

## Searches for Rat Protocols and Procedures

The tables below contain links to searches of multiple databases for alternatives and refinements for a study involving a diabetic retinopathy rat model and several commonly used procedures. Construct your own queries with appropriate terms, or use the examples below if they are relevant.

**Important!** Pubmed MeSH Terms are specific words and phrases drawn from the NLM's controlled vocabulary. Use the [MeSH Terms Browser](#) to find the MeSH Terms most appropriate for your study. Substituting phrases not found in the MeSH vocabulary will **not** be effective.

**Hot Tip!** The [MAJR] qualifier identifies a MeSH Term which is a main topic of the article. Use [MAJR] in place of [MeSH] and [ALL] to find the subset of articles focussed on the search terms. Compare the "focussed" and "inclusive" examples below to see the effect of using the [MAJR] qualifier.

### Replacement and Reduction:

The goal of these searches is to find models or systems which are more informative, to reduce animal numbers through better statistical methods, to replace species with ones more acceptable to society, and to replace animal use with in vitro or computer models, if possible.

	PubMed	Agricola	Other
<b>Gene, condition or disease AND species</b>	<i>focussed:</i> Insulin [MAJR] AND Rats [MAJR] <i>inclusive:</i> Insulin [ALL] AND Rats [ALL]	w=Insulin & (w=Rat + w=Rats)	<b>MGI</b> Insulin
	<i>focussed:</i> "Diabetes Mellitus, Experimental" [MAJR] AND Rats [MAJR] <i>inclusive:</i> "Diabetes Mellitus, Experimental" [MeSH] AND Rats [ALL]	w=Diabetes & (w=Rat + w=Rats)	<b>MGI</b> Diabetes
	<i>focussed:</i> "Diabetic Retinopathy" [MAJR] AND Rats [MAJR] <i>inclusive:</i> "Diabetic Retinopathy" [MeSH] AND Rats [ALL]	w=Retinopathy & (w=Rat + w=Rats)	
	"Diabetes Mellitus, Experimental" [MeSH] AND ((Double [WORD] AND Blind* [WORD]) OR Placebo [WORD])		
<b>Alternative Animal Models</b>	"Diabetes Mellitus, Experimental" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH] OR "Models, Genetic" [MeSH])		
	"Diabetic Retinopathy" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH] OR		

	"Models, Genetic" [MeSH]		
	<b>focussed:</b> "Streptozocin" [MAJR] AND Rats [MAJR] <b>inclusive:</b> "Streptozocin" [MeSH] AND Rats [ALL]	(w=Streptozotocin + w=Streptozocin) & (w=Rats + w=Rat)	
<b>In Vitro Assays</b>	("Diabetes Mellitus, Experimental" [MeSH] AND "Biological Assay" [MeSH]) NOT ("Models, Animal" [MeSH] OR "Animal Experimentation" [MeSH])		
<b>Models Not Involving Animals</b>	("Diabetes Mellitus, Experimental" [MeSH] AND ("Models, Theoretical" [MeSH] OR "Computer Simulation" [MeSH])) NOT ("Models, Animal" [MeSH] OR "Animal Experimentation" [MeSH])		
<b>Statistical Methods</b>	"Statistics" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH])	(w=Statistics + w=Statistical) & ((w=Sample & w=Size) + w=Power)	Statistics Core Hyperstat StatPages.net Power Analysis bibliography crossover designs
<b>Teaching</b>	"Teaching" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH])	w=teaching & w=alternatives	<b>NORINA</b>

Use the [PubMed MESH Terms Browser](#) to find terms to build your own queries.  
Use [Pubmed Clinical Queries](#) for studies focussed on therapies.

#### Refinement:

The goal of these searches is to find alternate procedures which cause less pain or distress.

	<b>PubMed</b>	<b>Agricola</b>	<b>Other</b>
<b>Euthanasia</b>	"Euthanasia" [MeSH] AND Rats [ALL]	w=Euthanasia & (w=Rats + w=Rat)	Methods pdf Methods
<b>Blood Collection</b>	"Blood Specimen Collection/Methods" [MeSH] AND Rats [ALL]	(w=Blood & (w=Sampling + w=Collecting)) & (w=Rats + w=Rat)	
<b>Anesthesia</b>	"Anesthesia/Methods" [MeSH] AND Rats [ALL]	w=Anesthesia & (w=Rats + w=Rat)	<b>altweb</b> Rats OR Rat
<b>Analgesia</b>	"Analgesia/methods" [MeSH] AND Rats [ALL]	w=Analgesia & (w=Rats + w=Rat)	<b>altweb</b> Rats OR Rat

<b>Neuromuscular Blockade</b>	"Neuromuscular Blockade" [MeSH] AND Rats [All]	w=Neuromuscular & w=Blockade & (w=Rats + w=Rat)	
<b>Surgery</b>	"Surgical Procedures, Operative/Methods"[MAJR] AND Rats [MAJR]	w=Surgery & (w=Rats + w=Rat)	
<b>ID</b>	"Animal Identification Systems" [MeSH] AND Rats [ALL]	w=Identification & (w=Rats + w=Rat)	
<b>Immunizations</b>	"Freund's Adjuvant" [MeSH] AND Alternatives [ALL]	w=Freund's & w=Alternatives	Alternatives to CFA
<b>Footpad Injections</b>	Footpad [ALL] AND Alternative [ALL]	w=Footpad & w=Alternatives	
<b>Monoclonal Antibodies, Ascites</b>	"Antibodies, Monoclonal" [MeSH] AND ("Bioreactors" [MeSH] OR "Methods" [MeSH] OR "Ascites" [MeSH] OR "Animal Experimentation" [MeSH])	((w=Monoclonal & (w=Antibodies + w=Antibody)) + w=Ascites) & (w=Alternatives + w=Bioreactors)	<b>ILAR</b> MAb Production
<b>Experimental Infection</b>	"Infection" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH])	w=Infection & w=Alternatives & (w=Rat + w=Rats)	
<b>Biohazards</b>	"Containment of Biohazards" [MeSH] AND Rats [ALL]		
<b>Substance Administration</b>	"Drug Administration Routes" [MeSH] AND Rats [ALL]		
<b>Toxicology</b>	"Toxicology" [MeSH] AND ("Animal Experimentation" [MeSH] OR "Models, Animal" [MeSH])	w=Toxicology & w=Alternatives & (w=Rat + w=Rats)	<b>Toxnet</b>
<b>Restraint</b>	"Restraint, Physical/Methods" [MeSH] AND Rats [ALL]	w=Restraint & (w=Rats + w=Rat)	
<b>Diet</b>	"Diet" [MeSH] AND Rats [ALL]	w=Diet & (w=Rats + w=Rat)	
<b>Intubation</b>	"Intubation/Methods" [MeSH] AND Rats [ALL]	w=Intubation & (w=Rats + w=Rat)	
<b>Perfusion</b>	"Perfusion/Methods" [MeSH] AND Rats [ALL]	w=Perfusion & (w=Rats + w=Rat)	
<b>Catheterization</b>	"Catheterization/Methods" [MeSH] AND Rats [ALL]	(w=Catheter + w=Catheterization) & (w=Rat + w=Rats)	
<b>Housing</b>	"Housing, Animal" [MeSH] AND Rats [ALL]	w=Caging & (w=Rat + w=Rats)	Rat Housing <b>Enrichment DB</b>
<b>Aging</b>			<b>NIA</b>

## Why Searches For Alternatives Must Be Performed

[Mice](#) | [Rats](#) | [Dogs](#) | [Cats](#) | [Rabbits](#) | [Frogs](#) | [Ferrets](#) | [Goats](#) | [Pigs](#) | [Fish](#) | [Primates](#)