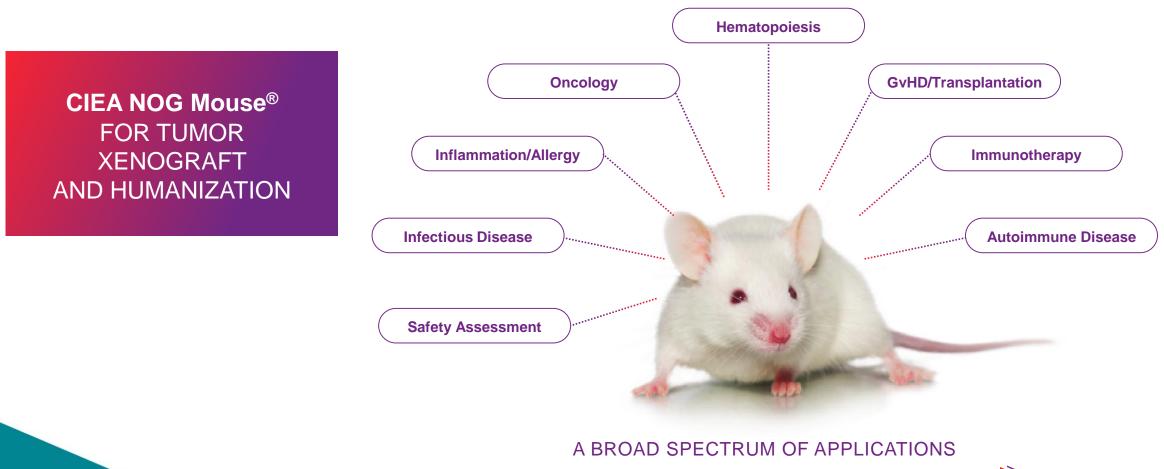
PHENOTYPE DEVELOPMENT OF THE C57BL/6NTAC





CIEA NOG Mouse[®]

First and Most Versatile Severely Immunodeficient Model on the Market





Confidential and Proprietary I © Taconic Biosciences

RAGN12

The Most Studied and Robust RAG Model on the Market



SUPERIOR PERFORMANCE

- ▶ T and B cell deficient mouse on C57BL/6 background
- Not leaky and no thymic lymphomas as in NOD scid
- More radiation resistant compared to scid mice
- RAGN12 is part of a suite of models congenic on C57BL/6NTac, ideal for adoptive transfer experiments

ROBUST SUPPORT

- Available at both MPFTM and EF health standards
 - MPF preferred for some applications, including adoptive transfer colitis studies
 - ► EF preferred for tumor xenograft studies
- Easy access under simple Conditions of Use, whereas competing models require additional licenses and fees



Core Strengths

Expertise

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Extensive Commercial Genetically Engineered Models

Selection, Quality, and Efficiency to Progress Programs Forward

TACONIC TRANSGENIC MODELS™

- ► Key GEMs available live in typical study sizes
- Sold under convenient label license agreement

CRYOPRESERVED REPOSITORIES

- Access to 4000+ models, including constitutive and conditional knockouts, transgenic over-expressors and targeted transgenics over- expressors and targeted transgenics
- ▶ Timeline: 14–16 weeks after order receipt
- Simple terms which permit drug discovery use
- ► Taconic's Colony Management Solutions can quickly scale up to provide cohorts





Cryopreserved Repositories

Easy Access Means Starting Your Project Sooner

Obtain Taconic cryopreserved GEMs in a simple, fast, and transparent way — move your project forward with confidence.

KEY ELEMENTS

CLEAR DELIVERABLES: Receive four mutant animals

SIMPLE TIMELINE: 14–16 weeks after order receipt

STRAIGHTFORWARD TERMS OF USE: Simple agreements designed for drug discovery use

WORLDWIDE ACCESS: Most models available to both for-profit and non-profit users



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Unparalleled Scientific Management

The GEMs Scientific Team Translates Goals into Action Plans

Globally-recognized agility, transparency, and innovation

Full access to PhD geneticists, embryologists and molecular biologists, and pre-clinical scientists

PhD Scientific Program Managers lead each client's Program Team from conception

Extensive experience in *in vivo* outsourcing project management

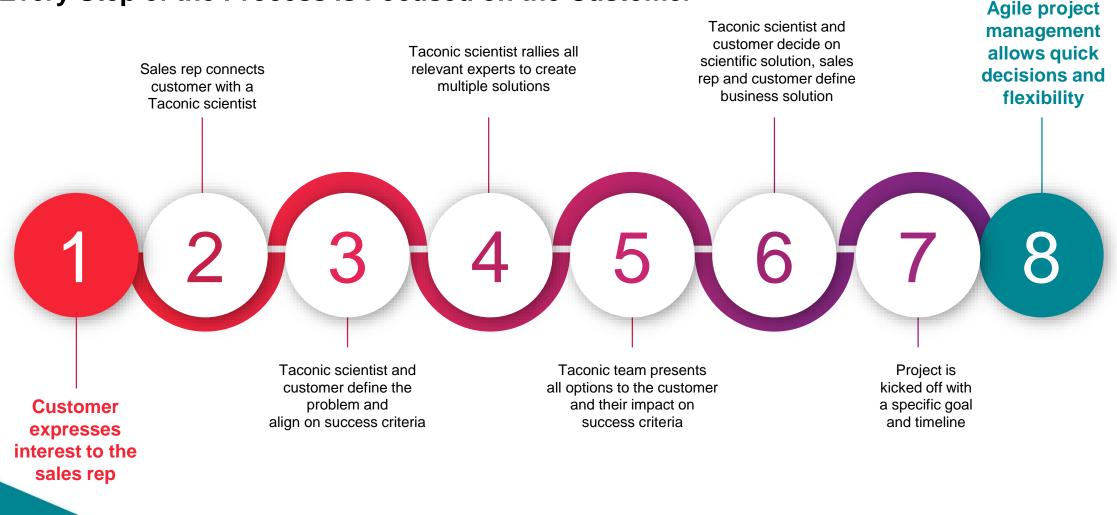
Full access to PhD scientists in our custom model generation service

All animal operations overseen by board-certified veterinarians and standing Institutional Animal Care and Use Committee (IACUC)



Start by Understanding the Goal

Every Step of the Process is Focused on the Customer





Model Generation Solutions

Developing the Right Model to Deliver the Right Results

- Multiple genetic modification platforms provide flexibility: CRISPR, Easi-CRISPR, ES Cell, Pronuclear Injection
- Comprehensive, high-throughput platforms for qualitative and quantitative genotyping & profiling
- Over 4000 models generated in last 10 years
- ► Twenty years of experience

- Fully-licensed provider of model generation services, one of few companies in the world licensed to work on rats and mice, prokaryotic and eukaryotic cells
- Capacity to produce animals at five health standards including Germ Free for microbiota studies
- Embryology capabilities for Rapid Expansion result in up to four-fold reduction in breeding timelines



Model Generation Solutions

Developing the Right Model to Deliver the Right Results

"Our collaboration with Taconic was the first time we outsourced conditional knockout production and have been favorably impressed. Taconic's communication from construct design, to validation of the recombination in ES cells, through to the breeding of chimeras and excision of the selection cassette was of exceptional quality and the fact that Taconic uses Southern blotting to interrogate the targeted loci in the ES cells gave us confidence in progressing to the production of chimeras and breeding. Having discovered the joys of outsourcing, I would think hard before trying to make a conditional allele in my lab again."

- DAVID RON, MD, Professor of Cellular Pathophysiology and Clinical Biochemistry at a Major Research Institution

"Taconic has been a great partner for us. We had previously relied on several other academic institutions for model generation, wasting tens of thousands of dollars and several years, with no success. Since starting our relationship with Taconic, the company has generated a Plk1-KI line that subsequently secured a major grant from the NIH. We are so pleased that we have already placed several additional orders and look forward to working with Taconic for many years to come."

- XIAOQI LIU, Biochemistry Department at a Major Research Institution

"We are very pleased to add Taconic to our list of licensees as it furthers our goal of making this technology more broadly accessible and Taconic is certainly a globally recognized leader in the animal model field."

 ERIC RHODES, Chief Executive Officer of ERS Genomics



Colony Management Solutions

Breeding is Resource Intensive and Success is Crucial

TACONIC'S PHILOSOPHY

- Understand the client's needs and goals
- Establish true scientific collaboration between Taconic and client teams
- Exploit the Taconic toolbox and expertise to develop a custom project plan that meets the client's desired balance for speed, budget, and risk tolerance
- Practice agile project management principles that allow flexibility, mitigate risks, and capture unforeseen opportunities
- Provide value-add services, such as biospecimen collection, animal modifications (surgery), and conditioning (diet) to deliver the total solution

WHY IS THIS IMPORTANT?

Customers do not need to come in with a clear study design

Not all mutants are validated models

Mismanaged projects cost precious time and money

"The Taconic team is experienced, communicative, and flexible. From scientific strategy to execution, we thank them for devising such creative and effective ways to complete the contract breeding work critical to advancing our drug development project. We are glad to have partnered with them."

- LUMOS PHARMA





eTACONIC[®]

Empowers All Animal Model Stakeholders with Unparalleled Visibility and Access to Data

PRINCIPAL INVESTIGATORS

- Ease of access to information
- ▶ 24/7 visibility
- Real-time inventory status
- Monthly project status updates
- Shipping reports

PROCUREMENT MANAGERS

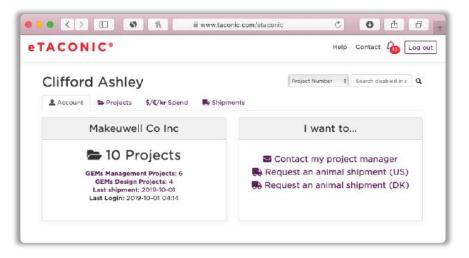
- Historical spending reports
- No need to download and manipulate data, inventory reports available on the customer dashboard
- Better predict, plan and manage resources

OUTSOURCING MANAGERS

- Information continuity across projects, PIs, and time
- Single source of Taconic project records
- Can also serve as an important repository of intellectual property documentation

VETERINARIANS

- Immediate access to colony genetic and health reports
- Full transparency on adverse phenotype information



eTACONIC[®] allows our Scientific Services customers to have secure, 24/7/365 access to their Colony Management and Model Generation project data and reports in real time across your organization.



The Complete Solution

The Only Comprehensive and Integrated Model Design and Breeding Services Provider

MODEL ACQUISITION

- Repository
- Collaboration
- Embryology
- Custom Generation

- TRANSITION MUTANT TO MODEL
- Pilot Cohorts
- Proof of Concept
- Phenotype Characterization
- Speed to Cohort and Data
- Creative Solutions

Multiple
 Health Profiles

BREEDING

SCALED

- Economical Options
- Managed Productions Colonies
- Reliable Delivery
- Reproducibility from Cohort to Cohort
- Flexible
 Breeding Plans

Microbiome

SERVICES

SPECIALIZED

- Back-Crossing/Speed Congenics
- Fecal Microbiota Transplantation
- Custom Diets
- Transgene Mapping

DISTRIBUTION

- Move to Repository
- Market It
- Distribute It
- ► License It

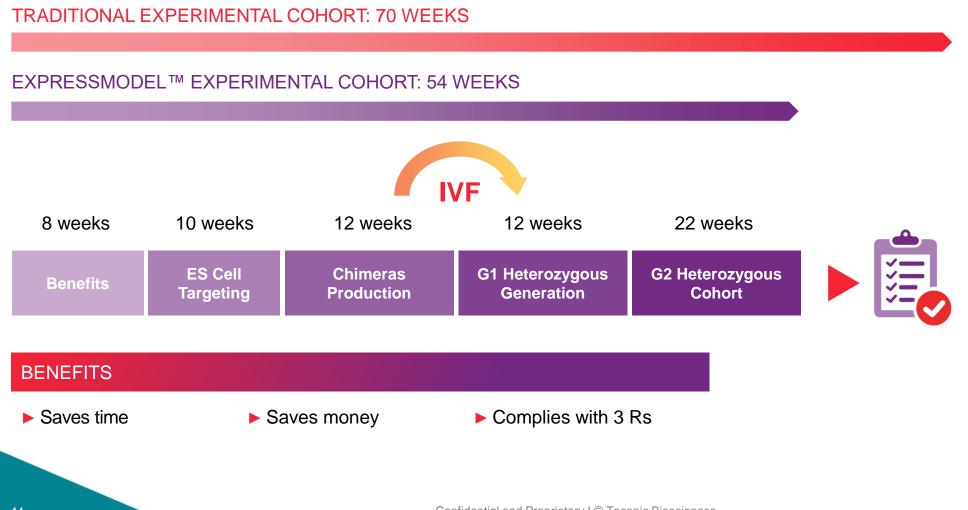
CUSTOM MODEL GENERATION

COLONY MANAGEMENT SOLUTIONS



Innovative ExpressMODEL[™] Platform

Obtain Results Up to Four Months Faster than Standard Model Development





Taconic continues to deliver superior value to its customers by providing premium products and services in custom solutions for each unique project.



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TACONIC.COM