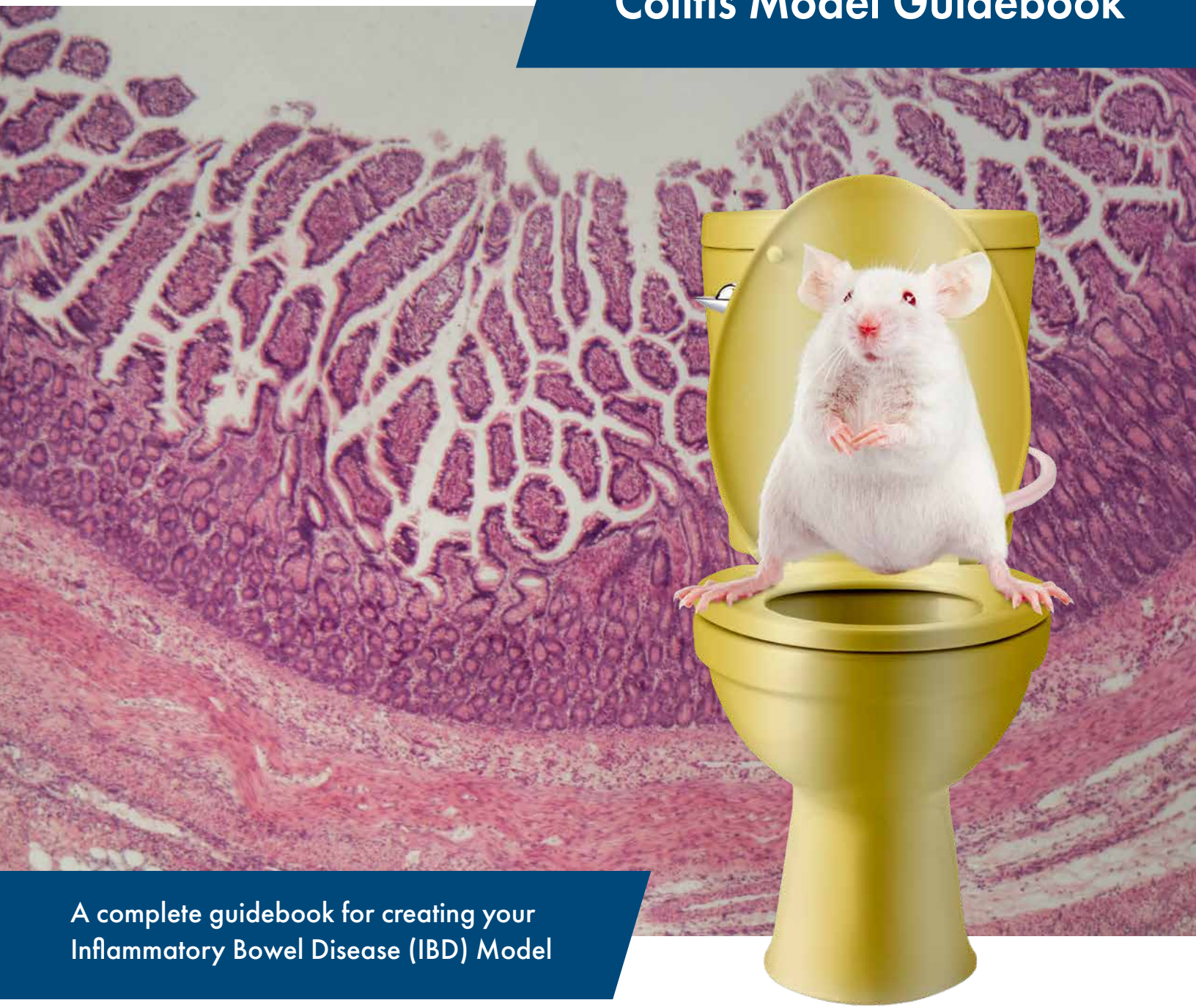
Colitis Model Guidebook



A complete guidebook for creating your Inflammatory Bowel Disease (IBD) Model

- Creating an IBD animal model
- DSS dosage guide
- Verifying model establishment
- Obtaining more information from colitis model using FastPrep® sample preparation systems
- Feeding your animals with MP Bio animal diets

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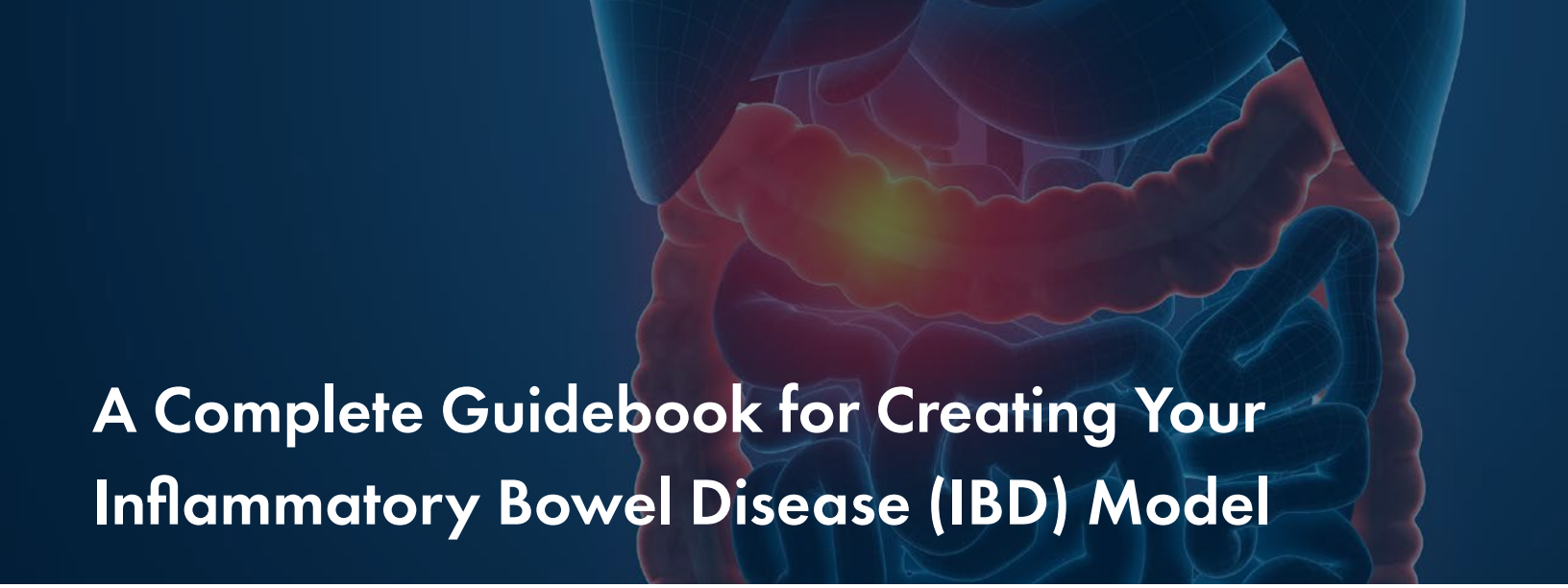

A Complete Guidebook for Creating Your Inflammatory Bowel Disease (IBD) Model

What is an IBD Model?

Inflammatory Bowel Disease (IBD) refers to a group of chronic inflammatory diseases affecting the gastrointestinal (GI) tract. Based on the pathogenic mechanisms, there are two typical categories: ulcerative colitis (UC) mostly affects the colon and rectum, while Crohn's disease (CD) can affect the entire GI tract.

Animal models have been proven to be one of the most effective and informative ways to demonstrate the above-mentioned pathogenic mechanisms. They serve as highly useful tools for understanding mucosal immunology and seeking treatment methods. Chemically-induced model creation is one of the most robust and reproducible methods for studying the overall etiology of the disease, including immunological and histological changes in the GI tract, as observed in human.

Among various chemically-induced colitis models, the dextran sodium sulfate (DSS)-induced colitis model is widely used due to its ease of administration and highly similar mechanism to human ulcerative colitis. Dextran Sulfate Sodium Salt (DSS) is a polyanionic derivative of Dextran. Administering dextran sodium sulfate via drinking water triggers development of colitis in mice and rats by binding to medium-chain-length fatty acids present in the colon and inducing inflammation. Reproducible results can be observed within a short period of time (7-10 days) with proper concentration of DSS.

Pairing DSS with azoxymethane (AOM) to induce mouse colon cancer models has been widely adopted recently to study the carcinogenesis mechanisms of human colorectal cancer. AOM is administered at the beginning of the model induction, followed by repeated cycles of DSS, the colitis-inducing agent.

MP Biomedicals offers a gold standard reagent for the creation of colitis animal models – Colitis Grade Dextran Sulfate Sodium Salt (36,000-50,000) and the Colonic Carcinogen Azoxymethane (AOM).

Dextran Sulfate Sodium Salt (Mw = 36,000-50,000) from MP Bio is one of the most widely used products based on peer reviewed scientific publications. Over the past 15 years, more than 8,000 scientific publications have cited the use of our DSS.

Description	Size	Cat. No.
Dextran Sulfate Sodium Salt (DSS) - Colitis Grade (36,000 - 50,000 MW)	1 g	0216011001
	10 g	0216011010
	25 g	0216011025
	50 g	0216011050
	100 g	0216011080
	500 g	0216011090
Azoxymethane, Colonic Carcinogen	25 mg	0218397125
	100 mg	0218397180

Creating an IBD Animal Model

Materials

- **6–16-week-old sex- and age-matched mice of strain of choice;** at least five or more mice per experimental group recommended. All animals must be maintained in accordance with local and national animal care regulations.
- **Azoxymethane**
- **Dextran Sulfate Sodium Salt (DSS) - Colitis Grade (36,000 - 50,000 MW)**
- **Water for Injection (WFI)**
- **Autoclaved animal drinking water**
- **Sterile isotonic saline**

Solution Preparation

DSS-supplemented drinking water:

To make 500 mL of a 2% DSS solution, dissolve 10 g DSS powder in 500 mL of autoclaved drinking water. Store at 4°C until use.

AOM Solution:

Dissolve AOM in WFI to obtain a 10 mg/mL stock solution. Aliquot and freeze at -20°C. Avoid repeated freeze-thaw cycles. On the day of use, thaw aliquot and dilute 1/10 with sterile saline.

Protocol – Acute DSS Colitis

1. On day 1, weigh and mark mice.
2. Fill the drinking supply of the mouse cages with DSS solution. Calculate 5 mL DSS solution per mouse per day. Control mice receive the same drinking water without DSS.
3. Empty the remaining DSS solution from the cage water bottles at day 3 and refill with DSS solution for another 2 days.
4. Empty the remaining DSS solution from the bottles at day 5 and refill with DSS solution.
5. Replace the remaining DSS solution with autoclaved water on day 8.

Protocol – Chronic DSS Colitis

1. On day 1, weigh and mark mice.
2. Fill the drinking supply of the mouse cages with DSS solution. Calculate 5 mL DSS solution per mouse per day. Control mice receive the same drinking water without DSS.
3. Empty the remaining DSS solution from the cage water bottles at day 3 and refill with DSS solution for another 2 days.
4. Empty the remaining DSS solution from the bottles at day 5 and refill with DSS solution.
5. At day 8, replace the remaining DSS solution with autoclaved drinking water without DSS for 14 days.
6. Repeat Steps 2-4 on days 22-26.
7. On day 27, replace the remaining DSS solution with autoclaved water for 14 days.
8. Repeat Steps 2-4 on days 42-46.
9. Replace the remaining DSS solution on day 47 with autoclaved water.

Protocol – Colitis-associated colorectal cancer

1. On day 1, weigh and mark mice.
2. Inject mice intraperitoneally with 10 mg/kg AOM solution.
3. Proceed with Steps 1-9 of the **chronic DSS colitis** protocol.

Results of a Successful IBD Model

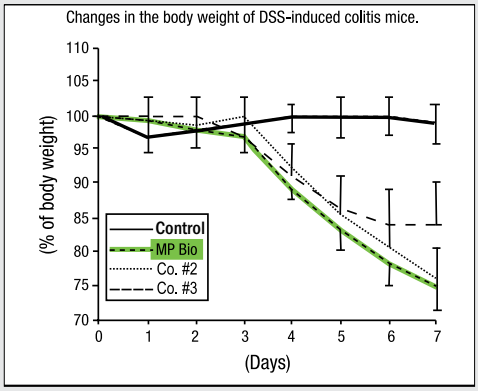

Figure 1. A comparative study reported by Bamba et al., demonstrating that DSS from MP Bio outperforms other competitors in colitis induction by administrating DSS via drinking water at a concentration of 2.0% (w/w) for 7 days.

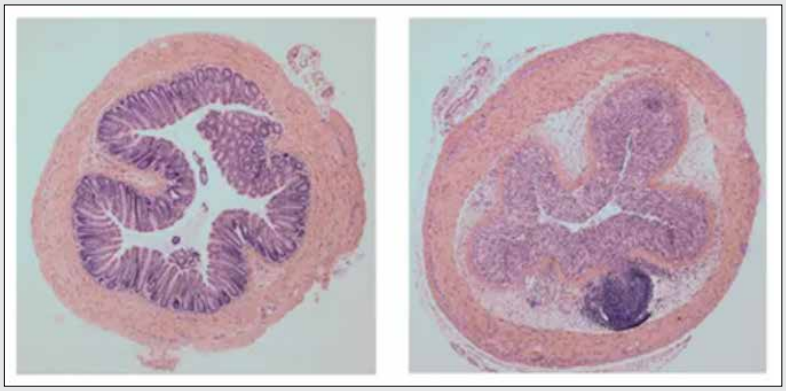

Figure 2. Biopsies stained with Hematoxylin & Eosin imaged at 40X magnification (Zheng et al.). Left: Control; Right: Mice administrated 2.5% DSS solution in drinking water for 7 consecutive days.

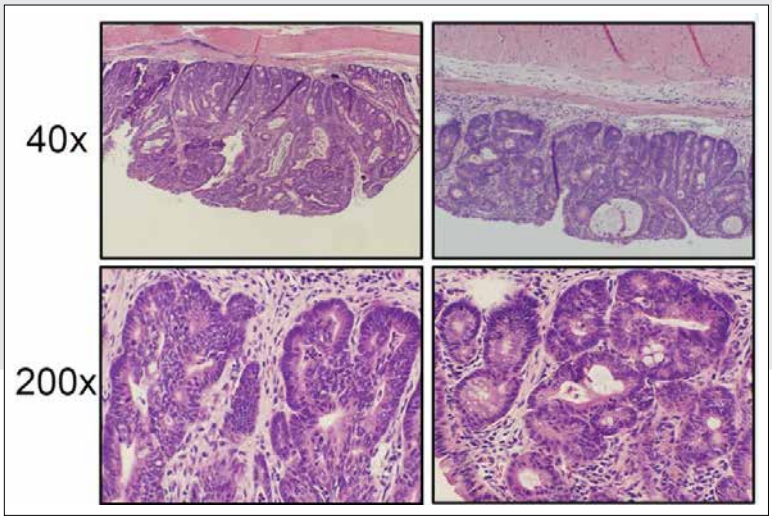

Figure 3. Biopsies stained with Hematoxylin & Eosin imaged at 40X and 200X magnification (Wang et al.). Left: Wild type mice supplied with 10 mg/kg AOM i.p. and 3% DSS on days 0-5, 21-26, 42-47; Right CAMK2γ knockout mice supplied with 10 mg/kg AOM i.p. and 3% DSS on days 0-5, 21-26, 42-47.

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DSS Dosage Guide

Dosage for different strains of mice

Animal/Strain	Dose	Days	Publication
C57BL/6	2.5%	8	Jia, Q.; Ivanov, I.; Zlatev, Z.; et al. Dietary fish oil and curcumin combine to modulate colonic cytokinetics and gene expression in dextran sodium sulphate-treated mice. *Br.J.Nutr.* **2011**, *106(4)*, 519-9.
Wild-type C57BL/6J(m)	3%	6	Thiess, A.L.; Laroui, H.; Obertone, T.S.; et al. Nanoparticle-based therapeutic delivery of prohibitin to the colonic epithelial cells ameliorates acute murine colitis. *Inflamm. Bowel Dis.* **2011**, *17(5)*, 1163-76.
C57BL/6 AhR null, WT	3.5%	7	Arsenescu, R.; Arsenescu, V.; Zhong, J.; et al. Role of xenobiotic receptor in inflammatory bowel disease. *Inflamm. Bowel Dis.* **2011**, *17(5)*, 1149-2.
C57BL/6	5%	3-14	Nagalingham, N.A.; Kao, J.Y.; Young, V.B. Microbial ecology of the murine gut associated with the development of dextran sodium sulfate-induced colitis. *Inflamm, Bowel Disease.* **2011**, *7(4)*, 917-26.
C57BL/6	1.5%	7	Ramakers, J.; Verstege, M.I.; Thuijls, G.; et al. The PPARγ agonist rosiglitazone impairs colonic inflammation in mice with experimental colitis. *J.Clin.Immunol.* **2007**, *27(3)*, 275-283.
BALB/c	1%	10	Palffy, R.; Gardlik, R.; Behuliak, M.; et al. Salmonella-mediated gene therapy in experimental colitis in mice. *Ex.Biol.Med.* **2011**, *236(2)*, 177-83.
C57BL/6J	3%	5	Shiomi, Y.; Nishiumi, S.; Ooi, M.; et al. GCMS-based metabolomic study in mice with colitis induced by dextran sulfate sodium. *Inflamm. Bowel Dis.* **2011**, *17(11)*, 2261-74.
BALB/c	1-5%	10	Rochat, T.; Bermudez-Humaran, L.; Gratadoux, J-J.; et al. Anti-infammatory effects of Lactobacillus casei BL23 producing or not a manganese-dependent catalase on DSS-induced colitis in mice. *Microb. CellFact.* **2007**, *20(6)*, 22.
BALB/c; NMRI/KI	2.5-5%	n/a	Bylund-Fellenius, A-C.; Landström, E.; Axelsson, L.G.; et al. Experimental colitis induced by dextran sulphate in normal and germfree mice. *Microbial Ecology in Health and Disease.* **1994**, *7*, 207-215.
IL-5-/- and +/+	2.9%, 5%	9	Stevceva, L.; Pavli, P.; Husband, A.; et al. Eosinophilia is attenuated in experimental colitis induced in IL-5 deficient mice. *Genes Immun.* **2000**, *1(3)*, 213-8.
BALB/c; athymic nu/nu CD-1 (BR)	2.5-5%	7-35	Axelsson, L.G.; Landström, E.; Bylund-Fellenius, A.C. Experimental colitis induced by dextran sulphate sodium in mice: Beneficial effects of sulphasalazine and olsalazine. *Aliment. Pharmacol.Ther.* **1998**, *12(9)*, 925-34.
WT; CCR9(-/-); CCL25 (-/-)	2%	7	Wurbel, M.A.; McIntyre, M.G.; Dwyer, P.; et al. CCL25/CCR9 interactions regulate large intestinal inflammation in a murine model of acute colitis. *PLoS One.* **2011**, *6(1)*, e16442.
Wild-type; DPIV -/-	2%	6	Yazbeck, R.; Howard, G.S.; Butler, R.N.; et al. Biochemical and histological changes in the small intestine of mice with dextran sulfate sodium induced colitis. *J.Cell Physiol.* **2011**, *226(12)*, 319-24.
BALB/c	5%	7	Kumar, G.K.; Dhamotharan, R.; Kulkarni, N.M. Embelin ameliorates dextran sodium sulfate-induced colitis in mice. *Int. Immunopharmacol.* **2011**, E

DSS Dosage Guide

Dosage for different strains of rats

Animal/Strain	Dose	Days	Publications
Wistar	2%	2 weeks to 6 months	Tamaru, T.; Kobayashi, H.; Kishimoto, S.; et al. Histochemical study of colonic cancer in experimental colitis of rats. *Dig. Dis. Sci.* **1993**, *38*, 529-537.
Sprague-Dawley	5%	9	Schreiber, O.; Petersson, J.; Phillipson, M.; et al. Lactobacillus reuteri prevents colitis by reducing P-selectin associated leukocyte- and platelet-endothelial cell interactions. *Am.J.Physiol.Gastrointest.Liver.* **2009**, *296*, G534-542. Dicksved, J.; Schreiber, O.; Willing, B.; et al. Lactobacillus reuteri maintains a functional mucosal barrier during DSS treatment despite mucus layer dysfunction. *PLoS One.* **2012**, *7(9)*, e46399. Petersson, J.; Schreiber, O.; Steege, A.; et al. eNOS involved in colitis-induced mucosal blood flow increase. *Am.J.Physiol.Gastrointest.Liver.* **2007**, *293*, G1281-1287.
Sprague-Dawley	5%	6	Vasina, V.; Broccoli, M.; Ursino, M.G.; et al. Non-peptidyl low molecular weight radical scavenger IAC attenuates DSS-induced colitis in rats. *World J.Gastroenterol.* **2010**, *16(29)*, 3642-50.
Sprague-Dawley	5%	7	Shi, X.Z.; Winston, J.H.; Sarna, S.K. Differential immune and genetic responses in rat models of Crohn's colitis and ulcerative colitis. *Am.J.Physiol.Gastrointest.Liver Physiol.* **2011**, *300(1)*, G41-51.
Wistar	2.5%	7	Aoi, Y.; Terashima, S.; Ogura M.; et al. Roles of nitric oxide (NO) and NO synthases in healing of dextran sulfate sodium-induced rat colitis. *J Physio Pharmacol.* **2008**, *59(2)*, 315-36.
Wistar	5%	10	Lopez-Posadeas, R.; Requena, P.; Gonzalez, R.; et al. Bovine glycomacropeptide has intestinal antiinflammatory effects in rats with dextran-sulfate induced colitis. *J.Nutr.* **2010**, *140(11)*, 2014-2019.
Wistar	2-4%	7	Shimizu, T.; Suzuki, M.; Fujimura, J.; et al. The relationship between the concentration of dextran sodium sulfate and the degree of induced experimental colitis in weanling rats. *J.Pediatric Gastro. Nutrition.* **2003**, *37*, 481-486.
ACI	5%	14	Hirono, I.; Kuhara, K.; Hosaka, S.; et al. Induction of intestinal tumors in rats by dextran sulfate sodium. *J.Natl.Cancer Inst.* **1981**, *66(3)*, 579-583.

Dosage for other animals

Animal/Strain	Dose	Days	Publications
Hamster	2.5%	6	Karlsson, A.; Jägervall, A.; Pettersson, M.; et al. Dextran sulphate sodium induces acute colitis and alters hepatic function in hamsters. *Int. Immunopharmacol.* **2008**, *8(1)*, 20-27.
Hamster	1%	n/a	Yamada, M.; Ohkusa, T.; Ohkusa, I. Occurence of dysplasia and adenocarcinoma after experimental chronic ulcerative colitis in hamsters induced by dextran sulphate sodium. *Gut.* **1992**, *33*, 1521-1527.
Guinea Pig	3%	4	Iwanaga, T.; Hoshi, O.; Han, H.; et al. Morphological analysis of acute ulcerative colitis experimentally induced by dextran sulfate sodium in the guinea pig: Some possible mechanisms of cecal ulceration. *J. Gastroenterol.* **1994**, *29(4)*, 430-438.
Pig (Yorkshire)	1.25 g/kg BW	5	Young, D.; Ibuki, M.; Nakamori, T.; et al. Soy-derived di-and tripeptides alleviate colon and ileum inflammation in pigs with dextran sodium sulfate-induced colitis. *J.Nutr.* **2012**, *142(2)*, 363-8.

FAQs

How do you prepare DSS solution for inducing colitis in animal models?	Prepare DSS solution with sterile water and refer to our application guide for detailed w/v concentration. 0.22 μm filtration is always recommended prior to use.
What are the critical parameters for successfully inducing colitis in animal models?	The molecular weight of DSS, concentration of DSS solution, type and strains of animals and type of diets provided to the animals.
What is the administration route of DSS solution?	DSS solution can be administrated by oral intake, such as drinking freely or intragastric administration.
Any conditions we need to pay attention to when inducing colitis animal models?	1. Prepare DSS solution with sterile water and refer to our application guide for detailed w/v concentration. 0.22 μm filtration is always recommended prior to use. 2. Change with freshly prepared DSS solution every 1-2 days. 3. In order to clearly observe model development, adequate housing needs to be provided; 2-3 per cage is recommended and no more than 5 per cage at maximum. 4. Maintain consistent habitat conditions across all animals.
What would be the estimated volume of water consumption for mouse and rat?	7-10 mL per day for mouse and 11 mL per day per 100 g bodyweight for rat.
Does the molecular weight affect the results of colitis model creation?	Yes. 36,000-50,000 is the best molecular range of DSS for colitis model creation. Low molecular weight DSS has a weaker inflammatory effect and will be difficult to be absorbed if the molecular weight is higher.

FAQs

Why do I need to use a different concentration of DSS solution every time I receive a new lot of DSS?	DSS is a polymer, and the range of molecular weight is only indicating an average value. Molecular weight varies from lot to lot, but within the optimum range. We recommend purchasing enough of the same lot of DSS to cover your entire experimental project. If this is not feasible, we recommend performing a pre-test prior to switching lots.
Why are there no significant symptoms observed after administrating 3% DSS to mice after 3 days?	Each individual animal has a different level of tolerance to DSS. Noticeable bodyweight decreases can be observed as late as 5 days after DSS administration. If 7 days of DSS administration has not resulted in any changes, please increase the DSS concentration or contact MP Biomedicals.
Is intestinal bleeding common after creating a colitis animal model?	High concentration DSS solution can cause intestinal bleeding; this is normal if the bleeding is at a controllable scale. Lower DSS concentrations can significantly relieve the bleeding.
Bodyweight decreases significantly, but little or only mild pathological symptoms show according to H&E staining.	Bodyweight dropping is only indicating DSS is taking effect, but cannot be considered as the sign of establishment of the model. Pathological symptoms will be revealed only when DSS intake reaches a certain level.
Why is phase 2 induction of chronic colitis always slower than phase 1, even with the same concentration of DSS?	DSS tolerance level will be increased after phase 1 induction, slower or milder symptom built- up is common. Increase DSS concentration accordingly can resolve the issue.
Can DSS be used on zebrafish for colitis model creation?	Yes.
What is the difference between colitis models created by DSS and TNBS?	DSS induces ulcerative colitis, while TNBS induces Crohn's disease.

Verifying Model Establishment

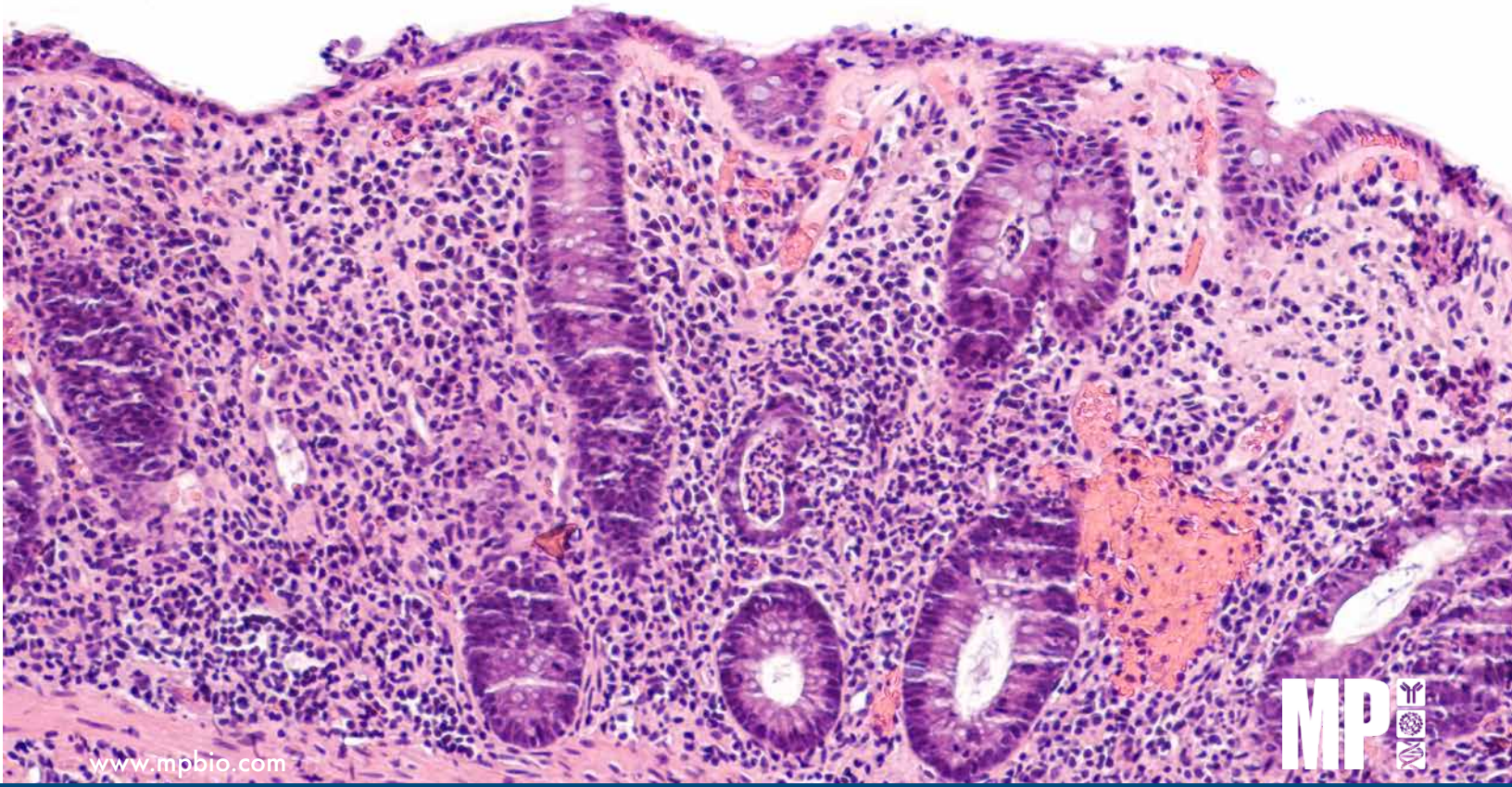
DSS colitis model induction can be easily monitored by body weight loss. Body weight can be measured on a daily basis, without sacrificing the animal or any invasive procedures. However, in some rare cases, body weight can reduce significantly, even before the colitis model has been completely developed or prior to observing significant pathological symptoms in intestinal tissue. Therefore, tissue staining is the recommended option for verifying colitis model establishment.

H&E Staining

Hematoxylin & Eosin staining is the most common and straightforward method for verifying animal model establishment. From the staining, one can easily identify all morphological changes related to your model induction. As one of the most important histological and pathological staining methods, H&E has been adopted by most researchers to confirm the DSS colitis model establishment.

MP Bio offers all the histological grade reagents needed for your H&E staining.

Description	Cat. No.
Coplin Staining Jar	02170062
Hematoxylin	02101922
Eosin Y Disodium Salt	02152471
Eosin Y Disodium Salt, 10% Solution	02195700
Xylene - Histological Grade	02158692
Paraformaldehyde (16% w/v), Methanol-Free	02199983
Ammonium Hydroxide, ACS	02193854
Lithium Carbonate, ACS	02152537



Obtaining More Information from Colitis Models

In addition to gastrointestinal research, colitis models have also been used for gut microbiome research. Fecal matter is the most popular sample for studying the microbiological environment in colitis models. Sample preparation and purification in such samples can often be very time-consuming. With MP Bio's high-throughput FastPrep® sample preparation systems, lysing matrices and FastDNA™ SPIN Kit for Feces, raw samples can be processed to analysis-ready purified extracts in only 30 minutes.

	Description	Size	Cat. No.
Instrumentation	FastPrep-24™ 5G instrument	1 each	116005500
	FastPrep-96™ instrument	1 each	116010500
Lysing Matrices	Lysing Matrix E	50 x 2 mL	116914050
		100 x 2 mL	116914100
		500 x 2 mL	116914500
		25 x 4.5 mL	116974025
		50 x 4.5 mL	116974050
		100 x 4.5 mL	116974100
		5 x 15 mL	116934005
		25 x 15 mL	116934025
		50 x 15 mL	116934050
		10 x 50 mL	116954010
		50 x 50 mL	116954050
		100 x 50 mL	116954100
		96-well Rack	116984001
		10 x 96-well Rack	116984010
	Lysing Matrix G	50 x 2 mL	116916050
		100 x 2 mL	116916100
	Lysing Matrix H	50 x 2 mL	116917050
		100 x 2 mL	116917100
	Lysing Matrix I	50 x 2 mL	116918050
		100 x 2 mL	116918100
	Lysing Matrix Y	96-well Rack	116960001
		10 x 96-well Rack	116960010
Nucleic Acid Purification Kits	FastDNA™ SPIN Kit for Feces	50 preps	116570200
	FastDNA™-96 Fecal DNA Kit	2 x 96 preps	119696400

Feeding Your Animals with MP Bio Animal Diets

Take a fresh look at MP Bio's prepared animal research diets and you'll discover an entirely new standard in quality, freshness and value. Whether you're studying obesity, type II diabetes, a vitamin or mineral deficiency, insect breeding or memory loss based on diet, MP Bio offers you a fresh perspective for your animal dietary needs.

Our animal diets and dietary components are of the finest quality and the most uniform of commercially available diets. Our specialists adhere to strict specifications and every component is extensively monitored throughout the entire manufacturing process to ensure greater consistency with every order.

Because dietary components vary in shelf-life, we choose not to stock any finished preparation. Instead, every diet is freshly formulated after an order has been placed. Furthermore, due to the tremendous volume of components we handle weekly, we are constantly restocking raw materials. So you can rest assured that the diet ingredients are always fresh.

- Best Quality: **MP Bio animal diets and dietary components are of the finest quality and the most uniform of commercially available diets. MP Bio operates under certified quality systems, with production sites regulated under ISO9001:2015 minimum.**
- Customizable: **MP Bio has over five decades of experience in customized animal research diets and more than 15,000 successful custom formulations.**
- Fresh: **All animal diets are freshly formulated upon placing your order.**
- More Options: **MP Bio animal diets offer selections in both pelleted and powdered form and the flexibility to customize pellet size and color.**

Need Your Diet Customized?

Visit www.mpbio.com or simply submit your inquires to customer service via CustServ@mpbio.com.

Standard Formulation Diets

Name	Description	Cat. No.
AIN-76 Semipurified Diet **(3.902 kCal/g)**	Standard AIN formulation for rodent animals for effective growth and survival.	02905453
AIN-76A Semipurified Diet **(High Vitamin K)**	Intended for growth and maintenance during the first year of life. Good for reproduction and lactation in both rats and mice.	02960097
AIN-76C Semipurified Diet **(Stabilized for longer shelf life)**	Basic animal diet for maintaining mouse and rat colonies in the research lab.	02960296
AIN-93G Diet **(4.00 kCal/g, 20% Casein)**	Standard AIN formulation for rodent animal growth and breeding.	02960399
AIN-93M Diet **(3.85 kCal/g, 14% Casein)**	Standard AIN formulation for mature rodent animals.	02960397
Mouse Diet, Purified	A natural-ingredient diet specifically formulated to provide the proper balance of all known nutrients considered essential for the growth, maintenance, and reproduction of mice for lab experiments.	02904606
Vanderzant-Adkisson Special Wheat Germ Diet for Insects	Widely used for laboratory rearing of more than 20 species of insects.	02902942

Feeding Your Animals with MP Bio Animal Diets

Specialty Research Diets

Name	Application	Cat. No.
Obesity and Cholesterol Research		
Fat-Free Diet	Fat-free diet for cholesterol metabolism research.	02901683
Modified High Fat Diet **(45% Fat, 5.81 kCal/g)**	Modified with essential trace minerals, DL-Methionine and fiber. Used for obesity research.	02960192
High Saturated Fat Diet **(4.39 kCal/g, with Hydrogenated Coconut Oil)**	High Saturated Fat Diet has been used to induce obesity and high cholesterol in mice.	02960242
High Unsaturated Fat Diet **(4.39 kCal/g, with Safflower Oil)**	High Unsaturated Fat Diet has been used to induce obesity and high cholesterol in the mice.	02960244
Modified High Carbohydrate Diet **(68% Carbohydrate, 4.2 kCal/g)**	Mono-sourced (sucrose) high carbohydrate diet for obesity and diabetes research. Complex carbohydrate source diets are available up request.	02960236
Atherogenic Disease Research		
Atherogenic Diet **(7.5% Cocoa Butter, 1.25% Cholesterol)**	Feeding mice with atherogenic diet can induce the formation of plaques in the inner lining of arteries associated with coronary heart disease.	02960404
Dairy Butter Diet for Mice **(17.84% Dairy Butter)**	High Dairy Butter content diet for atherogenic model creation.	02960393
Liver Injury Research		
Choline Sufficient Diet	Supplemented with MP's Vitamin Diet Fortification Mixture to supply sufficient levels of Choline. Can be used as control diet in liver injury studies.	02960412
Choline Deficient Diet	Choline Deficient Diet, is used for the study of typical cellular and extracellular adult liver progenitor cells in rodents.	02960034
Choline Control Diet	Diet for animals used to study liver injury in conjunction with MP's Methionine/Choline Deficient diet.	02960414
Methionine/Choline Deficient Diet	Used to study induction of non-alcoholic steatohepatitis (NASH) in experimental models and its routes of development.	02960439
Methionine/Choline Control Diet	This control diet triggers the resolution of hepatic inflammatory and fibrotic reactions and hepatocyte apoptosis	02960441

Animal Dietary Supplement Mixtures

Name	Cat. No.
Salt & Mineral	
AIN-76 Mineral Mixture	02905455
AIN-93G Mineral Mix	02960400
AIN-93M Mineral Mix	02960401
Briggs Salt Mixture	02902834
Guinea Pig Mineral Mix	02960285
Hegsted Salt Mix	02902840
Hubbel, Mandel & Wakeman Salt Mixture	02902838
Jones & Foster Salt Mix	02902110
Phillips & Hart Salt Mix	02902844
Rogers & Harper Salt Mix	02902842
Salt Mix #2 USP XIII	02902845
Salt Mix USP XIV	02902850

Name	Cat. No.
Salt & Mineral - *cont.*	
Sodium-Free Salt Mix for Rat	02960352
Trace Minerals for Ultra Clean Environment	02960264
Wesson Salt Mixture	02902851
Williams-Briggs Salt Mix	02902837
Vitamin	
AIN-76 Vitamin Mixture	02905454
AIN-76A Vitamin Mixture	02960098
AIN-93VX Vitamin Mixture	02960402
Vanderzant Modification Vitamin Mixture for Insects	02903244
Vitamin Diet Fortification Mixture	02904654

DIY Animal Diet Ingredients

Name	Cat. No.
Alphacel Hydrolyzed	02900454
Alphacel Non-Nutritive Bulk	02900453
Brewer's Yeast	02903312
Casein Purified High Nitrogen	02901293
Casein Vitamin Free	02904520
Cocoa Butter	02905417
Coconut Oil	02901403
Coconut Oil Hydrogenated	02901404
Cod Liver Oil	02901405
Corn Ground Yellow	02901411
Corn Oil	02901414
Corn Oil Tocopherol-Stripped	02901415
Cottonseed Oil	02901419
Dextrin Type II	02901520
Dextrinized Corn Starch	02960429
D-(+)-Dextrose Anhydrous	02901521
Dextrose Monohydrate	02905594
Egg White Spray Dried	02901633

Name	Cat. No.
Gelatin	02960317
Lard Tocopherol-Stripped	02902141
Linseed Oil, Raw	02960122
Liver Powder	02900396
Liver Concentrate Powder	02900377
Menhaden Oil	02960120
Milk Powder, Whole	02902363
Milk Powder, Skim	02902887
Peanut Oil	02904684
Soybean Meal Defatted	02960024
Soybean Protein	02902940
Soy Protein Isolated	02905456
Starch, Corn	02902956
Starch, Wheat	02902952
Sucrose	02904713
Torula Yeast	02903085
Wheat Germ	02903288
Xanthan Gum	02960021

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