

Experiment Number: 20725 - 04

**P18: INCIDENCE RATES OF NON-NEOPLASTIC LESIONS BY ANATOMIC SITE (a) WITH
AVERAGE SEVERITY GRADES[b]**

Date Report Requested: 04/15/2016

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

F1_Mice

NTP Study Number: C20725
Lock Date: 10/11/2012
Cage Range: ALL
Date Range: ALL
Reasons For Removal: ALL
Removal Date Range: ALL
Treatment Groups: Include ALL
Study Gender: Both
TDMSE Version: 3.0.2.3_002
PWG Approval Date: 01/25/2016

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Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
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Disposition Summary

Animals Initially In Study	50	50	50	50
Early Deaths				
Accidentally Killed		1		
Moribund Sacrifice	6	5	4	14
Natural Death	9	5	9	11
Survivors				
Terminal Sacrifice	35	39	37	25
Animals Examined Microscopically	50	50	50	50

ALIMENTARY SYSTEM

Esophagus	(50)	(50)	(50)	(50)
Epithelium, Hyperplasia		1 [2.0]		
Periesophageal Tissue, Inflammation, Chronic Active				3 [1.7]
Submucosa, Inflammation, Chronic Active				1 [1.0]
Gallbladder	(45)	(42)	(43)	(43)
Inflammation				1 [2.0]
Intestine Large, Cecum	(46)	(48)	(47)	(48)
Inflammation	7 [1.6]		2 [1.0]	
Intestine Large, Colon	(46)	(47)	(48)	(47)
Intestine Large, Rectum	(46)	(46)	(45)	(49)
Inflammation				1 [1.0]
Intestine Small, Duodenum	(45)	(47)	(44)	(44)
Inflammation	1 [3.0]			
Necrosis	1 [2.0]			
Intestine Small, Ileum	(45)	(47)	(44)	(46)
Hemorrhage				1 [2.0]
Hyperplasia, Lymphoid	1 [1.0]	1 [2.0]	2 [2.0]	
Inflammation	3 [1.0]		1 [1.0]	
Intestine Small, Jejunum	(44)	(46)	(43)	(43)
Hyperplasia, Lymphoid	1 [1.0]		1 [2.0]	1 [1.0]
Inflammation	1 [1.0]	1 [2.0]		
Liver	(50)	(50)	(50)	(50)

a - Number of animals examined microscopically at site and number of animals with lesion

b-Average severity grade(1-minimal;2-mild;3-moderate;4-marked)

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Lab: BNW

B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Basophilic Focus	7	5	7	6
Clear Cell Focus	2	5	5	
Cyst	1	1		
Eosinophilic Focus	4	6	4	4
Hematopoietic Cell Proliferation				1 [1.0]
Hepatodiaphragmatic Nodule	1			
Mixed Cell Focus	4	7	2	1
Pigmentation, Ceroid	1 [2.0]			
Syncytial Alteration		1 [1.0]		
Tension Lipidosis		2 [1.0]		1 [1.0]
Thrombosis		1 [4.0]		
Hepatocyte, Degeneration	2 [2.5]			
Hepatocyte, Necrosis	4 [2.0]	5 [2.4]	1 [2.0]	3 [1.7]
Mesentery	(4)	(1)	(5)	(0)
Hemorrhage	1 [2.0]			
Artery, Thrombosis	1 [2.0]			
Fat, Necrosis	1 [2.0]	1 [1.0]	2 [1.5]	
Pancreas	(48)	(48)	(50)	(50)
Necrosis			1 [1.0]	
Acinus, Atrophy	2 [2.5]		1 [1.0]	
Salivary Glands	(50)	(49)	(50)	(50)
Stomach, Forestomach	(48)	(48)	(49)	(50)
Inflammation	2 [1.0]	1 [1.0]	1 [2.0]	
Necrosis			1 [1.0]	
Epithelium, Hyperplasia	3 [1.3]	2 [1.0]	1 [3.0]	1 [1.0]
Stomach, Glandular	(47)	(48)	(49)	(49)
Inflammation	3 [1.0]	4 [1.0]	2 [1.0]	
Mineralization			1 [1.0]	
Epithelium, Hyperplasia	1 [1.0]			
Tooth	(2)	(2)	(1)	(0)
Dysplasia	2 [1.5]	2 [1.5]	1 [1.0]	

CARDIOVASCULAR SYSTEM

Blood Vessel	(50)	(50)	(50)	(50)
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Lab: BNW

B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Inflammation	2 [1.0]			1 [1.0]
Heart	(50)	(50)	(50)	(49)
Cardiomyopathy	4 [1.0]	1 [2.0]	8 [1.3]	3 [1.0]
Inflammation, Acute	1 [1.0]		1 [3.0]	3 [3.0]
Inflammation, Chronic Active			1 [1.0]	5 [1.0]
Mineralization		1 [2.0]		
Necrosis	1 [4.0]			3 [2.7]
Polyarteritis	3 [2.0]			1 [2.0]
Thrombosis	1 [2.0]			
Valve, Inflammation, Chronic Active	1 [1.0]			

ENDOCRINE SYSTEM

Adrenal Cortex	(50)	(49)	(50)	(50)
Hyperplasia	1 [2.0]			
Inflammation, Suppurative				1 [1.0]
Vacuolization Cytoplasmic	1 [2.0]			
Zona Fasciculata, Hypertrophy, Focal	23 [1.1]	26 [1.1]	35 [1.1]	9 [1.0]
Adrenal Medulla	(50)	(48)	(50)	(50)
Hyperplasia			3 [1.0]	
Islets, Pancreatic	(48)	(48)	(49)	(50)
Hyperplasia	1 [1.0]	1 [1.0]	4 [1.5]	
Parathyroid Gland	(40)	(39)	(44)	(37)
Pituitary Gland	(50)	(49)	(50)	(50)
Pars Distalis, Hyperplasia	1 [1.0]	2 [1.5]		
Thyroid Gland	(50)	(49)	(50)	(50)
Cyst	1			
Inflammation, Chronic Active	1 [1.0]			2 [1.5]
Follicular Cell, Hyperplasia		1 [1.0]		1 [1.0]

GENERAL BODY SYSTEM

Tissue NOS	(0)	(0)	(0)	(1)
Inflammation, Chronic Active				1 [2.0]

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B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
GENITAL SYSTEM				
Epididymis	(49)	(49)	(50)	(49)
Exfoliated Germ Cell	32	23	25	26
Granuloma Sperm	1 [2.0]	2 [1.5]		1 [4.0]
Infiltration Cellular, Lymphoid	1 [1.0]			
Inflammation	3 [1.7]	2 [2.0]	1 [1.0]	1 [1.0]
Preputial Gland	(50)	(49)	(50)	(49)
Ectasia		2 [1.0]	2 [1.5]	1 [1.0]
Inflammation	1 [2.0]	3 [1.3]	5 [2.0]	3 [2.0]
Prostate	(49)	(49)	(49)	(50)
Inflammation		2 [1.0]		1 [2.0]
Seminal Vesicle	(49)	(49)	(50)	(50)
Dilatation	2 [1.0]			
Testes	(49)	(49)	(50)	(49)
Interstitial Cell, Hyperplasia			1 [2.0]	1 [2.0]
Seminiferous Tubule, Degeneration	14 [1.3]	6 [1.2]	13 [1.4]	6 [1.2]

HEMATOPOIETIC SYSTEM

Bone Marrow	(48)	(47)	(50)	(49)
Infiltration Cellular, Mast Cell			1 [1.0]	
Necrosis	1 [1.0]			
Myeloid Cell, Hyperplasia	9 [2.1]	8 [1.4]	20 [1.3]	39 [2.5]
Lymph Node	(5)	(1)	(3)	(8)
Deep Cervical, Ectasia				1 [2.0]
Deep Cervical, Hematopoietic Cell Proliferation				1 [3.0]
Deep Cervical, Hyperplasia, Lymphoid				4 [2.8]
Deep Cervical, Infiltration Cellular, Plasma Cell				1 [3.0]
Pancreatic, Ectasia			1 [3.0]	
Pancreatic, Hyperplasia, Lymphoid				1 [4.0]
Renal, Ectasia	1 [1.0]		1 [2.0]	
Renal, Hematopoietic Cell Proliferation				1 [2.0]
Lymph Node, Bronchial	(34)	(43)	(38)	(31)

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B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Ectasia				1 [2.0]
Hematopoietic Cell Proliferation			1 [2.0]	
Hyperplasia, Lymphoid		1 [1.0]	3 [1.0]	2 [1.0]
Infiltration Cellular, Plasma Cell				1 [2.0]
Inflammation, Chronic Active				2 [1.5]
Pigmentation				3 [1.0]
Lymph Node, Mandibular	(36)	(33)	(30)	(32)
Ectasia				4 [2.0]
Hematopoietic Cell Proliferation				3 [2.7]
Hyperplasia, Lymphoid	2 [1.0]	5 [1.2]	11 [1.3]	10 [1.7]
Infiltration Cellular, Plasma Cell	1 [1.0]		2 [1.0]	14 [2.0]
Lymph Node, Mediastinal	(37)	(33)	(38)	(32)
Hematopoietic Cell Proliferation			1 [1.0]	1 [2.0]
Hyperplasia, Lymphoid				2 [1.0]
Infiltration Cellular, Plasma Cell			1 [2.0]	2 [1.5]
Inflammation, Chronic Active				2 [3.0]
Lymph Node, Mesenteric	(47)	(47)	(49)	(47)
Ectasia	1 [2.0]		1 [2.0]	
Hematopoietic Cell Proliferation	4 [1.5]	1 [1.0]		2 [1.5]
Hyperplasia, Lymphoid	7 [1.7]	1 [3.0]	2 [1.0]	
Inflammation			1 [2.0]	
Spleen	(48)	(49)	(50)	(50)
Angiectasis		1 [1.0]		
Congestion				1 [2.0]
Hematopoietic Cell Proliferation	11 [2.2]	12 [1.7]	15 [1.8]	25 [2.0]
Hyperplasia, Lymphoid		4 [1.3]	1 [1.0]	3 [1.7]
Inflammation	1 [1.0]			2 [1.5]
Necrosis				2 [1.5]
Lymphoid Follicle, Atrophy				2 [2.0]
Thymus	(43)	(42)	(44)	(30)
Atrophy	10 [1.4]	5 [1.2]	2 [1.5]	5 [1.6]
Cyst	1			1
Ectopic Parathyroid Gland	6 [1.0]	4 [1.0]	11 [1.0]	4 [1.0]
Inflammation, Chronic Active	1 [1.0]			3 [2.0]

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Lab: BNW

B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
INTEGUMENTARY SYSTEM				
Mammary Gland	(1)	(0)	(0)	(1)
Skin	(50)	(49)	(50)	(49)
Hyperkeratosis			1 [2.0]	
Inflammation, Chronic Active	1 [3.0]	1 [3.0]	2 [3.5]	1 [3.0]
Pigmentation, Melanin		1 [2.0]		
Epidermis, Hyperplasia		2 [2.0]	1 [1.0]	
Epidermis, Necrosis			1 [3.0]	
Epidermis, Ulcer	1 [3.0]	1 [3.0]	1 [2.0]	
Subcutaneous Tissue, Cyst Epithelial Inclusion			1 [3.0]	
Subcutaneous Tissue, Inflammation, Suppurative			1 [4.0]	
Subcutaneous Tissue, Necrosis			1 [3.0]	

MUSCULOSKELETAL SYSTEM

Bone	(50)	(50)	(50)	(50)
Fibro-Osseous Lesion	1 [1.0]	1 [1.0]	3 [2.0]	2 [1.5]
Maxilla, Osteomalacia				1 [2.0]
Skeletal Muscle	(2)	(4)	(5)	(2)
Degeneration		1 [1.0]		1 [1.0]
Hemorrhage, Acute		2 [3.5]		
Inflammation		1 [1.0]		1 [2.0]
Necrosis, Acute		1 [3.0]		

NERVOUS SYSTEM

Brain	(50)	(50)	(50)	(50)
Infiltration Cellular, Lymphocyte			2 [1.0]	
Inflammation, Acute	1 [2.0]		1 [1.0]	
Inflammation, Chronic Active				1 [2.0]
Necrosis, Chronic	1 [2.0]			
Peripheral Nerve	(0)	(2)	(1)	(1)
Degeneration		1 [1.0]	1 [1.0]	1 [1.0]

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Lab: BNW

B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Spinal Cord	(0)	(2)	(1)	(1)

RESPIRATORY SYSTEM

Larynx	(49)	(49)	(49)	(50)
Inflammation, Suppurative	2 [1.0]			
Inflammation, Chronic Active	4 [1.0]	2 [1.0]	11 [1.2]	42 [1.6]
Artery, Inflammation, Chronic Active				1 [2.0]
Lumen, Exudate				2 [3.5]
Respiratory Epithelium, Hyperplasia	1 [1.0]			11 [1.3]
Respiratory Epithelium, Metaplasia, Squamous	3 [1.0]		6 [1.2]	50 [3.1]
Respiratory Epithelium, Necrosis	2 [1.0]	1 [1.0]	9 [1.0]	34 [1.2]
Respiratory Epithelium, Regeneration				32 [1.8]
Squamous Epithelium, Hyperplasia	3 [1.3]	7 [1.3]	15 [1.4]	42 [1.8]
Lung	(50)	(49)	(50)	(50)
Foreign Body				1
Inflammation, Suppurative				3 [2.3]
Inflammation, Chronic Active	1 [1.0]		2 [1.5]	
Mineralization	1 [1.0]			
Thrombosis	2 [1.0]	1		2
Alveolar Epithelium, Hyperplasia	1 [1.0]	1 [1.0]		
Alveolar Epithelium, Hyperplasia, Focal	3 [2.0]	3 [1.3]	4 [2.8]	
Alveolus, Infiltration Cellular, Histiocyte	7 [2.0]	2 [2.0]	3 [1.3]	9 [1.4]
Bronchiole, Epithelium, Hyperplasia	1 [1.0]		1 [2.0]	2 [2.0]
Bronchus, Inflammation, Suppurative				1 [1.0]
Bronchus, Epithelium, Necrosis				2 [1.5]
Bronchus, Epithelium, Regeneration				34 [1.9]
Interstitial, Fibrosis	1 [1.0]		1 [1.0]	
Mediastinum, Inflammation, Suppurative				3 [1.3]
Mediastinum, Inflammation, Chronic Active	1 [1.0]			8 [1.1]
Mediastinum, Necrosis				1 [2.0]
Pleura, Inflammation, Suppurative				2 [1.5]
Pleura, Inflammation, Chronic Active			1 [2.0]	
Nose	(49)	(48)	(50)	(50)
Foreign Body			3	

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B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Inflammation, Suppurative	2 [1.0]	4 [1.0]	47 [1.4]	50 [3.2]
Glands, Olfactory Epithelium, Inflammation, Acute		1 [1.0]		
Glands, Respiratory Epithelium, Cyst		1 [3.0]		5
Glands, Sinus, Metaplasia, Respiratory			1 [2.0]	13 [1.0]
Lamina Propria, Fibrosis			44 [1.0]	50 [2.0]
Lateral Wall, Inflammation, Chronic Active	5 [2.2]	8 [1.9]	5 [2.0]	2 [2.5]
Mucosa, Regeneration			47 [1.2]	47 [1.6]
Nasopharyngeal Duct, Polyp, Inflammatory				1
Olfactory Epithelium, Accumulation, Hyaline Droplet	1 [1.0]		1 [1.0]	2 [1.5]
Olfactory Epithelium, Atrophy		14 [1.1]	48 [2.1]	38 [1.8]
Olfactory Epithelium, Metaplasia, Respiratory	1 [1.0]		39 [1.6]	45 [2.7]
Olfactory Epithelium, Metaplasia, Squamous	1 [1.0]			
Olfactory Epithelium, Necrosis				19 [2.2]
Respiratory Epithelium, Accumulation, Hyaline Droplet	3 [1.0]	1 [1.0]	6 [1.0]	7 [1.0]
Respiratory Epithelium, Cyst		1 [3.0]		
Respiratory Epithelium, Hyperplasia	1 [1.0]			8 [1.0]
Respiratory Epithelium, Metaplasia, Squamous		6 [1.0]	47 [1.5]	50 [2.4]
Respiratory Epithelium, Necrosis			34 [1.1]	50 [1.6]
Respiratory Epithelium, Regeneration			2 [2.0]	
Septum, Perforation			3	11
Turbinate, Atrophy		8 [1.1]	49 [1.2]	50 [2.3]
Turbinate, Necrosis			4 [1.0]	27 [1.0]
Trachea	(48)	(49)	(49)	(49)
Inflammation, Chronic Active			2 [1.0]	45 [1.6]
Necrosis				47 [1.5]
Carina, Epithelium, Hyperplasia				1 [1.0]
Carina, Epithelium, Necrosis				1 [1.0]
Carina, Submucosa, Fibrosis				16 [1.7]
Carina, Submucosa, Inflammation, Chronic Active				4 [1.8]
Carina, Submucosa, Mineralization				15 [1.9]
Epithelium, Hyperplasia				6 [2.0]
Epithelium, Metaplasia, Squamous				5 [1.0]
Epithelium, Regeneration				45 [2.9]

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Lumen, Exudate				4 [3.0]
Submucosa, Fibrosis				46 [2.3]

SPECIAL SENSES SYSTEM

	(49)	(49)	(50)	(50)
Eye				
Phthisis Bulbi				1
Anterior Chamber, Inflammation, Suppurative				5 [2.0]
Cornea, Edema				1 [1.0]
Cornea, Inflammation, Acute	2 [1.5]		1 [1.0]	17 [1.4]
Cornea, Mineralization				5 [1.4]
Cornea, Neovascularization				1 [3.0]
Cornea, Epithelium, Hyperplasia	1 [1.0]			9 [1.2]
Cornea, Epithelium, Ulcer				3 [2.0]
Lens, Cataract	1 [2.0]	1 [1.0]		2 [2.0]
Harderian Gland	(50)	(49)	(50)	(50)
Hyperplasia	2 [1.5]	3 [2.0]	1 [2.0]	2 [1.0]

URINARY SYSTEM

	(49)	(50)	(50)	(50)
Kidney				
Cyst	1	2	1	
Infarct	2 [2.0]	1 [1.0]	2 [2.0]	1 [1.0]
Infiltration Cellular, Lymphocyte		1 [1.0]		
Inflammation	1 [2.0]		2 [3.5]	1 [2.0]
Metaplasia, Osseous	2 [1.0]	2 [1.0]	4 [1.3]	2 [1.0]
Mineralization		1 [1.0]		
Nephropathy	34 [1.1]	26 [1.1]	25 [1.3]	10 [1.0]
Pigmentation, Hemosiderin			1 [2.0]	
Papilla, Necrosis				1 [2.0]
Pelvis, Dilatation		1 [1.0]	1 [4.0]	
Urinary Bladder	(49)	(48)	(50)	(49)
Angiectasis	1 [1.0]			
Hyperplasia, Lymphoid			1 [2.0]	
Inflammation		1 [1.0]		

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B6C3F1 MICE MALE	Control	12.5 ppm	25 ppm	50 ppm
Mineralization				1 [1.0]

*** END OF MALE ***

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Disposition Summary				
Animals Initially In Study	50	50	50	50
Early Deaths				
Moribund Sacrifice	10	6	4	15
Natural Death	4	4	4	17
Survivors				
Moribund Sacrifice				1
Terminal Sacrifice	36	40	42	17
Animals Examined Microscopically	50	50	50	50

ALIMENTARY SYSTEM

Esophagus	(50)	(50)	(50)	(50)
Epithelium, Hyperplasia		1 [1.0]		
Periesophageal Tissue, Inflammation, Chronic Active				9 [1.6]
Gallbladder	(42)	(45)	(45)	(37)
Hyperplasia		1 [1.0]		
Inflammation				3 [1.0]
Ulcer		1 [1.0]		
Intestine Large, Cecum	(47)	(49)	(50)	(41)
Inflammation	2 [1.5]		2 [1.5]	
Inflammation, Granulomatous	1 [4.0]			
Necrosis		1 [1.0]		
Intestine Large, Colon	(47)	(49)	(50)	(46)
Intestine Large, Rectum	(49)	(49)	(46)	(43)
Inflammation		1 [1.0]		
Intestine Small, Duodenum	(47)	(48)	(49)	(38)
Inflammation	1 [4.0]	2 [1.0]		
Necrosis	1 [4.0]			
Intestine Small, Ileum	(47)	(48)	(49)	(39)
Hyperplasia, Lymphoid		1 [1.0]	1 [1.0]	
Inflammation	1 [4.0]			
Necrosis	1 [4.0]	1 [1.0]		
Ulcer	1 [4.0]			

a - Number of animals examined microscopically at site and number of animals with lesion

b-Average severity grade(1-minimal;2-mild;3-moderate;4-marked)

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Intestine Small, Jejunum	(46)	(49)	(49)	(39)
Liver	(50)	(50)	(50)	(50)
Amyloid Deposition			1 [4.0]	
Angiectasis	1 [2.0]			1 [2.0]
Basophilic Focus	1	3	3	1
Clear Cell Focus	1	7	3	
Cyst	1		1	2
Eosinophilic Focus	4	4		1
Fatty Change		1 [3.0]	2 [1.5]	
Fibrosis, Focal		1 [2.0]		
Hematopoietic Cell Proliferation		1 [2.0]	1 [1.0]	1 [2.0]
Hepatodiaphragmatic Nodule				1 [2.0]
Hyperplasia, Lymphoid		2 [1.0]	4 [1.3]	
Infiltration Cellular, Lymphocyte				1 [2.0]
Inflammation			1 [4.0]	
Mixed Cell Focus	2			
Tension Lipidosis				1 [1.0]
Centrilobular, Hepatocyte, Hypertrophy				1 [1.0]
Hepatocyte, Degeneration		1 [3.0]		
Hepatocyte, Necrosis	3 [1.7]	4 [2.0]	1 [4.0]	1 [1.0]
Kupffer Cell, Hypertrophy				1 [1.0]
Mesentery	(6)	(10)	(4)	(1)
Fat, Necrosis	4 [1.3]	9 [1.6]	4 [1.5]	
Pancreas	(50)	(50)	(50)	(47)
Cyst	1			1
Inflammation, Chronic Active	1 [2.0]	1 [3.0]	1 [1.0]	
Necrosis		1 [3.0]		
Acinus, Atrophy	1 [1.0]	2 [2.0]	1 [1.0]	
Salivary Glands	(49)	(50)	(50)	(50)
Inflammation, Chronic Active				3 [2.0]
Stomach, Forestomach	(50)	(50)	(50)	(49)
Infiltration Cellular, Lymphoid			1 [1.0]	
Inflammation	3 [1.3]	1 [1.0]	3 [1.0]	
Mineralization	1 [1.0]			
Epithelium, Hyperplasia	3 [1.7]	2 [1.5]	2 [1.0]	1 [1.0]
Stomach, Glandular	(49)	(50)	(50)	(46)

a - Number of animals examined microscopically at site and number of animals with lesion

b-Average severity grade(1-minimal;2-mild;3-moderate;4-marked)

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Cyst	1			
Degeneration		1 [1.0]		
Infiltration Cellular, Lymphoid	1 [1.0]		1 [1.0]	
Inflammation	5 [1.6]		1 [1.0]	2 [1.0]
Mineralization	3 [1.3]			1 [1.0]
Necrosis	1 [1.0]			
Tooth	(1)	(0)	(0)	(0)

CARDIOVASCULAR SYSTEM

Blood Vessel	(50)	(50)	(50)	(50)
Inflammation	1 [2.0]	1 [2.0]		3 [1.7]
Heart	(50)	(50)	(50)	(50)
Cardiomyopathy	4 [1.0]	1 [1.0]	2 [1.0]	4 [1.0]
Inflammation, Acute	2 [1.5]			2 [1.5]
Inflammation, Chronic Active		2 [1.0]	1 [2.0]	7 [1.7]
Mineralization		1 [1.0]		1 [1.0]
Necrosis	1 [1.0]			2 [1.5]
Polyarteritis	1 [3.0]			3 [1.7]
Valve, Inflammation, Chronic Active				1 [1.0]
Valve, Thrombosis	1 [2.0]			

ENDOCRINE SYSTEM

Adrenal Cortex	(50)	(50)	(50)	(50)
Accessory Adrenal Cortical Nodule	1 [1.0]			
Angiectasis				2 [1.0]
Hematopoietic Cell Proliferation				1 [2.0]
Hemorrhage				1 [2.0]
Hyperplasia			1 [1.0]	1 [1.0]
Hypertrophy				2 [1.0]
Inflammation, Chronic Active			1 [4.0]	
Necrosis	1 [1.0]		1 [4.0]	
Vacuolization Cytoplasmic	1 [3.0]	1 [2.0]		
Zona Fasciculata, Hyperplasia, Focal		1 [1.0]		

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b-Average severity grade(1-minimal;2-mild;3-moderate;4-marked)

Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Zona Fasciculata, Hypertrophy, Focal	2 [1.0]		2 [1.0]	3 [1.0]
Adrenal Medulla	(50)	(50)	(49)	(50)
Hyperplasia	2 [1.5]	4 [1.0]	1 [1.0]	2 [1.0]
Islets, Pancreatic	(49)	(50)	(49)	(48)
Hyperplasia		1 [2.0]		
Parathyroid Gland	(38)	(39)	(46)	(46)
Hyperplasia			1 [1.0]	
Pituitary Gland	(49)	(49)	(50)	(48)
Pars Distalis, Angiectasis	3 [1.3]	1 [1.0]	1 [2.0]	
Pars Distalis, Hyperplasia	15 [1.5]	7 [1.1]	6 [1.7]	1 [1.0]
Pars Distalis, Inflammation, Suppurative			1 [1.0]	
Pars Intermedia, Angiectasis			1 [1.0]	
Thyroid Gland	(50)	(49)	(48)	(50)
Inflammation, Chronic Active				9 [1.2]
Mineralization				1 [1.0]
Follicular Cell, Hyperplasia		2 [1.0]	1 [1.0]	

GENERAL BODY SYSTEM

None

GENITAL SYSTEM

Clitoral Gland	(47)	(49)	(48)	(44)
Ovary	(49)	(50)	(49)	(50)
Angiectasis			1 [1.0]	
Cyst	15	17	12	12
Hemorrhage		1 [2.0]	1 [4.0]	
Hyperplasia, Tubular		1 [1.0]		
Inflammation	2 [4.0]	1 [1.0]	3 [2.0]	6 [2.2]
Mineralization		1 [2.0]	1 [2.0]	
Necrosis		1 [3.0]	1 [2.0]	
Uterus	(50)	(50)	(50)	(50)
Angiectasis	1 [3.0]	4 [1.8]	2 [2.5]	
Hemorrhage	1 [2.0]			

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Inflammation	4 [2.5]	2 [2.0]		
Thrombosis	1 [3.0]	3 [1.7]	1 [2.0]	
Artery, Necrosis	1 [4.0]			
Endometrium, Hyperplasia, Cystic	42 [2.4]	43 [2.3]	47 [2.1]	30 [1.9]

HEMATOPOIETIC SYSTEM

Bone Marrow	(50)	(50)	(50)	(49)
Myeloid Cell, Hyperplasia	3 [2.3]	2 [1.0]	7 [2.1]	33 [2.2]
Lymph Node	(11)	(10)	(11)	(7)
Deep Cervical, Hyperplasia, Lymphoid			1 [3.0]	4 [2.5]
Deep Cervical, Infiltration Cellular, Plasma Cell				1 [3.0]
Iliac, Ectasia		1 [2.0]		
Lumbar, Ectasia	1 [2.0]	1 [2.0]	1 [3.0]	
Lumbar, Hyperplasia	1 [2.0]			
Lumbar, Hyperplasia, Lymphoid	1 [1.0]		1 [3.0]	
Renal, Amyloid Deposition	1 [2.0]			
Renal, Ectasia			1 [2.0]	
Renal, Hyperplasia, Lymphoid	2 [2.5]	1 [2.0]		
Renal, Necrosis	1 [2.0]			
Lymph Node, Bronchial	(40)	(42)	(43)	(43)
Ectasia	1 [1.0]			
Hematopoietic Cell Proliferation		1 [2.0]		1 [1.0]
Hyperplasia, Lymphoid	5 [1.6]	7 [1.1]	4 [1.3]	1 [1.0]
Inflammation, Chronic Active				5 [2.6]
Necrosis, Lymphoid		1 [1.0]		1 [1.0]
Lymph Node, Mandibular	(39)	(47)	(45)	(39)
Amyloid Deposition	1 [2.0]			
Ectasia		1 [2.0]		3 [2.0]
Hematopoietic Cell Proliferation			2 [2.0]	1 [3.0]
Hyperplasia, Lymphoid	4 [1.3]	5 [1.0]	12 [1.3]	12 [1.6]
Hyperplasia, Plasma Cell				2 [2.5]
Infiltration Cellular, Plasma Cell	1 [1.0]			5 [2.6]
Infiltration Cellular, Polymorphonuclear				1 [1.0]
Inflammation, Suppurative				1 [3.0]

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Lymph Node, Mediastinal	(40)	(38)	(41)	(33)
Hematopoietic Cell Proliferation		1 [2.0]		
Hyperplasia, Lymphoid	1 [4.0]	2 [1.5]	2 [1.5]	1 [2.0]
Hyperplasia, Plasma Cell			1 [3.0]	1 [2.0]
Inflammation, Acute	1 [2.0]			
Inflammation, Chronic Active				2 [1.5]
Necrosis, Lymphoid		1 [1.0]		1 [1.0]
Lymph Node, Mesenteric	(49)	(50)	(50)	(45)
Ectasia		1 [2.0]	1 [2.0]	
Hematopoietic Cell Proliferation				2 [1.5]
Hyperplasia, Lymphoid	2 [2.0]	1 [1.0]	2 [2.5]	1 [1.0]
Infiltration Cellular, Plasma Cell	1 [4.0]			
Spleen	(50)	(50)	(50)	(48)
Amyloid Deposition			1 [2.0]	
Angiectasis				1 [1.0]
Hematopoietic Cell Proliferation	8 [2.3]	14 [1.9]	5 [1.4]	11 [2.3]
Hyperplasia, Lymphoid	10 [1.6]	15 [1.3]	10 [1.4]	4 [2.3]
Inflammation	1 [1.0]	1 [2.0]	1 [4.0]	2 [2.5]
Necrosis		1 [3.0]	1 [4.0]	3 [1.7]
Lymphoid Follicle, Atrophy				1 [2.0]
Thymus	(47)	(50)	(49)	(45)
Atrophy	4 [1.5]	5 [1.2]	2 [1.0]	12 [1.8]
Cyst		1		
Ectopic Parathyroid Gland	4 [1.0]	8 [1.0]	4 [1.0]	3 [1.0]
Hyperplasia, Lymphoid	3 [1.7]	4 [2.0]	2 [1.5]	1 [3.0]
Inflammation, Chronic	2 [2.0]			
Inflammation, Chronic Active				8 [2.1]

INTEGUMENTARY SYSTEM

Mammary Gland	(49)	(50)	(50)	(49)
Hyperplasia	1 [2.0]			
Inflammation, Chronic	1 [1.0]			
Skin	(50)	(50)	(50)	(50)
Erosion	1 [1.0]			

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Fibrosis				1 [2.0]
Inflammation, Chronic Active	1 [1.0]	2 [1.0]		3 [3.7]
Epidermis, Hyperplasia	1 [2.0]			1 [2.0]
Subcutaneous Tissue, Necrosis				2 [2.5]

MUSCULOSKELETAL SYSTEM

Bone	(50)	(50)	(50)	(50)
Fibro-Osseous Lesion	13 [1.1]	12 [1.5]	17 [1.2]	3 [1.7]
Skeletal Muscle	(6)	(1)	(3)	(4)
Degeneration	2 [1.0]		1 [1.0]	1 [2.0]
Inflammation		1 [3.0]		

NERVOUS SYSTEM

Brain	(50)	(50)	(50)	(50)
Infiltration Cellular		1 [1.0]		1 [1.0]
Infiltration Cellular, Lymphocyte	2 [1.0]		2 [1.5]	5 [1.2]
Inflammation, Acute	1 [1.0]			1 [3.0]
Inflammation, Chronic			1 [1.0]	
Peripheral Nerve	(2)	(1)	(2)	(2)
Degeneration	1 [1.0]		2 [2.0]	1 [2.0]
Spinal Cord	(2)	(1)	(2)	(2)

RESPIRATORY SYSTEM

Larynx	(49)	(50)	(50)	(49)
Inflammation, Chronic Active	4 [1.3]	5 [1.2]	22 [1.2]	36 [2.1]
Lumen, Exudate				4 [3.8]
Respiratory Epithelium, Hyperplasia			4 [1.3]	1 [2.0]
Respiratory Epithelium, Metaplasia, Atypical, Squamous		1 [3.0]		1 [3.0]
Respiratory Epithelium, Metaplasia, Squamous	2 [1.0]		6 [1.7]	48 [3.0]
Respiratory Epithelium, Necrosis	1 [1.0]	1 [1.0]	14 [1.1]	32 [1.5]

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Respiratory Epithelium, Regeneration			3 [1.0]	30 [1.4]
Squamous Epithelium, Hyperplasia	4 [1.3]	13 [1.2]	34 [1.5]	40 [2.1]
Submucosa, Mineralization		1 [1.0]		
Lung	(50)	(50)	(50)	(50)
Foreign Body				1
Hematopoietic Cell Proliferation		1 [3.0]		
Hemorrhage	1 [1.0]			
Hyperplasia, Lymphoid	1 [1.0]	1 [1.0]		
Inflammation, Suppurative		1 [1.0]		5 [1.8]
Inflammation, Chronic Active	1 [2.0]		1 [1.0]	2 [1.5]
Necrosis				1 [3.0]
Alveolar Epithelium, Hyperplasia, Focal	3 [1.3]			
Alveolus, Infiltration Cellular, Histiocyte	2 [2.0]	3 [1.0]	3 [1.3]	4 [1.0]
Alveolus, Inflammation, Suppurative				1 [3.0]
Alveolus, Epithelium, Hyperplasia			1 [2.0]	
Artery, Mediastinum, Inflammation, Chronic Active				1 [4.0]
Bronchiole, Inflammation, Suppurative				1 [2.0]
Bronchiole, Inflammation, Chronic				1 [1.0]
Bronchiole, Epithelium, Hyperplasia	1 [2.0]			2 [1.0]
Bronchus, Inflammation, Suppurative				2 [2.5]
Bronchus, Regeneration				1 [1.0]
Bronchus, Epithelium, Degeneration				4 [2.5]
Bronchus, Epithelium, Necrosis	2 [1.0]			5 [1.4]
Bronchus, Epithelium, Regeneration	2 [1.0]			38 [2.8]
Bronchus, Smooth Muscle, Mineralization				3 [1.7]
Bronchus, Submucosa, Fibrosis				5 [1.2]
Interstitial, Fibrosis				1 [1.0]
Mediastinum, Inflammation, Suppurative		1 [1.0]	1 [1.0]	8 [2.0]
Mediastinum, Inflammation, Chronic Active			1 [1.0]	7 [1.7]
Pleura, Inflammation, Suppurative				5 [2.0]
Pleura, Inflammation, Chronic Active			1 [2.0]	
Nose	(50)	(50)	(50)	(50)
Foreign Body			3	3
Inflammation, Suppurative	3 [1.0]	20 [1.2]	50 [1.6]	50 [3.3]
Glands, Respiratory Epithelium, Cyst				2 [2.0]

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Glands, Sinus, Metaplasia, Respiratory				12 [1.0]
Lamina Propria, Fibrosis			47 [1.0]	49 [1.9]
Lateral Wall, Inflammation, Chronic Active	1 [2.0]		1 [2.0]	
Mucosa, Regeneration			39 [1.2]	48 [2.1]
Olfactory Epithelium, Accumulation, Hyaline Droplet	11 [1.0]	11 [1.1]	17 [1.2]	2 [1.0]
Olfactory Epithelium, Atrophy		41 [1.6]	49 [2.2]	45 [1.4]
Olfactory Epithelium, Metaplasia, Respiratory		22 [1.2]	46 [1.7]	49 [3.3]
Olfactory Epithelium, Necrosis			1 [2.0]	20 [1.6]
Respiratory Epithelium, Accumulation, Hyaline Droplet	18 [1.2]	28 [1.1]	28 [1.0]	3 [1.0]
Respiratory Epithelium, Hyperplasia		1 [1.0]		2 [1.5]
Respiratory Epithelium, Metaplasia, Squamous	1 [1.0]	9 [1.0]	48 [1.3]	50 [2.7]
Respiratory Epithelium, Necrosis	1 [1.0]	5 [1.0]	33 [1.2]	50 [1.8]
Septum, Perforation			6	5
Turbinate, Atrophy		32 [1.0]	50 [1.1]	50 [2.1]
Turbinate, Necrosis			1 [1.0]	11 [1.0]
Pleura	(0)	(0)	(1)	(0)
Trachea	(50)	(49)	(50)	(50)
Inflammation, Chronic Active	1 [1.0]		4 [1.5]	42 [2.1]
Necrosis			3 [1.0]	48 [1.9]
Carina, Inflammation, Chronic Active				1 [1.0]
Carina, Epithelium, Regeneration				1 [1.0]
Carina, Submucosa, Fibrosis				6 [1.3]
Carina, Submucosa, Mineralization				5 [1.8]
Epithelium, Hyperplasia			1 [2.0]	1 [2.0]
Epithelium, Metaplasia, Squamous				2 [1.5]
Epithelium, Regeneration			9 [1.1]	45 [3.0]
Glands, Hyperplasia				1 [2.0]
Lumen, Exudate				12 [3.4]
Submucosa, Fibrosis				44 [2.3]

SPECIAL SENSES SYSTEM

Ear	(0)	(0)	(0)	(1)
Inflammation, Suppurative				1 [1.0]

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Test Type: CHRONIC

2,3-Butanedione

Time Report Requested: 10:33:43

Route: RESPIRATORY EXPOSURE WHOLE BODY

CAS Number: 431-03-8

First Dose M/F: 08/31/09 / 08/31/09

Species/Strain: MICE/B6C3F1

Lab: BNW

B6C3F1 MICE FEMALE	Control	12.5 ppm	25 ppm	50 ppm
Eye	(50)	(49)	(50)	(49)
Anterior Chamber, Inflammation, Suppurative			4 [1.8]	3 [1.0]
Cornea, Fibrosis			1 [1.0]	
Cornea, Inflammation, Acute	1 [1.0]	2 [1.0]	20 [1.2]	23 [1.1]
Cornea, Mineralization			13 [1.0]	16 [1.3]
Cornea, Necrosis				6 [1.3]
Cornea, Epithelium, Hyperplasia	2 [1.5]	2 [1.0]	10 [1.1]	9 [1.1]
Cornea, Epithelium, Ulcer			10 [1.4]	10 [1.6]
Lens, Cataract				2 [1.5]
Harderian Gland	(50)	(50)	(50)	(50)
Hyperplasia	2 [1.5]	4 [1.3]	1 [1.0]	4 [1.0]
Inflammation				1 [2.0]
Pigmentation, Porphyrin				1 [2.0]

URINARY SYSTEM

Kidney	(50)	(50)	(50)	(49)
Amyloid Deposition			1 [4.0]	
Cyst	1			
Hyperplasia, Lymphoid	1 [2.0]	3 [1.7]	3 [1.3]	
Infarct		3 [1.0]	3 [1.0]	2 [1.0]
Inflammation				1 [4.0]
Metaplasia, Osseous	1 [1.0]	1 [1.0]	1 [1.0]	
Necrosis		1 [1.0]		
Nephropathy	14 [1.2]	15 [1.1]	6 [1.5]	6 [1.2]
Capsule, Inflammation		1 [2.0]		
Urinary Bladder	(50)	(50)	(50)	(49)
Hyperplasia, Lymphoid	1 [3.0]	1 [1.0]	1 [1.0]	

*** END OF REPORT ***

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b-Average severity grade(1-minimal;2-mild;3-moderate;4-marked)