

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P04: NEOPLASMS BY INDIVIDUAL ANIMAL**  
2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**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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B6C3F1 MICE MALE Control	DAY ON TEST	0731	0732	0733	0734	0735	0736	0737	0738	0739	0740	0741	0742	0743	0744	0745	0746	0747	0748	0749	0750	0751	0752	0753	0754	0755	males (cont...)
	ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gallbladder	+	A	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Large, Cecum Lymphoma Malignant	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Large, Colon	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Large, Rectum	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Duodenum Hepatoblastoma, Metastatic, Liver Lymphoma Malignant Polyp Adenomatous	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Small, Ileum Lymphoma Malignant Sarcoma, Metastatic, Uncertain Primary Site	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Intestine Small, Jejunum Lymphoma Malignant Sarcoma, Metastatic, Uncertain Primary Site	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+
Liver Hepatoblastoma Hepatocellular Adenoma Hepatocellular Adenoma, Multiple Hepatocellular Carcinoma	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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B6C3F1 MICE MALE Control	DAY ON TEST																									males (cont...)
	0731	0751	0772	0772	0768	0776	0766	0777	0777	0755	0766	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	
ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	
Hepatocellular Carcinoma, Multiple					X		X				X														X	X
Hepatocholangiocarcinoma, Multiple											X															
Sarcoma, Metastatic, Uncertain Primary Site												X														
Mesentery																										
Lymphoma Malignant																										
Sarcoma, Metastatic, Uncertain Primary Site													X													
Pancreas																										
Lymphoma Malignant																										
Sarcoma, Metastatic, Uncertain Primary Site														X												
Salivary Glands																										
Stomach, Forestomach																										
Lymphoma Malignant																										
Sarcoma, Metastatic, Uncertain Primary Site																										
Stomach, Glandular																										
Tooth																										
<b>CARDIOVASCULAR SYSTEM</b>																										
Blood Vessel																										
Heart																										
Hemangiosarcoma																										
Hepatocellular Carcinoma, Metastatic, Liver																										X
Hepatocholangiocarcinoma, Metastatic, Liver																										
Lymphoma Malignant																										

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<b>B6C3F1 MICE MALE</b>	DAY ON TEST	0731	0519	0729	0729	0686	0730	0677	0762	0779	0590	0644	0770	0773	0779	0779	0773	0773	0442	0730	0733	0683	0664	0661	<b>males (cont...)</b>
	ANIMAL ID	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	

**ENDOCRINE SYSTEM**

Adrenal Cortex Subcapsular, Adenoma	+	+	+	+	+	+	+	+	+	+	X	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Adrenal Medulla	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Islets, Pancreatic	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parathyroid Gland	+	+	+	+	M	+	+	M	+	+	+	+	M	M	+	+	M	+	+	+	+	+	+	+	+
Pituitary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Thyroid Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Epididymis	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Preputial Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Prostate	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Seminal Vesicle	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Testes	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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B6C3F1 MICE MALE	DAY ON TEST																								* TOTALS	
	0730	0663	0730	0512	0773	0777	0777	0777	0777	0777	0777	0777	0676	0777	0777	0777	0777	0676	0777	0557	0667	0777	0777	0777		
Control	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	49	
	0002	0002	0002	0002	0003	0003	0003	0003	0003	0003	0003	0003	0003	0003	0003	0003	0003	0004	0004	0004	0004	0004	0004	0004	0005	49
	0667	0667	0668	0669	0660	0661	0662	0663	0664	0665	0666	0667	0668	0669	0660	0661	0662	0663	0664	0665	0666	0667	0668	0669	0660	49

**RESPIRATORY SYSTEM**

Larynx	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Alveolar/Bronchiolar Adenoma			X																						4
Alveolar/Bronchiolar Adenoma, Multiple																									1
Alveolar/Bronchiolar Carcinoma						X						X													4
Alveolar/Bronchiolar Carcinoma, Multiple														X											1
Hepatoblastoma, Metastatic, Liver																				X					1
Hepatocellular Carcinoma, Metastatic, Liver																									4
Hepatocholangiocarcinoma, Metastatic, Liver																									1
Lymphoma Malignant																									1
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	49
Turbinates, Polyp																									1
Trachea	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	48

**SPECIAL SENSES SYSTEM**

Eye	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Harderian Gland Adenoma	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
																								X	3

**URINARY SYSTEM**

Kidney	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	49
Hepatocholangiocarcinoma, Metastatic, Liver																									1

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B6C3F1 MICE MALE 12.5 ppm	DAY ON TEST																								* TOTALS
	0730	0730	0732	0733	0733	0733	0733	0731	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730	0730		
ANIMAL ID	002226	002227	002228	002229	002230	002231	002232	002233	002234	002235	002236	002237	002238	002239	002240	002241	002242	002243	002244	002245	002246	002247	002248	002249	
Lymph Node Iliac, Lymphoma Malignant																									1 1
Lymph Node, Bronchial Lymphoma Malignant	+	+	I	+	I	+	+	+	M	M	A	+	+	I	+	+	+	+	M	+	+	+	+	+	43 2
Lymph Node, Mandibular Lymphoma Malignant	I	+	+	I	+	+	M	M	M	M	M	M	+	M	+	+	+	M	+	M	+	+	+	M	33 2
Lymph Node, Mediastinal Lymphoma Malignant	M	I	+	I	+	+	X	+	+	+	+	A	+	I	I	+	+	+	I	+	+	+	+	I	33 2
Lymph Node, Mesenteric Lymphoma Malignant	+	+	+	+	+	+	X	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	I	47 3
Spleen Hemangiosarcoma Lymphoma Malignant	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	49 2 3
Thymus Lymphoma Malignant	+	+	+	+	+	+	X	+	+	+	+	A	+	I	I	+	I	+	+	+	+	I	I	+	42 3
<b>INTEGUMENTARY SYSTEM</b>																									
Mammary Gland	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0
Skin Carcinoma Lymphoma Malignant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49 1 1

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B6C3F1 MICE MALE 25 ppm	DAY ON TEST																				* TOTALS	
	0729	0730	0731	0732	0733	0734	0735	0736	0737	0738	0739	0740	0741	0742	0743	0744	0745	0746	0747	0748		0749
ANIMAL ID	00426	00427	00428	00429	00430	00431	00432	00433	00434	00435	00436	00437	00438	00439	00440	00441	00442	00443	00444	00445	00446	
Histiocytic Sarcoma																		X				1
Lymphoma Malignant																				X		1
Mesentery					+		+	+						+								5
Hepatoblastoma, Metastatic, Liver									X													1
Hepatocellular Carcinoma, Metastatic, Liver														X								1
Hepatocholangiocarcinoma, Metastatic, Liver																						1
Pancreas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Hepatoblastoma, Metastatic, Liver									X													1
Hepatocholangiocarcinoma, Metastatic, Liver																						1
Histiocytic Sarcoma																			X			1
Lymphoma Malignant																						1
Salivary Glands	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Stomach, Forestomach	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Stomach, Glandular	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Hepatocholangiocarcinoma, Metastatic, Liver																						1
Histiocytic Sarcoma																			X			1
Lymphoma Malignant																				X		1
Tooth																						1
<b>CARDIOVASCULAR SYSTEM</b>																						
Blood Vessel	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Aorta, Histiocytic Sarcoma																				X		1
Heart	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50

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	ANIMAL ID	00426	00427	00428	00429	00430	00431	00432	00433	00434	00435	00436	00437	00438	00439	00440	00441	00442	00443	00444	00445	00446	00447	
Hepatocholangiocarcinoma, Metastatic, Liver																								1
Lymphoma Malignant																				X				2
Preputial Gland		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Prostate		+	+	+	+	+	+	+	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	49
Carcinoma, Metastatic, Urinary Bladder																								1
Hepatocholangiocarcinoma, Metastatic, Liver																								1
Lymphoma Malignant																				X				2
Seminal Vesicle		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Hepatocholangiocarcinoma, Metastatic, Liver																								1
Lymphoma Malignant																								1
Testes		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
<b>HEMATOPOIETIC SYSTEM</b>																								
Bone Marrow		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Lymphoma Malignant																				X				1
Lymph Node												+												3
Pancreatic, Hepatoblastoma, Metastatic, Liver											X													1
Renal, Lymphoma Malignant																								1
Lymph Node, Bronchial		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	38
Alveolar/Bronchiolar Carcinoma, Metastatic, Lung																					X			1
Lymph Node, Mandibular		+	+	M	I	+	+	M	+	I	+	M	+	+	+	+	+	+	M	+	+	+	+	30
Lymphoma Malignant																				X				1

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	0729	0730	0739	0738	0758	0772	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777		0777				
ANIMAL ID	00426	00442	00442	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444	00444					
Lymph Node, Mediastinal	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	I	+	+	M	I	M	+	I	+	+	38
Alveolar/Bronchiolar Carcinoma, Metastatic, Lung					X																					1
Hepatoblastoma, Metastatic, Liver									X																	1
Hepatocholangiocarcinoma, Metastatic, Liver																										1
Lymph Node, Mesenteric	+	+	+	+	I	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Hepatocholangiocarcinoma, Metastatic, Liver																										1
Histiocytic Sarcoma																			X							2
Lymphoma Malignant																						X				3
Spleen	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Histiocytic Sarcoma																										1
Lymphoma Malignant																						X				2
Thymus	+	+	+	+	+	+	+	+	+	+	+	+	I	+	+	+	+	I	+	I	M	+	+	+	+	44
Alveolar/Bronchiolar Carcinoma, Metastatic, Lung					X																					1
Histiocytic Sarcoma																				X						1
<b>INTEGUMENTARY SYSTEM</b>																										
Mammary Gland	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0
Skin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
<b>MUSCULOSKELETAL SYSTEM</b>																										
Bone	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Skeletal Muscle					+				+											+						5

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 Lab: BNW

B6C3F1 MICE MALE 25 ppm	DAY ON TEST																								* TOTALS
	0729	0730	0731	0732	0733	0734	0735	0736	0737	0738	0739	0740	0741	0742	0743	0744	0745	0746	0747	0748	0749	0750	0751		
ANIMAL ID	00426	00427	00428	00429	00430	00431	00432	00433	00434	00435	00436	00437	00438	00439	00440	00441	00442	00443	00444	00445	00446	00447	00448	00449	
Alveolar/Bronchiolar Carcinoma, Metastatic, Lung					X																			1	
Hepatoblastoma, Metastatic, Liver										X														1	
Hepatocholangiocarcinoma, Metastatic, Liver																								1	
Histiocytic Sarcoma																			X					1	
<b>NERVOUS SYSTEM</b>																									
Brain	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50	
Lymphoma Malignant																				X				1	
Peripheral Nerve																								1	
Spinal Cord																								1	
<b>RESPIRATORY SYSTEM</b>																									
Larynx	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49	
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50	
Alveolar/Bronchiolar Adenoma									X			X												5	
Alveolar/Bronchiolar Carcinoma						X					X										X			4	
Alveolar/Bronchiolar Carcinoma, Multiple					X																			2	
Hepatoblastoma, Metastatic, Liver									X															1	
Hepatocellular Carcinoma, Metastatic, Liver												X	X				X							7	
Hepatocholangiocarcinoma, Metastatic, Liver																								1	
Histiocytic Sarcoma																			X					1	
Lymphoma Malignant																				X				2	
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50	

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically





Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

<b>B6C3F1 MICE MALE</b>	DAY ON TEST	0731	0407	0304	0702	0703	0407	0701	0703	0703	0702	0702	0601	0701	0608	0702	0409	0605	0703	0703	0702	0702	0506	0302	0702	0703	<b>males (cont...)</b>
	<b>50 ppm</b>	ANIMAL ID	006011	006012	006013	006014	006015	006016	006017	006018	006019	006020	006021	006022	006023	006024	006025	006026	006027	006028	006029	006030	006031	006032	006033	006034	

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Gallbladder	M	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+		
Intestine Large, Cecum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Large, Colon	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	
Intestine Small, Ileum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Intestine Small, Jejunum Lymphoma Malignant	+	+	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+	+	A	+	+	+	
Liver	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hemangiosarcoma																										
Hepatocellular Adenoma				X																						
Hepatocellular Adenoma, Multiple									X																	
Hepatocellular Carcinoma					X				X														X			
Pancreas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Lymphoma Malignant																										
Salivary Glands	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

























Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE Control	DAY ON TEST	0684	0733	0733	0733	0733	0679	0578	0773	0773	0773	0678	0773	0773	0773	0773	0773	0773	0773	0666	0665	0700	0703	females (cont...)	
	ANIMAL ID	0010	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011		0011
Adrenal Cortex Subcapsular, Adenoma		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Adrenal Medulla Pheochromocytoma Benign		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Islets, Pancreatic		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	M	+	+	
Parathyroid Gland		+	+	M	M	+	+	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+		
Pituitary Gland Pars Distalis, Adenoma Pars Intermedia, Carcinoma		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Thyroid Gland Lymphoma Malignant Follicular Cell, Adenoma		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>GENERAL BODY SYSTEM</b>																									
NONE																									
<b>GENITAL SYSTEM</b>																									
Clitoral Gland		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Ovary Granulosa-Theca Tumor Malignant Lymphoma Malignant		+	+	+	+	+	+	+	+	I	+	+	+	+	+	+	+	+	+	+	+	+	+		

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE Control	DAY ON TEST																									females (cont...)
	0684	0733	0773	0773	0773	0676	0777	0575	0777	0777	0776	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	0777	
ANIMAL ID	0010	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	0011	
Granulosa-Theca Tumor Malignant, Metastatic, Ovary																									X	
Histiocytic Sarcoma																										
Lymphoma Malignant								X				X			X									X		
Spleen	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Lymphoma Malignant								X				X			X						X			X		
Thymus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Hepatoblastoma, Metastatic, Liver																										
Lymphoma Malignant								X				X									X			X		
<b>INTEGUMENTARY SYSTEM</b>																										
Mammary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Adenoma																										
Lymphoma Malignant													X													
Skin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Basal Cell Carcinoma																										
<b>MUSCULOSKELETAL SYSTEM</b>																										
Bone	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Skeletal Muscle																										
Granulosa-Theca Tumor Malignant, Metastatic, Ovary																									+	
Lymphoma Malignant																									X	
Sarcoma																									X	

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE Control	DAY ON TEST	0684	0733	0733	0733	0733	0679	0753	0778	0773	0773	0678	0773	0773	0773	0773	0773	0773	0773	0666	0665	0700	0703	females (cont...)			
	ANIMAL ID	0010	0011	0010	0011	0011	0011	0011	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010	0010		0010		
		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	

**NERVOUS SYSTEM**

Brain	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Lymphoma Malignant													X												
Peripheral Nerve																									+
Spinal Cord																									+

**RESPIRATORY SYSTEM**

Larynx	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Lymphoma Malignant													X								X			
Lung	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Alveolar/Bronchiolar Adenoma									X								X							
Alveolar/Bronchiolar Carcinoma					X																			
Alveolar/Bronchiolar Carcinoma, Multiple																								
Carcinoma, Metastatic, Harderian Gland							X																	
Hepatoblastoma, Metastatic, Liver																								
Histiocytic Sarcoma																								
Lymphoma Malignant													X								X			X
Nose	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Carcinoma, Metastatic, Harderian Gland							X																	
Trachea	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

**SPECIAL SENSES SYSTEM**

Eye	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
-----	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
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 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
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 BLANK .. Not examined microscopically







Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE Control	DAY ON TEST	0732	0733	0732	0731	0732	0762	0772	0773	0759	0773	0766	0776	0769	0771	0749	0773	0773	0717	0757	0777	0777	0776	0766	* TOTALS		
	ANIMAL ID	0012	0013	0012	0011	0012	0002	0000	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001	0001		0001	
Adrenal Cortex Subcapsular, Adenoma		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50 1		
Adrenal Medulla Pheochromocytoma Benign		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50 1		
Islets, Pancreatic		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49		
Parathyroid Gland		+	+	+	+	+	M	M	+	M	+	M	M	+	M	+	+	+	+	+	M	+	M	M	+	38	
Pituitary Gland Pars Distalis, Adenoma Pars Intermedia, Carcinoma		+	+	+	+	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49 2 1	
Thyroid Gland Lymphoma Malignant Follicular Cell, Adenoma		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50 2 1		
<b>GENERAL BODY SYSTEM</b>																											
NONE																											
<b>GENITAL SYSTEM</b>																											
Clitoral Gland		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	M	+	+	+	M	M	47
Ovary Granulosa-Theca Tumor Malignant Lymphoma Malignant		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49 1 2	

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically



Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE	DAY ON TEST																								* TOTALS	
	0732	0733	0732	0731	0732	0732	0737	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732		
Control	0012	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0033	0034	0035	0036	0037	0038	0039	0040	
Granulosa-Theca Tumor Malignant, Metastatic, Ovary																									1	
Histiocytic Sarcoma																	X								1	
Lymphoma Malignant			X																		X				6	
Spleen	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50	
Lymphoma Malignant			X																		X		X		8	
Thymus	+	+	+	+	+	+	I	+	+	+	I	+	+	+	+	+	+	+	+	+	I	+	+	+	47	
Hepatoblastoma, Metastatic, Liver											X														1	
Lymphoma Malignant																					X		X		6	
<b>INTEGUMENTARY SYSTEM</b>																										
Mammary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	M	+	+	+	+	49
Adenoma																	X									1
Lymphoma Malignant																										1
Skin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Basal Cell Carcinoma																								X		1
<b>MUSCULOSKELETAL SYSTEM</b>																										
Bone	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Skeletal Muscle																									+	6
Granulosa-Theca Tumor Malignant, Metastatic, Ovary																										1
Lymphoma Malignant																										2
Sarcoma																										1

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE	DAY ON TEST																								* TOTALS		
	0732	0733	0732	0731	0732	0732	0737	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732	0732			
Control	0026	0027	0028	0029	0030	0031	0032	0033	0034	0035	0036	0037	0038	0039	0040	0041	0042	0043	0044	0045	0046	0047	0048	0049	0050		
	07	07	07	07	07	07	06	07	07	05	07	07	06	07	07	04	07	07	01	07	05	07	07	07	06		
	3	3	3	3	3	3	4	3	3	9	3	3	6	3	3	9	3	3	7	3	9	3	3	3	6		
	2	3	2	1	2	2	7	2	2	0	3	3	9	1	1	9	2	3	7	2	3	2	3	2	3		
	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	2	2	2	2	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	5		
	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0		
Carcinoma, Metastatic, Harderian Gland																										1	
Lymphoma Malignant																										1	
Harderian Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50		
Adenoma								X															X		3		
Carcinoma																									1		
Lymphoma Malignant																									2		
<b>URINARY SYSTEM</b>																											
Kidney	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50		
Carcinoma																							X		1		
Lymphoma Malignant			X																	X					4		
Urinary Bladder	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50		
Lymphoma Malignant																						X			4		
<b>SYSTEMIC LESIONS</b>																											
Multiple Organ	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50		
Histiocytic Sarcoma															X										1		
Lymphoma Malignant			X																X		X				9		

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
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 I .. Insufficient tissue

M .. Missing tissue  
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 BLANK .. Not examined microscopically

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P04: NEOPLASMS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

<b>B6C3F1 MICE FEMALE</b>	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	ANIMAL ID	6	7	7	7	7	6	7	6	7	7	7	7	6	7	7	7	7	7	7	7	6	7	7	7	5	7	6	7	3	3	3	3	3	
<b>12.5 ppm</b>		4	3	3	3	3	9	3	3	3	3	3	9	3	3	3	3	3	3	3	3	2	3	3	3	6	3	3	3	3	3	3	3	3	
		4	2	2	2	1	7	1	5	3	1	2	1	0	2	3	1	1	3	2	5	3	2	5	3	2	1	2	2	2	2	2	2	2	2
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5									

females  
(cont...)

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Gallbladder Hemangiosarcoma, Metastatic, Liver	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	M	+	+	+	+											
Intestine Large, Cecum Histiocytic Sarcoma	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Intestine Large, Colon Histiocytic Sarcoma	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Intestine Large, Rectum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Intestine Small, Duodenum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Intestine Small, Ileum Lymphoma Malignant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+	+	+	+	+	+	
Intestine Small, Jejunum Lymphoma Malignant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+	+	+	+	+	+	
Liver	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Hemangiosarcoma																																				
Hepatoblastoma																																				
Hepatocellular Adenoma																				X		X														
Hepatocellular Adenoma, Multiple				X								X	X								X		X													
Hepatocellular Carcinoma																																				X
Hepatocellular Carcinoma, Multiple																																				
Histiocytic Sarcoma	X	X																																		

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

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

Lab: BNW

		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>B6C3F1 MICE FEMALE</b>	DAY ON TEST	6	7	7	7	7	6	7	6	7	7	7	7	6	7	7	7	7	7	6	7	7	7	5	7			
	ANIMAL ID	4	3	3	3	3	9	3	3	3	3	3	9	3	3	3	3	3	3	2	3	3	3	6	3			
<b>12.5 ppm</b>		4	2	2	2	1	7	1	5	3	1	2	1	0	2	3	1	1	3	2	5	3	2	1	2			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7
Lymphoma Malignant		X																										
Mesentery																												
Hepatocellular Carcinoma, Metastatic, Liver																												
Histiocytic Sarcoma																												
Pancreas																												
Histiocytic Sarcoma																												
Lymphoma Malignant																												
Salivary Glands																												
Histiocytic Sarcoma																												
Stomach, Forestomach																												
Squamous Cell Papilloma																												
Stomach, Glandular																												
Histiocytic Sarcoma																												
<b>CARDIOVASCULAR SYSTEM</b>																												
Blood Vessel																												
Heart																												
Histiocytic Sarcoma																												
Lymphoma Malignant																												
<b>ENDOCRINE SYSTEM</b>																												
Adrenal Cortex																												
Histiocytic Sarcoma																												

females  
(cont...)

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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 BLANK .. Not examined microscopically

**Experiment Number:** 20725 - 04  
**Test Type:** CHRONIC  
**Route:** RESPIRATORY EXPOSURE WHOLE BODY  
**Species/Strain:** MICE/B6C3F1

**P04: NEOPLASMS BY INDIVIDUAL ANIMAL**  
 2,3-Butanedione  
**CAS Number:** 431-03-8

**Date Report Requested:** 04/15/2016  
**Time Report Requested:** 10:33:42  
**First Dose M/F:** 08/31/09 / 08/31/09  
**Lab:** BNW

<b>B6C3F1 MICE FEMALE</b>	<b>12.5 ppm</b>	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>females (cont...)</b>	
			6	7	7	7	7	6	7	6	7	7	7	6	7	7	7	7	7	6	7	7	7	5	7		
			4	3	3	3	3	9	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	6		3
			4	2	2	2	1	7	1	5	3	1	2	1	0	2	3	1	1	3	2	5	3	2	1		2
		ANIMAL ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2			
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4			

Lymphoma Malignant

X

Adrenal Medulla

Islets, Pancreatic

Parathyroid Gland

Pituitary Gland

Pars Distalis, Adenoma

Pars Distalis, Carcinoma

Pars Intermedia, Adenoma

Thyroid Gland

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Clitoral Gland

Ovary

Cystadenoma

Histiocytic Sarcoma

Luteoma

Lymphoma Malignant

Teratoma Benign

Uterus

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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
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 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE	DAY ON TEST																									ANIMAL ID	females (cont...)
	0644	0733	0773	0773	0773	0676	0773	0676	0773	0773	0773	0773	0676	0773	0773	0773	0773	0773	0676	0773	0773	0773	0575	0773			
12.5 ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	000000000000000000000000		
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	000000000000000000000000		
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	000000000000000000000000		
	1	2	3	4	5	6	7	8	9	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	123456789011111111122222		

Histiocytic Sarcoma  
 Polyp Stromal

X  
 X

**HEMATOPOIETIC SYSTEM**

Bone Marrow	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
Hemangiosarcoma, Metastatic, Spleen																						X					
Lymph Node		+				+							+									+	+	+			
Inguinal, Lymphoma Malignant																											
Lumbar, Histiocytic Sarcoma																											
Lumbar, Lymphoma Malignant						X																X					
Pancreatic, Hepatocellular Carcinoma, Metastatic, Liver																											
Pancreatic, Histiocytic Sarcoma		X																									
Renal, Histiocytic Sarcoma		X																									
Renal, Lymphoma Malignant						X																	X				
Lymph Node, Bronchial	I	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I	I	+	+	+	M	+
Histiocytic Sarcoma		X																									
Lymphoma Malignant																							X	X			
Lymph Node, Mandibular	+	+	+	+	+	+	M	+	+	+	+	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+
Histiocytic Sarcoma																											
Lymphoma Malignant																								X			
Lymph Node, Mediastinal	+	+	M	+	+	+	+	+	+	+	+	M	I	M	+	+	+	+	+	+	+	+	+	+	+	+	+
Histiocytic Sarcoma																											
Lymphoma Malignant																								X			
Lymph Node, Mesenteric	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE 12.5 ppm	DAY ON TEST																									females (cont...)
	0644	0732	0772	0777	0777	0676	0777	0676	0777	0777	0777	0777	0676	0777	0777	0777	0777	0777	0676	0777	0777	0777	0575	0777		
ANIMAL ID	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000		
Histiocytic Sarcoma	X	X																								
Lymphoma Malignant					X												X				X					
Spleen	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Hemangiosarcoma																							X			
Lymphoma Malignant					X												X	X			X					
Thymus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Histiocytic Sarcoma		X																								
Lymphoma Malignant																	X	X								
<b>INTEGUMENTARY SYSTEM</b>																										
Mammary Gland	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Histiocytic Sarcoma, Metastatic, Uterus	X																									
Skin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Melanoma Malignant																	X									
Neural Crest Tumor																	X									
Subcutaneous Tissue, Fibrosarcoma					X																					
<b>MUSCULOSKELETAL SYSTEM</b>																										
Bone	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Skeletal Muscle																								+		
<b>NERVOUS SYSTEM</b>																										
Brain	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Carcinoma, Metastatic, Pituitary Gland																										

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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

<b>B6C3F1 MICE FEMALE</b>	DAY ON TEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		6	7	7	7	7	6	7	6	7	7	7	7	6	7	7	7	7	7	7	7	7	6	7	7	7	5	7	7	7	7	7	7	
		4	3	3	3	3	9	3	3	3	3	3	3	9	3	3	3	3	3	3	3	2	3	3	3	6	3	3	3	3	3	3	3	
<b>12.5 ppm</b>	ANIMAL ID	4	2	2	2	1	7	1	5	3	1	2	1	0	2	3	1	1	3	3	2	5	3	2	2	1	2	2	2	2	2	2		
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	
		1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5								
		<b>females (cont...)</b>																																

Lymphoma Malignant  
 Urinary Bladder  
 Histiocytic Sarcoma  
 Lymphoma Malignant

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	X																																		

**SYSTEMIC LESIONS**

Multiple Organ  
 Histiocytic Sarcoma  
 Lymphoma Malignant

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
X	X																																		
			X														X	X			X														

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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
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Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE 12.5 ppm	DAY ON TEST																				* TOTALS														
	0731	0733	0732	0732	0732	0738	0733	0733	0731	0731	0732	0731	0733	0733	0732	0733	0732	0730	0733	0732		0732	0731	0732	0733	0733	0733	0733	0733	0734	0735	0736	0737	0738	0739
ANIMAL ID	00326	00337	00338	00339	00340	00341	00342	00343	00344	00345	00346	00347	00348	00349	00350	00351	00352	00353	00354	00355	00356	00357	00358	00359	00360	00361	00362	00363	00364	00365	00366	00367	00368	00369	00370
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	1	3	2	2	2	8	3	3	1	1	2	1	3	3	2	3	2	0	3	8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

**ALIMENTARY SYSTEM**

Esophagus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Gallbladder	+	+	+	+	M	A	M	+	+	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	45
Hemangiosarcoma, Metastatic, Liver																																			1
Intestine Large, Cecum	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Histiocytic Sarcoma																																			1
Intestine Large, Colon	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Histiocytic Sarcoma																																			1
Intestine Large, Rectum	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Intestine Small, Duodenum	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	48
Intestine Small, Ileum	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	48
Lymphoma Malignant																																			3
Intestine Small, Jejunum	+	+	+	+	+	A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	49
Lymphoma Malignant																																			1
Liver	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Hemangiosarcoma																																			1
Hepatoblastoma																																			1
Hepatocellular Adenoma	X	X	X								X	X																							10
Hepatocellular Adenoma, Multiple																																			1
Hepatocellular Carcinoma	X																																		4
Hepatocellular Carcinoma, Multiple							X																												1
Histiocytic Sarcoma								X																											3

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 Species/Strain: MICE/B6C3F1

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 Lab: BNW

B6C3F1 MICE FEMALE 12.5 ppm	DAY ON TEST																				* TOTALS					
	0 7 3 1	0 7 3 3	0 7 3 2	0 7 3 2	0 7 3 2	0 7 2 8	0 7 3 3	0 7 3 3	0 7 3 1	0 7 3 1	0 7 3 2	0 7 3 1	0 7 3 3	0 7 3 3	0 7 3 2	0 7 3 3	0 6 8 0	0 7 3 3	0 7 3 2	0 7 3 2		0 7 3 1	0 7 3 2	0 7 3 3	0 7 3 3	0 6 7 4
ANIMAL ID	0 0 3 2 6	0 0 3 2 7	0 0 3 2 8	0 0 3 2 9	0 0 3 3 0	0 0 3 3 1	0 0 3 3 2	0 0 3 3 3	0 0 3 3 4	0 0 3 3 5	0 0 3 3 6	0 0 3 3 7	0 0 3 3 8	0 0 3 3 9	0 0 3 4 0	0 0 3 4 1	0 0 3 4 2	0 0 3 4 3	0 0 3 4 4	0 0 3 4 5	0 0 3 4 6	0 0 3 4 7	0 0 3 4 8	0 0 3 4 9	0 0 3 4 0	0 0 3 5 0
Peripheral Nerve																									1	
Spinal Cord																									1	
<b>RESPIRATORY SYSTEM</b>																										
Larynx	+ +																								50	
Lung	+ +																								50	
Alveolar/Bronchiolar Adenoma	X																								4	
Alveolar/Bronchiolar Adenoma, Multiple	X																								1	
Alveolar/Bronchiolar Carcinoma	X																								1	
Hepatocellular Carcinoma, Metastatic, Liver	X																								2	
Histiocytic Sarcoma	X																								3	
Lymphoma Malignant	X																								4	
Nose	+ +																								50	
Trachea	+ + + + + + + I + + + + + + + + + + + + + + + +																								49	
<b>SPECIAL SENSES SYSTEM</b>																										
Eye	+ + + + + A + + + + + + + + + + + + + + + + + +																								49	
Harderian Gland	+ +																								50	
Adenoma	X X																								3	
<b>URINARY SYSTEM</b>																										
Kidney	+ +																								50	
Histiocytic Sarcoma	X																								1	

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

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

Lab: BNW

B6C3F1 MICE FEMALE 12.5 ppm	DAY ON TEST	0731	0733	0732	0772	0772	0778	0773	0773	0771	0771	0772	0771	0773	0773	0772	0773	0772	0768	0773	0773	0773	0773	0773	0773	0774	* TOTALS
	ANIMAL ID	00326	00337	00338	00339	00340	00341	00342	00343	00344	00345	00346	00347	00348	00349	00350	00351	00352	00353	00354	00355	00356	00357	00358	00359	00360	
Lymphoma Malignant											X									X							2
Urinary Bladder		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Histiocytic Sarcoma																											1
Lymphoma Malignant											X									X							2

  

SYSTEMIC LESIONS																											
Multiple Organ	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	50
Histiocytic Sarcoma									X																		3
Lymphoma Malignant										X										X							6

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
+ .. Tissue examined microscopically  
X .. Lesion present  
I .. Insufficient tissue

M .. Missing tissue  
A .. Autolysis precludes evaluation  
BLANK .. Not examined microscopically







Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

B6C3F1 MICE FEMALE  25 ppm	DAY ON TEST																								females (cont...)
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	7	7	7	7	7	7	7	7	7	7	7	5	7	7	7	7	7	5	7	7	7	7	7	6	
	3	3	3	3	3	3	3	3	3	3	9	3	3	3	3	3	8	3	3	1	3	3	3	2	
	3	1	2	2	2	3	3	1	1	2	2	1	2	1	2	3	1	2	2	4	2	2	3	0	
ANIMAL ID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5

Pars Distalis, Adenoma  
 Pars Distalis, Carcinoma

X

Thyroid Gland  
 Carcinoma  
 Lymphoma Malignant

I + M

**GENERAL BODY SYSTEM**

NONE

**GENITAL SYSTEM**

Clitoral Gland  
 Hemangiosarcoma, Metastatic, Spleen

+ + + + + + + + + M + + + + + + + + + + + + + + + +

X

Ovary  
 Cystadenoma  
 Hemangioma  
 Hemangiosarcoma, Metastatic, Spleen  
 Luteoma  
 Lymphoma Malignant

+ + + + + + + + + M + + + + + + + + + + + + + + + +

X

X

X

X

Uterus  
 Granular Cell Tumor Benign  
 Polyp Stromal

+ +

X

**HEMATOPOIETIC SYSTEM**

Bone Marrow  
 Hemangiosarcoma, Metastatic, Spleen

+ +

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm                     | DAY ON TEST |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | ANIMAL ID | females<br>(cont...) |
|--|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|----------------------|
|  | 0733        | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 | 0733 |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | X         |                      |
| Lymph Node                                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Axillary, Lymphoma Malignant                     |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Deep Cervical, Lymphoma Malignant                |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lumbar, Lymphoma Malignant                       |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Pancreatic, Lymphoma Malignant                   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Renal, Lymphoma Malignant                        |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymph Node, Bronchial                            |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Alveolar/Bronchiolar Carcinoma, Metastatic, Lung |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymph Node, Mandibular                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymph Node, Mediastinal                          |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Hemangiosarcoma, Metastatic, Spleen              |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymph Node, Mesenteric                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Spleen   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Hemangiosarcoma                                  |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Lymphoma Malignant                               |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |
| Thymus   |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |           |                      |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically





Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                              |             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B6C3F1 MICE FEMALE<br>25 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                              |             | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 |   |
|                              |             | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 9 | 3 | 3 | 3 | 3 | 3 | 3 | 8 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |   |
|                              | 3           | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 0 | 0 |   |   |
| ANIMAL ID                    | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |   |
|                              | 5           | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |   |   |
|                              | 0           | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |   |   |
|                              | 1           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 0 |   |   |
| Lymphoma Malignant           |             |   |   |   |   |   | X |   |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

females  
(cont...)

**SYSTEMIC LESIONS**

|                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Organ     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Lymphoma Malignant |   |   | X |   |   | X |   |   |   | X |   |   | X | X |   | X |   |   | X |   |   | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

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

Lab: BNW

| B6C3F1 MICE FEMALE | 25 ppm | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |
|--------------------|--------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|
|                    |        | 0733        | 0733  | 0732  | 0771  | 0771  | 0773  | 0777  | 0777  | 0777  | 0676  | 0777  | 0777  | 0777  | 0777  | 0777  | 0676  | 0777  | 0777  | 0777  | 0676  |          | 0777  |       |       |       |
| ANIMAL ID          |        | 00526       | 00527 | 00528 | 00529 | 00530 | 00531 | 00532 | 00533 | 00534 | 00535 | 00536 | 00537 | 00538 | 00539 | 00540 | 00541 | 00542 | 00543 | 00544 | 00545 | 00546    | 00547 | 00548 | 00549 | 00550 |

ALIMENTARY SYSTEM

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |         |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---------|---------|
| Esophagus                                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +       | 50      |
| Gallbladder                                    | M | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | M | + | + | + | + | M | + | + | 45      |         |
| Intestine Large, Cecum<br>Lymphoma Malignant   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +       | 50<br>1 |
| Intestine Large, Colon<br>Lymphoma Malignant   | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | +       | 50<br>1 |
| Intestine Large, Rectum<br>Lymphoma Malignant  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | X | + | + | + | + | I | + | + | + | + | + | 46<br>1 |         |
| Intestine Small, Duodenum<br>Polyp Adenomatous | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49<br>1 |         |
| Intestine Small, Ileum                         | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49      |         |
| Intestine Small, Jejunum                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 49      |         |
| Liver  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50      |         |
| Hepatocellular Adenoma                         | X |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | X | X |   |   |   | 7       |         |
| Hepatocellular Carcinoma                       |   |   |   |   |   |   |   |   |   |   |   | X |   | X |   |   |   |   |   |   |   |   |   |   |   | 3       |         |
| Lymphoma Malignant                             |   |   |   |   |   |   |   |   |   |   |   |   |   | X | X |   |   | X |   |   |   |   |   | X |   | 8       |         |
| Mesentery                                      |   |   |   |   |   |   |   |   |   |   |   |   | + |   |   |   |   |   |   |   |   | + |   |   |   | 4       |         |
| Pancreas                                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | 50      |         |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically









Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>25 ppm                     | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |      |
|--|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|------|
|  | 0733        | 0732  | 0731  | 0731  | 0733  | 0731  | 0732  | 0732  | 0732  | 0731  | 0733  | 0733  | 0733  | 0733  | 0732  | 0732  | 0731  | 0733  | 0733  | 0733  | 0732  | 0732  |          | 0732  | 0732  | 0730  | 0731 |
| ANIMAL ID  | 00526       | 00527 | 00528 | 00529 | 00530 | 00531 | 00532 | 00533 | 00534 | 00535 | 00536 | 00537 | 00538 | 00539 | 00540 | 00541 | 00542 | 00543 | 00544 | 00545 | 00546 | 00547 | 00548    | 00549 | 00550 | 00551 |      |
| Alveolar/Bronchiolar Carcinoma, Metastatic, Lung |             |       |       |       |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1    |
| Lymphoma Malignant                               |             | X     |       |       |       |       |       |       |       |       |       |       |       |       | X     | X     |       |       |       | X     | X     |       |          |       | X     |       | 12   |
| <b>INTEGUMENTARY SYSTEM</b>                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |      |
| Mammary Gland                                    | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50   |
| Skin   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50   |
| Lymphoma Malignant                               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       | X     |       |       |       |       |       |       |          |       |       |       | 1    |
| Subcutaneous Tissue, Fibrosarcoma                |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1    |
| <b>MUSCULOSKELETAL SYSTEM</b>                    |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |      |
| Bone   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50   |
| Skeletal Muscle                                  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 3    |
| Alveolar/Bronchiolar Carcinoma, Metastatic, Lung |             |       |       |       |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1    |
| <b>NERVOUS SYSTEM</b>                            |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |      |
| Brain  | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50   |
| Peripheral Nerve                                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       | +     | 2    |
| Spinal Cord                                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       | +     |       | 2    |
| <b>RESPIRATORY SYSTEM</b>                        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |      |
| Larynx   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50   |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically





Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                           |             |                          |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---------------------------|-------------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0732                     | 0346 | 0644 | 0736 | 0436 | 0723 | 0276 | 0443 | 0663 | 0669 | 0663 | 0733 | 0733 | 0271 | 0702 | 0335 | 0573 | 0665 | 0733 | 0255 | 0733 | 0733 | 0513 | 0733 | 0513 | 0515 |
|                           | ANIMAL ID   | 0070                     | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 | 0077 |
| <b>50 ppm</b>             |             | 1                        | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    |      |
|                           |             | <b>females (cont...)</b> |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

**ALIMENTARY SYSTEM**

|  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esophagus                                    | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Gallbladder                                  | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | A | + | + | + | + | + | + | + | A |   |
| Intestine Large, Cecum<br>Lymphoma Malignant | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | + | + | + | + | + | + | + | + | A |   |
| Intestine Large, Colon                       | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A |   |
| Intestine Large, Rectum                      | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Intestine Small, Duodenum                    | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | A | + | + | + | A | + | + | + |   |   |
| Intestine Small, Ileum                       | + | + | A | + | + | + | + | + | + | + | A | + | + | + | A | + | + | A | + | + | + | + | + | + | A |   |
| Intestine Small, Jejunum                     | + | + | A | + | + | + | + | + | + | + | A | + | + | + | + | + | A | + | + | + | + | + | + | + | A |   |
| Liver  | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |   |
| Hemangiosarcoma                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hemangiosarcoma, Metastatic, Skeletal Muscle |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hepatocellular Adenoma                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hepatocellular Adenoma, Multiple             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Lymphoma Malignant                           |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mesentery                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Hemangiosarcoma, Metastatic, Skeletal Muscle |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Pancreas                                     | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | A |   |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
 I .. Insufficient tissue

M .. Missing tissue  
 A .. Autolysis precludes evaluation  
 BLANK .. Not examined microscopically

Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm  | DAY ON TEST      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  | ANIMAL ID | females<br>(cont...) |                  |                  |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|----------------------|------------------|------------------|------------------|
|   | 0<br>7<br>3<br>2 | 0<br>3<br>4<br>6 | 0<br>6<br>4<br>6 | 0<br>7<br>3<br>2 | 0<br>4<br>6<br>6 | 0<br>7<br>3<br>2 | 0<br>2<br>6<br>0 | 0<br>7<br>3<br>3 | 0<br>4<br>8<br>0 | 0<br>6<br>5<br>6 | 0<br>6<br>6<br>9 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>2<br>7<br>1 | 0<br>7<br>0<br>8 | 0<br>3<br>5<br>5 | 0<br>7<br>3<br>3 | 0<br>6<br>5<br>5 | 0<br>7<br>3<br>1 | 0<br>2<br>5<br>2 |           |                      | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 | 0<br>7<br>3<br>1 |
| Lymphoma Malignant  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           | X                    |                  |                  |                  |
| Salivary Glands<br>Lymphoma Malignant                                   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Stomach, Forestomach<br>Lymphoma Malignant                              | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Stomach, Glandular  | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | A                |
| <b>CARDIOVASCULAR SYSTEM</b>  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Blood Vessel<br>Hemangiosarcoma, Metastatic, Skeletal Muscle            | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Heart   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| <b>ENDOCRINE SYSTEM</b>   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |           |                      |                  |                  |                  |
| Adrenal Cortex<br>Capsule, Hemangiosarcoma, Metastatic, Skeletal Muscle | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Adrenal Medulla   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Islets, Pancreatic<br>Lymphoma Malignant                                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Parathyroid Gland   | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |
| Pituitary Gland   | +                | +                | +                | +                | +                | +                | I                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +                | +         | +                    | +                | +                | +                |

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
 + .. Tissue examined microscopically  
 X .. Lesion present  
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M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

|                           |             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>B6C3F1 MICE FEMALE</b> | DAY ON TEST | 0732 | 0346 | 0643 | 0743 | 0746 | 0273 | 0746 | 0463 | 0666 | 0666 | 0773 | 0773 | 0227 | 0773 | 0333 | 0333 | 0025 | 0355 | 0733 | 0655 | 0731 | 0225 | 0773 | 0773 | 0515 | 0515 |
|                           | ANIMAL ID   | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 | 0070 |

females  
(cont...)

Skeletal Muscle  
Hemangiosarcoma +

**NERVOUS SYSTEM**

Brain +  
 Lymphoma Malignant X  
 Peripheral Nerve +  
 Spinal Cord +

**RESPIRATORY SYSTEM**

Larynx +  
 Lung +  
 Alveolar/Bronchiolar Adenoma X  
 Lymphoma Malignant X  
 Nose +  
 Adenocarcinoma X  
 Trachea +

**SPECIAL SENSES SYSTEM**

Ear +  
 Eye +

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
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 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
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 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm  | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |         |  |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|---------|--|
|   | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          | 0750  |       |       |         |  |
| ANIMAL ID   | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749 | 00750   |  |
| Lymphoma Malignant  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       | 1       |  |
| Salivary Glands<br>Lymphoma Malignant                                   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1 |  |
| Stomach, Forestomach<br>Lymphoma Malignant                              | +           | +     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 49<br>1 |  |
| Stomach, Glandular  | +           | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +        | +     | +     | +     | 46      |  |
| <b>CARDIOVASCULAR SYSTEM</b>  |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |         |  |
| Blood Vessel<br>Hemangiosarcoma, Metastatic, Skeletal Muscle            | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1 |  |
| Heart   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50      |  |
| <b>ENDOCRINE SYSTEM</b>   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |         |  |
| Adrenal Cortex<br>Capsule, Hemangiosarcoma, Metastatic, Skeletal Muscle | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50<br>1 |  |
| Adrenal Medulla   | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 50      |  |
| Islets, Pancreatic<br>Lymphoma Malignant                                | +           | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 48<br>1 |  |
| Parathyroid Gland   | +           | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | M        | +     | M     | +     | 46      |  |
| Pituitary Gland   | +           | +     | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | 48      |  |

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Experiment Number: 20725 - 04

Test Type: CHRONIC

Route: RESPIRATORY EXPOSURE WHOLE BODY

Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL

2,3-Butanedione

CAS Number: 431-03-8

Date Report Requested: 04/15/2016

Time Report Requested: 10:33:42

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

Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm | DAY ON TEST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | * TOTALS |   |   |
|------------------------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|---|
|                              | ANIMAL ID   | 7 | 4 | 6 | 7 | 2 | 6 | 7 | 7 | 2 | 6 | 7 | 6 | 7 | 3 | 4 | 5 | 6 | 3 | 7 | 5 | 5 | 7 | 4 |          | 6 | 7 |
|                              |             | 3 | 1 | 7 | 3 | 6 | 9 | 3 | 3 | 2 | 9 | 3 | 0 | 3 | 4 | 2 | 8 | 9 | 2 | 1 | 9 | 4 | 3 | 0 | 0        | 3 |   |
|                              |             | 0 | 2 | 0 | 2 | 7 | 0 | 3 | 3 | 5 | 6 | 1 | 5 | 1 | 7 | 4 | 5 | 8 | 0 | 0 | 6 | 7 | 3 | 3 | 0        | 2 |   |
|                              |             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0        | 0 |   |
|                              |             | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7        | 7 |   |
|                              |             | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4        | 5 |   |
|                              |             | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9        | 0 |   |

Pars Intermedia, Adenoma

1

Thyroid Gland

+ +

50

GENERAL BODY SYSTEM

NONE

GENITAL SYSTEM

Clitoral Gland  
Lymphoma Malignant

+ + + + M M + + + + M + + + + + + M + + + + + + + +

44  
1

Ovary  
Lymphoma Malignant  
Periovarian Tissue, Hemangiosarcoma,  
Metastatic, Skeletal Muscle

+  
X  
X

50  
2  
1

Uterus  
Hemangioma  
Lymphoma Malignant

+  
X

50  
1  
1

HEMATOPOIETIC SYSTEM

Bone Marrow  
Lymphoma Malignant

+ + + + + + + + A + + + + + + + + + + + + + + + + + + +

49  
1

Lymph Node  
Axillary, Lymphoma Malignant  
Deep Cervical, Lymphoma Malignant  
Lumbar, Lymphoma Malignant

+ + + + + + + +

7  
1  
1  
1

\* .. Total animals with tissue examined microscopically; Total animals with tumor  
+ .. Tissue examined microscopically  
X .. Lesion present  
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M .. Missing tissue  
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Experiment Number: 20725 - 04  
 Test Type: CHRONIC  
 Route: RESPIRATORY EXPOSURE WHOLE BODY  
 Species/Strain: MICE/B6C3F1

P04: NEOPLASMS BY INDIVIDUAL ANIMAL  
 2,3-Butanedione  
 CAS Number: 431-03-8

Date Report Requested: 04/15/2016  
 Time Report Requested: 10:33:42  
 First Dose M/F: 08/31/09 / 08/31/09  
 Lab: BNW

| B6C3F1 MICE FEMALE<br>50 ppm              | DAY ON TEST |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | * TOTALS |       |       |       |       |   |    |    |
|---|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------|-------|-------|---|----|----|
|   | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  |          | 0750  |       |       |       |   |    |    |
| ANIMAL ID                                 | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746    | 00747 | 00748 | 00749 | 00750 |   |    |    |
| Renal, Lymphoma Malignant                 |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 1  |    |
| Lymph Node, Bronchial Lymphoma Malignant  | +           | +     | +     | +     | +     | +     | +     | +     | M     | +     | +     | +     | +     | +     | +     | +     | I     | M     | +     | +     | +        | +     | M     | +     | I     | + | 43 |    |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 2  |    |
| Lymph Node, Mandibular Lymphoma Malignant | +           | +     | M     | +     | +     | +     | +     | +     | M     | M     | +     | M     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | M     | +     | +     |   | 39 |    |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 3  |    |
| Lymph Node, Mediastinal                   | +           | I     | M     | +     | +     | I     | I     | +     | +     | +     | M     | I     | I     | M     | +     | +     | M     | +     | +     | M     | +        | M     | I     | +     | +     |   | 33 |    |
| Lymph Node, Mesenteric Lymphoma Malignant | +           | A     | +     | +     | +     | I     | +     | +     | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +        | +     | +     | +     | +     | M | 45 |    |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 3  |    |
| Spleen Lymphoma Malignant                 | +           | A     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | + |    | 48 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 4  |    |
| Thymus Histiocytic Sarcoma                | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | I     | +     | +     | +     | +     | +     | I     | +     | +     | +        | +     | I     | I     | +     |   | 45 |    |
| Lymphoma Malignant                        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       | X | 1  |    |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |   | 2  |    |
| <b>INTEGUMENTARY SYSTEM</b>               |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |   |    |    |
| Mammary Gland Lymphoma Malignant          | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | + |    | 49 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |   |    | 1  |
| Skin Squamous Cell Carcinoma              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | + |    | 50 |
|   |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |   |    | 1  |
| <b>MUSCULOSKELETAL SYSTEM</b>             |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |       |       |       |   |    |    |
| Bone                                      | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | +     | +     | +     | +     | + |    | 50 |

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Species/Strain: MICE/B6C3F1

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|------------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
|                              | 0730        | 0731  | 0732  | 0733  | 0734  | 0735  | 0736  | 0737  | 0738  | 0739  | 0740  | 0741  | 0742  | 0743  | 0744  | 0745  | 0746  | 0747  | 0748  | 0749  | 0750  | 0751  | 0752  | 0753  | 0754  |          | 0755  |
|                              | ANIMAL ID   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
|                              | 00726       | 00727 | 00728 | 00729 | 00730 | 00731 | 00732 | 00733 | 00734 | 00735 | 00736 | 00737 | 00738 | 00739 | 00740 | 00741 | 00742 | 00743 | 00744 | 00745 | 00746 | 00747 | 00748 | 00749 | 00750 | 00751    | 00752 |
| Harderian Gland              | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50    |
| Adenoma                      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 2     |
| Lymphoma Malignant           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1     |
| <b>URINARY SYSTEM</b>        |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
| Kidney                       | +           | +     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 49    |
| Lymphoma Malignant           |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1     |
| Urinary Bladder              | +           | +     | +     | +     | +     | +     | +     | +     | A     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 49    |
| Lymphoma Malignant           |             |       |       |       |       |       |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 3     |
| <b>SYSTEMIC LESIONS</b>      |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          |       |
| Multiple Organ               | +           | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +     | +        | 50    |
| Histiocytic Sarcoma          |             |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 1     |
| Lymphoma Malignant           |             |       |       |       |       |       |       |       |       |       | X     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |          | 4     |

\*\*\* END OF REPORT \*\*\*

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