

# **Clinical Laboratory Parameters for Crl:CD(SD) Rats**

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## **INTRODUCTION**

Normal or expected values for hematology and serum chemistry are frequently sought by those wishing to compare values assayed in their research to values obtained in other laboratories. Meaningful data on these parameters are often difficult to find. Control group data are not frequently published as stand-alone articles in peer-reviewed literature. Furthermore, although control group data are included along with test data when reporting findings in the literature, such data are not the primary topic of the paper and therefore are not referenced by a keyword. For this reason, computerized searches of the literature typically fail to find control data (1). To this end, we have compiled clinical laboratory data from 65 studies conducted in the CrI:CD(SD) rat.

## **PURPOSE**

The purpose of this publication is to provide the study director or reviewing toxicologist with a range of normal or expected values for selected hematology and serum chemistry parameters obtained at various intervals in studies of up to 150 weeks of duration. Different analytical methods, as well as environmental and technique-related variables, can greatly influence the values obtained for a particular parameter (1-3). For these reasons, the data included in this publication are for informational purposes only and are not intended for conclusive interpretation of any toxicological findings. While this information may be helpful in explaining a particular finding in a study, it is not meant as a substitute for an institution's in-house historical control data or for the concurrent control data from the study in question (1,3).

## **COMMON STUDY PARAMETERS**

The 65 studies included in this publication were conducted between 1995 and 2005 in five different contract laboratories or pharmaceutical toxicology facilities in the United States. The animals used in these studies were all CrI:CD(SD) rats from Charles River Laboratories production sites in North America. All studies were conducted in accordance with Good Laboratory Practice regulations of the US Food and Drug Administration or the Environmental Protection Agency and/or the Standard Operating Procedures of the participating laboratory. All studies were designed to support in-house research or marketing permits.

The data included in this publication were obtained from control group animals of dietary, oral gavage or intravenous injection studies. Some animals were untreated and others received the study control article in a manner like that used in the treated animals. Vehicles included: saline; deionized water; sterile water for injection; sodium phosphate buffer; 0.5-1.5 % aqueous methyl cellulose and 1% polyethylene glycol.

Rats included in this publication were housed singly or in pairs of the same sex in stainless steel wire mesh cages with free access to tap water. The animal rooms were generally maintained at average temperatures of  $72 \pm 5$  degrees Fahrenheit with an average relative humidity of 30-70%. A 12hr/12hr light/dark cycle was employed in all studies. Since the studies were conducted over a ten-year period in several different facilities, there were some variations in environmental conditions. However, the overall environmental conditions were not considered by those performing the studies to have had any effect on the overall quality and integrity of the studies. All rats were fed Purina PMI Certified Rodent Chow 5002 or PMI Rodent 18% Chow #5LG3.

The clinical laboratory evaluations were performed at intervals specified in individual study protocols and are presented here by age of animal at the time of evaluation. The rats were fasted overnight prior to blood collection. Instruments used for the clinical laboratory determinations included a BMC Hitachi-Model 717 analyzer and a Technicon H1E analyzer by Bayer.

## **DATA SETS PRESENTED**

The serum chemistry and hematology data are separated by sex and age range at the time of evaluation. Whenever necessary, results were converted to match the units and terminology more commonly used and presented here.

## **NOTES AND ABBREVIATIONS**

A/G Ratio = albumin/globulin ratio, a calculated parameter

Alanine Aminotransferase = ALT (aka SGPT)

Aspartate Aminotransferase = AST (aka SGOT)

MCHC = Mean Corpuscular Hemoglobin Concentration

MCH = Mean Corpuscular Hemoglobin

MCV = Mean Corpuscular Volume

N = number of animals included in determination

Range = Minimum to maximum values obtained, not presented for those parameters for which N<20.

## **ACKNOWLEDGMENTS**

Our special thanks to Joe Frank and all of the contributing laboratories without whose help this publication would not have been possible.

## **REFERENCES**

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3. Giknis, M.L.A. and Clifford, C.B., Clinical Laboratory Parameters for the CrI:CD(SD) Rats, Charles River Laboratories, (1999).

## **REQUEST FOR DATA**

The purpose of this and other publications by Charles River Laboratories is to assist you, our clients, in evaluating your data. Our aim is to provide you with the data that you need to do your job well.

We welcome your input and any suggestions you may have on ways to improve the usefulness of this document as well as topics for future documents. However, the publication is only as good as the data and the data usually improves in accuracy as the sample size increases. To this end we invite and encourage you to participate in our ongoing efforts to provide up to date information on historical control data on clinical laboratory determinations and on the incidence of neoplastic and non-neoplastic lesions in all strains of rats and mice supplied by Charles River Laboratories. If you or someone in your laboratory is willing to participate, please contact **Mary Giknis** through **Charles River Laboratories, 251 Ballardvale Street, Wilmington, MA 01887, 978-658-6000** or at **MLAGIKNIS@verizon.net**.

**Table 1: Summary of Hematology Historical Control Data from Rats 3-7 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	141	7.09	6.76 - 7.45
Hematocrit, %	141	41.80	40.10 - 44.20
Hemoglobin, g/dl	141	14.17	13.90 - 14.50
MCHC, %	141	33.92	32.50 - 35.00
MCH, pg	141	20.00	19.30 - 20.80
MCV, fl	141	59.02	58.00 - 62.10
Leukocytes, 10 <sup>3</sup> /μl	141	11.67	8.20 - 15.69
Neutrophils, %	141	9.14	7.00 - 13.30
Neutrophils, 10 <sup>3</sup> /μl	141	1.07	0.84 - 1.67
Lymphocytes, %	141	85.83	83.20 - 87.70
Lymphocytes, 10 <sup>3</sup> /μl	141	10.02	7.10 - 13.77
Monocytes, %	141	2.45	2.00 - 3.10
Monocytes, 10 <sup>3</sup> /μl	141	0.28	0.10 - 0.38
Eosinophils, %	141	0.89	0.80 - 1.00
Eosinophils, 10 <sup>3</sup> /μl	141	0.10	0.08 - 0.14
Basophils, %	141	0.41	0.30 - 0.60
Basophils, 10 <sup>3</sup> /μl	141	0.07	0.00 - 0.11
Large Unstained Cells, %	131	1.86	0.90 - 4.60
Large Unstained Cells, 10 <sup>3</sup> /μl	126	0.19	0.11 - 0.34
Platelets, 10 <sup>3</sup> /μl	141	995.11	899 - 1210

**Table 2: Summary of Hematology Historical Control Data from Rats 3-7 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	141	7.17	6.89 - 7.51
Hematocrit, %	141	40.87	39.10 - 42.80
Hemoglobin, g/dl	141	14.16	13.80 - 14.50
MCHC, %	141	34.66	33.60 - 35.60
MCH, pg	141	19.78	19.10 - 20.70
MCV, fl	141	57.10	55.70 - 61.30
Leukocytes, 10 <sup>3</sup> /μl	141	9.73	7.55 - 11.70
Neutrophils, %	141	7.99	5.90 - 13.00
Neutrophils, 10 <sup>3</sup> /μl	141	0.77	0.52 - 1.44
Lymphocytes, %	141	87.08	82.00 - 89.50
Lymphocytes, 10 <sup>3</sup> /μl	141	8.49	6.62 - 10.35
Monocytes, %	141	2.21	1.50 - 3.00
Monocytes, 10 <sup>3</sup> /μl	141	0.21	0.10 - 0.27
Eosinophils, %	141	1.10	0.80 - 1.40
Eosinophils, 10 <sup>3</sup> /μl	141	0.11	0.07 - 0.13
Basophils, %	141	0.38	0.30 - 0.50
Basophils, 10 <sup>3</sup> /μl	141	0.04	0.00 - 0.06
Large Unstained Cells, %	131	1.32	1.00 - 1.90
Large Unstained Cells, 10 <sup>3</sup> /μl	126	0.14	0.09 - 0.21
Platelets, 10 <sup>3</sup> /μl	141	968.00	879 - 1162

**Table 3: Summary of Hematology Historical Control Data from Rats 8-12 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	549	7.96	7.77 - 8.19
Hematocrit, %	549	43.93	41.20 - 47.30
Hemoglobin, g/dl	549	15.07	14.40 - 16.00
MCHC, %	544	34.38	32.70 - 35.70
MCH, pg	544	18.96	18.30 - 20.00
MCV, fl	544	55.17	53.00 - 59.50
Leukocytes, 10 <sup>3</sup> /μl	549	11.57	10.09 - 14.01
Neutrophils, %	529	9.89	8.20 - 14.50
Neutrophils, 10 <sup>3</sup> /μl	529	1.18	0.91 - 1.70
Lymphocytes, %	529	84.39	80.20 - 86.00
Lymphocytes, 10 <sup>3</sup> /μl	529	9.73	8.50 - 12.10
Monocytes, %	529	2.58	2.10 - 3.40
Monocytes, 10 <sup>3</sup> /μl	529	0.28	0.10 - 0.46
Eosinophils, %	529	1.20	1.00 - 1.50
Eosinophils, 10 <sup>3</sup> /μl	529	0.13	0.10 - 0.16
Basophils, %	529	0.48	0.30 - 1.00
Basophils, 10 <sup>3</sup> /μl	529	0.05	0.00 - 0.10
Large Unstained Cells, %	529	1.68	1.10 - 2.80
Large Unstained Cells, 10 <sup>3</sup> /μl	215	0.18	0.14 - 0.27
Platelets, 10 <sup>3</sup> /μl	260	792.00	379 - 967

**Table 4: Summary of Hematology Historical Control Data from Rats 8-12 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	554	7.53	7.21 - 7.92
Hematocrit, %	554	38.67	9.60 - 46.00
Hemoglobin, g/dl	554	14.53	13.70 - 15.70
MCHC, %	551	34.90	32.80 - 36.20
MCH, pg	551	19.30	18.60 - 20.00
MCV, fl	551	55.35	53.60 - 58.10
Leukocytes, 10 <sup>3</sup> /μl	554	9.17	7.44 - 10.70
Neutrophils, %	554	8.93	6.80 - 13.00
Neutrophils, 10 <sup>3</sup> /μl	554	0.85	0.54 - 1.40
Lymphocytes, %	554	85.94	82.30 - 88.40
Lymphocytes, 10 <sup>3</sup> /μl	554	7.89	6.42 - 9.47
Monocytes, %	554	2.29	1.90 - 3.10
Monocytes, 10 <sup>3</sup> /μl	554	0.19	0.10 - 0.24
Eosinophils, %	554	1.18	1.00 - 1.50
Eosinophils, 10 <sup>3</sup> /μl	554	0.10	0.09 - 0.12
Basophils, %	554	0.35	0.30 - 0.40
Basophils, 10 <sup>3</sup> /μl	554	0.03	0.00 - 0.05
Large Unstained Cells, %	232	1.34	1.00 - 1.70
Large Unstained Cells, 10 <sup>3</sup> /μl	257	0.13	0.11 - 0.17
Platelets, 10 <sup>3</sup> /μl	554	875.90	797 - 1112

**Table 5: Summary of Hematology Historical Control Data from Rats 13-22 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	464	8.34	7.89 - 8.90
Hematocrit, %	464	43.25	28.30 - 49.20
Hemoglobin, g/dl	464	15.35	14.70 - 16.60
MCHC, %	464	34.18	32.90 - 35.30
MCH, pg	464	18.43	17.70 - 19.00
MCV, fl	464	54.01	51.70 - 58.40
Leukocytes, 10 <sup>3</sup> /μl	464	11.13	9.78 - 12.90
Neutrophils, %	464	11.11	9.00 - 13.60
Neutrophils, 10 <sup>3</sup> /μl	464	1.33	0.91 - 1.65
Lymphocytes, %	464	82.93	80.10 - 87.10
Lymphocytes, 10 <sup>3</sup> /μl	464	9.21	8.10 - 10.65
Monocytes, %	464	2.60	1.10 - 4.10
Monocytes, 10 <sup>3</sup> /μl	464	0.27	0.14 - 0.52
Eosinophils, %	464	1.32	0.70 - 2.00
Eosinophils, 10 <sup>3</sup> /μl	464	0.14	0.06 - 0.20
Basophils, %	464	0.40	0.30 - 0.50
Basophils, 10 <sup>3</sup> /μl	464	0.04	0.00 - 0.06
Large Unstained Cells, %	241	1.65	1.10 - 2.60
Large Unstained Cells, 10 <sup>3</sup> /μl	266	0.18	0.13 - 0.33
Platelets, 10 <sup>3</sup> /μl	464	851.58	765 - 1029

**Table 6: Summary of Hematology Historical Control Data from Rats 13-22 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	479	7.67	7.23 - 8.11
Hematocrit, %	479	42.24	39.60 - 45.90
Hemoglobin, g/dl	479	14.64	13.50 - 15.50
MCHC, %	479	34.68	32.60 - 36.00
MCH, pg	479	19.10	18.50 - 19.50
MCV, fl	479	55.14	53.50 - 58.30
Leukocytes, 10 <sup>3</sup> /μl	479	8.58	7.00 - 10.69
Neutrophils, %	479	9.71	7.70 - 14.20
Neutrophils, 10 <sup>3</sup> /μl	479	1.60	0.58 - 8.10
Lymphocytes, %	479	84.98	80.60 - 87.00
Lymphocytes, 10 <sup>3</sup> /μl	479	7.27	5.80 - 9.25
Monocytes, %	479	2.29	1.40 - 3.30
Monocytes, 10 <sup>3</sup> /μl	479	0.18	0.10 - 0.25
Eosinophils, %	479	1.24	0.60 - 1.60
Eosinophils, 10 <sup>3</sup> /μl	479	0.11	0.06 - 0.15
Basophils, %	479	0.35	0.20 - 0.50
Basophils, 10 <sup>3</sup> /μl	479	0.03	0.00 - 0.05
Large Unstained Cells, %	241	1.46	0.80 - 2.00
Large Unstained Cells, 10 <sup>3</sup> /μl	265	0.13	0.07 - 0.19
Platelets, 10 <sup>3</sup> /μl	479	841.08	787 - 1021

**Table 7: Summary of Hematology Historical Control Data from Rats 23-47 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, 10 <sup>6</sup> /μl	226	8.46	8.08 - 8.83
Hematocrit, %	226	47.65	47.00 - 48.30
Hemoglobin, g/dl	226	15.70	15.40 - 16.00
MCHC, %	221	32.90	31.70 - 34.10
MCH, pg	221	18.55	18.20 - 18.90
MCV, fl	221	56.55	53.20 - 59.90
Leukocytes, 10 <sup>3</sup> /μl	226	9.75	9.40 - 10.10
Neutrophils, %	226	17.85	17.60 - 18.09
Neutrophils, 10 <sup>3</sup> /μl	226	1.72	1.70 - 1.74
Lymphocytes, %	226	75.93	74.20 - 77.66
Lymphocytes, 10 <sup>3</sup> /μl	226	7.25	7.20 - 7.30
Monocytes, %	226	2.02	1.90 - 2.13
Monocytes, 10 <sup>3</sup> /μl	226	0.20	0.00 - 0.20
Eosinophils, %	226	2.02	0.90 - 1.70
Eosinophils, 10 <sup>3</sup> /μl	226	0.15	0.10 - 0.20
Basophils, %	226	0.10	0.00 - 0.20
Basophils, 10 <sup>3</sup> /μl	226	0.05	0.00 - 0.10
Large Unstained Cells, %	226	1.68	1.30 - 1.72
Large Unstained Cells, 10 <sup>3</sup> /μl	226	0.19	0.12 - 0.21
Platelets, 10 <sup>3</sup> /μl	226	958.00	885 - 1031

**Table 8: Summary of Hematology Historical Control Data from Rats 23-47 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, x10 <sup>6</sup> /μl	233	7.89	7.81 - 7.97
Hematocrit, %	233	45.90	44.80 - 47.00
Hemoglobin, g/dl	233	15.30	15.20 - 15.40
MCHC, %	228	33.30	32.10 - 34.50
MCH, pg	228	19.40	19.40 - 19.40
MCV, fl	228	58.35	56.30 - 60.40
Leukocytes, 10 <sup>3</sup> /μl	233	7.30	5.50 - 9.10
Neutrophils, %	233	15.88	15.40 - 16.36
Neutrophils, 10 <sup>3</sup> /μl	233	1.20	0.90 - 1.50
Lymphocytes, %	233	79.64	78.18 - 81.10
Lymphocytes, 10 <sup>3</sup> /μl	233	4.65	4.30 - 5.00
Monocytes, %	233	2.11	1.82 - 2.40
Monocytes, 10 <sup>3</sup> /μl	233	0.13	0.10 - 0.16
Eosinophils, %	233	1.71	1.60 - 1.82
Eosinophils, 10 <sup>3</sup> /μl	233	0.50	0.10 - 0.90
Basophils, %	233	0.35	0.10 - 0.49
Basophils, 10 <sup>3</sup> /μl	233	0.04	0.00 - 0.11
Large Unstained Cells, %	233	1.80	1.60 - 1.98
Large Unstained Cells, 10 <sup>3</sup> /μl	233	0.20	0.19 - 0.20
Platelets, 10 <sup>3</sup> /μl	233	884.50	826 - 943



**Table 9: Summary of Hematology Historical Control Data from Rats 48-65 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, x10 <sup>6</sup> /μl	8	8.68	-
Hematocrit, %	8	48.30	-
Hemoglobin, g/dl	8	16.20	-
MCHC, %	8	33.60	-
MCH, pg	5	18.10	-
MCV, fl	8	55.60	-
Leukocytes, 10 <sup>3</sup> /μl	8	9.70	-
Neutrophils, %	8	14.43	-
Neutrophils, 10 <sup>3</sup> /μl	8	1.40	-
Lymphocytes, %	8	81.44	-
Lymphocytes, 10 <sup>3</sup> /μl	8	7.90	-
Monocytes, %	8	2.06	-
Monocytes, 10 <sup>3</sup> /μl	8	0.20	-
Eosinophils, %	8	1.03	-
Eosinophils, 10 <sup>3</sup> /μl	8	0.10	-
Basophils, %	8	0.00	-
Basophils, 10 <sup>3</sup> /μl	8	0.00	-
Large Unstained Cells, %	-	-	-
Large Unstained Cells, 10 <sup>3</sup> /μl	-	-	-
Platelets, 1000/mm <sup>3</sup>	8	961.00	-

**Table 10: Summary of Hematology Historical Control Data from Rats 48-65 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, x10 <sup>6</sup> /μl	8	8.30	-
Hematocrit, %	8	46.40	-
Hemoglobin, g/dl	8	16.00	-
MCHC, %	8	34.50	-
MCH, pg	5	19.30	-
MCV, fl	8	55.90	-
Leukocytes, 10 <sup>3</sup> /μl	8	6.00	-
Neutrophils, %	8	10.20	-
Neutrophils, 10 <sup>3</sup> /μl	8	0.60	-
Lymphocytes, %	8	85.20	-
Lymphocytes, 10 <sup>3</sup> /μl	8	5.10	-
Monocytes, %	8	1.67	-
Monocytes, 10 <sup>3</sup> /μl	8	0.10	-
Eosinophils, %	8	1.67	-
Eosinophils, 10 <sup>3</sup> /μl	8	0.10	-
Basophils, %	8	0.00	-
Basophils, 10 <sup>3</sup> /μl	8	0.00	-
Large Unstained Cells, %	-	-	-
Large Unstained Cells, 10 <sup>3</sup> /μl	-	-	-
Platelets, 10 <sup>3</sup> /μl	8	1019.00	-

**Table 11: Summary of Hematology Historical Control Data from Rats 88-150 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Erythrocytes, x10 <sup>6</sup> /μl	104	7.71	5.09 - 9.02
Hematocrit, %	90	42.00	28.20 - 49.80
Hemoglobin, g/dl	90	14.20	8.60 - 16.30
MCHC, %	90	34.40	31.40 - 36.60
MCH, pg	90	19.10	16.50 - 20.90
MCV, fl	90	55.60	50.80 - 62.80
Leukocytes, 10 <sup>3</sup> /μl	102	10.60	3.90 - 17.20
Neutrophils, %	-	-	-
Neutrophils, 10 <sup>3</sup> /μl	102	4.20	1.10 - 10.00
Lymphocytes, %	-	-	-
Lymphocytes, 10 <sup>3</sup> /μl	102	4.00	1.20 - 7.10
Monocytes, %	-	-	-
Monocytes, 10 <sup>3</sup> /μl	102	0.40	0.10 - 0.90
Eosinophils, %	-	-	-
Eosinophils, 10 <sup>3</sup> /μl	102	0.15	0.00 - 0.40
Basophils, %	-	-	-
Basophils, 10 <sup>3</sup> /μl	102	0.10	0.00 - 0.20
Large Unstained Cells, %	-	-	-
Large Unstained Cells, 10 <sup>3</sup> /μl	-	-	-
Platelets, 10 <sup>3</sup> /μl	60	1145.00	648 - 1748

**Table 12: Summary of Hematology Historical Control Data from Rats 88-150 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Erythrocytes, x10 <sup>6</sup> /μl	99	7.27	5.86 - 8.26
Hematocrit, %	89	41.40	33.10 - 46.70
Hemoglobin, g/dl	89	14.80	11.90 - 16.30
MCHC, %	65	35.40	33.80 - 37.10
MCH, pg	65	20.10	18.40 - 22.00
MCV, fl	65	56.90	52.90 - 64.20
Leukocytes, 10 <sup>3</sup> /μl	99	6.30	3.00 - 12.00
Neutrophils, %	-	-	-
Neutrophils, 10 <sup>3</sup> /μl	99	3.30	1.00 - 8.40
Lymphocytes, %	-	-	-
Lymphocytes, 10 <sup>3</sup> /μl	99	2.60	0.90 - 4.40
Monocytes, %	-	-	-
Monocytes, 10 <sup>3</sup> /μl	99	0.30	0.10 - 0.60
Eosinophils, %	-	-	-
Eosinophils, 10 <sup>3</sup> /μl	99	0.10	0.00 - 0.20
Basophils, %	-	-	-
Basophils, 10 <sup>3</sup> /μl	99	0.00	0.00 - 0.00
Large Unstained Cells, %	-	-	-
Large Unstained Cells, 10 <sup>3</sup> /μl	-	-	-
Platelets, 10 <sup>3</sup> /μl	65	1019.0	668 - 1382

**Table 13: Summary of Serum Chemistry Historical Control Data from Rats 3-7 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	146	5.85	5.60 - 6.40
A/G Ratio	146	1.61	1.30 - 2.90
Albumin, g/dl	146	3.57	3.20 - 4.70
Alkaline Phosphatase, IU/l	146	232.60	201.00 - 268.00
Total Bilirubin, mg/dl	146	0.55	0.10 - 1.00
Urea Nitrogen, mg/dl	146	11.67	10.00 - 13.00
Creatinine, mg/dl	146	0.53	0.50 - 0.60
Glucose, mg/dl	146	136.20	85.00 - 167.00
Alanine Aminotransferase, IU/l	146	29.60	27.00 - 35.00
Aspartate Aminotransferase, IU/l	146	106.30	94.00 - 116.00
Creatine Kinase, IU/l	135	657.00	515.00 - 710.00
Lactate Dehydrogenase, IU/l	130	744.00	569.00 - 890.00
Gamma glutamyl Transpeptidase, IU/l	136	0.05	0.00 - 3.00
Calcium, mg/dl	146	10.00	9.40 - 11.40
Chloride, meq/l	146	102.50	100.00 - 105.00
Phosphorus, mg/dl	146	9.21	8.50 - 10.30
Potassium, meq/l	146	5.17	4.70 - 6.10
Sodium, meq/l	146	143.30	141.00 - 148.00
Total Cholesterol, mg/dl	146	66.80	56.00 - 92.00
Triglycerides, mg/dl	146	60.30	53.00 - 73.00

**Table 14: Summary of Serum Chemistry Historical Control Data from Rats 3-7 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	146	5.97	5.70 - 6.40
A/G Ratio	146	1.80	1.30 - 3.80
Albumin, g/dl	146	3.78	3.30 - 5.00
Alkaline Phosphatase, IU/l	146	161.70	133.00 - 219.00
Total Bilirubin, mg/dl	146	0.55	0.10 - 1.00
Urea Nitrogen, mg/dl	146	11.70	10.00 - 13.00
Creatinine, mg/dl	146	0.56	0.50 - 0.60
Glucose, mg/dl	146	145.50	100.00 - 179.00
Alanine Aminotransferase, IU/l	146	25.10	23.00 - 28.00
Aspartate Aminotransferase, IU/l	146	94.30	78.00 - 109.00
Creatine Kinase, IU/l	135	499.00	401.00 - 531.00
Lactate Dehydrogenase, IU/l	130	423.00	317.00 - 476.00
Gamma glutamyl Transpeptidase, IU/l	141	0.00	0.00 - 1.00
Calcium, mg/dl	146	10.14	9.40 - 11.30
Chloride, meq/l	146	105.00	100.00 - 108.00
Phosphorus, mg/dl	146	7.97	6.70 - 9.60
Potassium, meq/l	146	4.87	4.30 - 6.00
Sodium, meq/l	146	142.70	140.00 - 147.00
Total Cholesterol, mg/dl	146	80.20	69.00 - 92.00
Triglycerides, mg/dl	146	54.20	41.00 - 66.00

**Table 15: Summary of Serum Chemistry Historical Control Data from Rats 8-12 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	723	6.16	5.90 - 6.60
A/G Ratio	693	1.42	1.10 - 2.70
Albumin, g/dl	724	3.59	3.30 - 4.60
Alkaline Phosphatase, IU/l	719	160.00	136.00 - 188.00
Total Bilirubin, mg/dl	723	0.55	0.10 - 1.00
Urea Nitrogen, mg/dl	724	14.30	13.00 - 16.00
Creatinine, mg/dl	724	0.54	0.50 - 0.60
Glucose, mg/dl	724	146.30	112.00 - 176.00
Alanine Aminotransferase, IU/l	725	34.40	28.00 - 40.00
Aspartate Aminotransferase, IU/l	725	100.60	87.00 - 114.00
Creatine Kinase, IU/l	724	362.00	344.00 - 380.00
Lactate Dehydrogenase, IU/l	724	389.00	360.00 - 418.00
Gamma glutamyl Transpeptidase, IU/l	579	0.50	0.00 - 1.00
Calcium, mg/dl	718	10.04	9.40 - 11.00
Chloride, meq/l	720	104.00	102.00 - 105.00
Phosphorus, mg/dl	672	8.11	7.30 - 10.00
Potassium, meq/l	725	5.15	4.70 - 6.20
Sodium, meq/l	725	144.00	141.00 - 150.00
Total Cholesterol, mg/dl	709	61.70	54.00 - 74.00
Triglycerides, mg/dl	653	73.00	61.00 - 99.00

**Table 16: Summary of Serum Chemistry Historical Control Data from Rats 8-12 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	724	6.36	6.10 - 7.00
A/G Ratio	724	1.61	1.30 - 2.90
Albumin, g/dl	724	3.88	3.50 - 5.10
Alkaline Phosphatase, IU/l	695	113.30	90.00 - 147.00
Total Bilirubin, mg/dl	724	0.60	0.20 - 1.00
Urea Nitrogen, mg/dl	724	13.40	11.00 - 16.00
Creatinine, mg/dl	724	0.59	0.50 - 0.60
Glucose, mg/dl	724	160.30	113.00 - 185.00
Alanine Aminotransferase, IU/l	724	29.00	25.00 - 36.00
Aspartate Aminotransferase, IU/l	724	96.40	85.00 - 123.00
Creatine Kinase, IU/l	364	443.00	420.00 - 466.00
Lactate Dehydrogenase, IU/l	354	411.50	401.00 - 422.00
Gamma glutamyl Transpeptidase, IU/l	579	0.20	0.00 - 0.40
Calcium, mg/dl	724	10.08	9.50 - 11.00
Chloride, meq/l	723	105.40	103.00 - 107.00
Phosphorus, mg/dl	674	6.98	6.20 - 9.10
Potassium, meq/l	723	4.78	4.20 - 6.10
Sodium, meq/l	723	143.00	141.00 - 149.00
Total Cholesterol, mg/dl	708	75.20	67.00 - 87.00
Triglycerides, mg/dl	642	59.60	42.00 - 74.00

**Table 17: Summary of Serum Chemistry Historical Control Data from Rats 13-22 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	661	6.43	6.00 - 7.10
A/G Ratio	661	1.27	1.10 - 1.90
Albumin, g/dl	661	3.74	3.30 - 4.60
Alkaline Phosphatase, IU/l	646	124.67	104.00 - 160.00
Total Bilirubin, mg/dl	666	0.60	0.20 - 1.00
Urea Nitrogen, mg/dl	661	13.42	10.00 - 16.00
Creatinine, mg/dl	661	0.57	0.40 - 0.60
Glucose, mg/dl	661	157.33	121.00 - 197.00
Alanine Aminotransferase, IU/l	666	35.08	27.00 - 46.00
Aspartate Aminotransferase, IU/l	666	91.00	77.00 - 110.00
Creatine Kinase, IU/l	471	320.00	203.00 - 437.00
Lactate Dehydrogenase, IU/l	448	478.50	431.00 - 526.00
Gamma glutamyl Transpeptidase, IU/l	565	0.50	0.00 - 1.00
Calcium, mg/dl	661	10.17	9.60 - 10.90
Chloride, meq/l	658	103.75	101.00 - 107.00
Phosphorus, mg/dl	636	7.68	7.00 - 9.50
Potassium, meq/l	658	5.26	4.60 - 6.10
Sodium, meq/l	658	144.33	141.00 - 149.00
Total Cholesterol, mg/dl	666	65.42	55.00 - 89.00
Triglycerides, mg/dl	661	75.67	62.00 - 92.00

**Table 18: Summary of Serum Chemistry Historical Control Data from Rats 13-22 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	673	6.73	6.40 - 7.50
A/G Ratio	658	1.38	1.10 - 2.00
Albumin, g/dl	673	4.17	3.50 - 5.30
Alkaline Phosphatase, IU/l	658	82.83	65.00 - 117.00
Total Bilirubin, mg/dl	678	1.10	0.20 - 2.00
Urea Nitrogen, mg/dl	673	13.17	11.00 - 17.00
Creatinine, mg/dl	673	0.58	0.40 - 0.70
Glucose, mg/dl	673	159.33	120.00 - 186.00
Alanine Aminotransferase, IU/l	678	32.33	25.00 - 45.00
Aspartate Aminotransferase, IU/l	678	92.83	72.00 - 116.00
Creatine Kinase, IU/l	449	280.50	180.00 - 381.00
Lactate Dehydrogenase, IU/l	444	385.50	246.00 - 525.00
Gamma glutamyl Transpeptidase, IU/l	577	0.50	0.00 - 1.00
Calcium, mg/dl	673	10.28	9.60 - 11.20
Chloride, meq/l	667	104.83	101.00 - 108.00
Phosphorus, mg/dl	649	6.57	5.60 - 8.60
Potassium, meq/l	667	4.87	4.30 - 5.90
Sodium, meq/l	667	143.33	141.00 - 148.00
Total Cholesterol, mg/dl	678	77.67	66.00 - 97.00
Triglycerides, mg/dl	673	60.75	51.00 - 75.00

**Table 19: Summary of Serum Chemistry Historical Control Data from Rats 23-47 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	359	6.90	6.30 - 8.10
A/G Ratio	345	1.35	1.10 - 1.90
Albumin, g/dl	356	4.45	3.70 - 5.00
Alkaline Phosphatase, IU/l	330	105.00	53.00 - 226.00
Total Bilirubin, mg/dl	365	0.13	0.10 - 0.20
Urea Nitrogen, mg/dl	350	14.50	10.00 - 22.00
Creatinine, mg/dl	350	0.65	0.50 - 0.80
Glucose, mg/dl	350	115.00	92.00 - 138.00
Alanine Aminotransferase, IU/l	375	47.00	26.00 - 97.00
Aspartate Aminotransferase, IU/l	375	90.50	57.00 - 144.00
Creatine Kinase, IU/l	118	240.50	56.00 - 477.00
Lactate Dehydrogenase, IU/l	46	256.00	105.00 - 652.00
Gamma glutamyl Transpeptidase, IU/l	278	0.50	0.00 - 3.00
Calcium, mg/dl	350	10.90	9.90 - 11.90
Chloride, meq/l	350	105.50	97.00 - 110.00
Phosphorus, mg/dl	350	7.65	5.50 - 9.20
Potassium, meq/l	350	6.30	5.00 - 7.30
Sodium, meq/l	350	148.50	143.00 - 157.00
Total Cholesterol, mg/dl	375	92.00	62.00 - 234.00
Triglycerides, mg/dl	319	94.00	46.00 - 208.00

**Table 20: Summary of Serum Chemistry Historical Control Data from Rats 23-47 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	366	7.20	6.70 - 9.10
A/G Ratio	138	1.65	1.00 - 1.70
Albumin, g/dl	363	5.35	4.50 - 6.60
Alkaline Phosphatase, IU/l	357	130.00	19.00 - 205.00
Total Bilirubin, mg/dl	372	0.15	0.10 - 0.20
Urea Nitrogen, mg/dl	337	16.00	11.00 - 25.00
Creatinine, mg/dl	357	0.83	0.50 - 0.90
Glucose, mg/dl	337	115.00	95.00 - 152.00
Alanine Aminotransferase, IU/l	381	51.00	24.00 - 172.00
Aspartate Aminotransferase, IU/l	381	97.00	62.00 - 226.00
Creatine Kinase, IU/l	119	237.00	117.00 - 633.00
Lactate Dehydrogenase, IU/l	33	210.00	76.00 - 953.00
Gamma glutamyl Transpeptidase, IU/l	286	0.50	0.00 - 1.00
Calcium, mg/dl	356	11.70	10.20 - 12.60
Chloride, meq/l	356	103.50	95.00 - 111.00
Phosphorus, mg/dl	356	6.70	3.30 - 8.40
Potassium, meq/l	356	5.65	4.20 - 6.70
Sodium, meq/l	356	147.50	147.00 - 156.00
Total Cholesterol, mg/dl	357	96.50	47.00 - 182.00
Triglycerides, mg/dl	357	67.00	30.00 - 205.00

**Table 21: Summary of Serum Chemistry Historical Control Data from Rats 48-65 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	55	6.40	6.20 - 7.20
A/G Ratio	55	2.10	0.90 - 2.30
Albumin, g/dl	55	4.60	4.10 - 5.20
Alkaline Phosphatase, IU/l	52	96.00	68.00 - 148.00
Total Bilirubin, mg/dl	55	0.10	0.00 - 0.20
Urea Nitrogen, mg/dl	55	13.00	8.00 - 16.00
Creatinine, mg/dl	55	0.70	0.60 - 0.80
Glucose, mg/dl	55	109.00	89.00 - 165.00
Alanine Aminotransferase, IU/l	55	46.00	24.00 - 81.00
Aspartate Aminotransferase, IU/l	55	103.00	48.00 - 159.00
Creatine Kinase, IU/l	50	234.00	68.00 - 1218.00
Lactate Dehydrogenase, IU/l	50	194.00	61.00 - 241.00
Gamma glutamyl Transpeptidase, IU/l	55	1.00	0.00 - 2.00
Calcium, mg/dl	55	10.90	9.60 - 12.40
Chloride, meq/l	55	103.00	97.00 - 110.00
Phosphorus, mg/dl	55	8.00	5.90 - 10.50
Potassium, meq/l	55	6.00	9.60 - 12.20
Sodium, meq/l	55	147.00	141.00 - 156.00
Total Cholesterol, mg/dl	55	82.40	58.00 - 164.00
Triglycerides, mg/dl	55	110.00	78.00 - 274.00

**Table 22: Summary of Serum Chemistry Historical Control Data from Rats 48-65 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	55	7.20	6.70 - 8.90
A/G Ratio	55	1.80	1.40 - 2.30
Albumin, g/dl	55	5.55	4.90 - 6.70
Alkaline Phosphatase, IU/l	55	55.00	13.00 - 89.00
Total Bilirubin, mg/dl	55	0.20	0.10 - 0.30
Urea Nitrogen, mg/dl	55	13.00	8.00 - 17.00
Creatinine, mg/dl	55	0.70	0.60 - 0.90
Glucose, mg/dl	55	105.00	81.00 - 146.00
Alanine Aminotransferase, IU/l	55	37.60	23.00 - 117.00
Aspartate Aminotransferase, IU/l	55	90.00	50.00 - 128.00
Creatine Kinase, IU/l	41	171.40	58.00 - 740.00
Lactate Dehydrogenase, IU/l	42	209.00	71.00 - 268.00
Gamma glutamyl Transpeptidase, IU/l	55	1.00	0.00 - 2.00
Calcium, mg/dl	55	11.10	10.10 - 12.60
Chloride, meq/l	55	104.00	96.00 - 107.00
Phosphorus, mg/dl	55	7.20	5.00 - 13.40
Potassium, meq/l	55	5.60	4.10 - 6.90
Sodium, meq/l	55	146.00	141.00 - 151.00
Total Cholesterol, mg/dl	55	93.00	56.00 - 148.00
Triglycerides, mg/dl	55	84.00	61.00 - 259.00

**Table 23: Summary of Serum Chemistry Historical Control Data from Rats 88-150 Weeks of Age - Males**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	70	6.00	4.60 - 7.90
A/G Ratio	59	1.90	1.60 - 2.40
Albumin, g/dl	48	4.40	2.00 - 5.00
Alkaline Phosphatase, IU/l	60	3.70	2.10 - 4.90
Total Bilirubin, mg/dl	60	0.10	0.00 - 0.40
Urea Nitrogen, mg/dl	51	17.00	8.00 - 24.00
Creatinine, mg/dl	60	0.60	0.40 - 0.90
Glucose, mg/dl	51	120.40	49.00 - 167.00
Alanine Aminotransferase, IU/l	70	52.40	29.00 - 96.00
Aspartate Aminotransferase, IU/l	70	105.00	61.00 - 246.00
Creatine Kinase, IU/l	70	229.00	59.00 - 396.00
Lactate Dehydrogenase, IU/l	-	-	-
Gamma glutamyl Transpeptidase, IU/l	50	2.40	0.00 - 4.10
Calcium, mg/dl	70	11.70	9.60 - 13.10
Chloride, meq/l	71	103.00	90.00 - 132.00
Phosphorus, mg/dl	50	6.60	4.10 - 8.70
Potassium, meq/l	71	6.20	4.00 - 6.70
Sodium, meq/l	60	142.00	141.00 - 156.00
Total Cholesterol, mg/dl	60	116.00	50.00 - 204.00
Triglycerides, mg/dl	50	187.00	81.00 - 329.00

**Table 24: Summary of Serum Chemistry Historical Control Data from Rats 88-150 Weeks of Age - Females**

Test (Unit)	N	Mean	Range
Total Protein, g/dl	70	5.70	6.20 - 8.60
A/G Ratio	60	1.70	1.20 - 2.40
Albumin, g/dl	50	4.70	2.10 - 6.70
Alkaline Phosphatase, IU/l	60	44.30	10.00 - 219.00
Total Bilirubin, mg/dl	60	0.10	0.10 - 0.20
Urea Nitrogen, mg/dl	55	17.00	9.00 - 39.00
Creatinine, mg/dl	60	0.50	0.30 - 0.90
Glucose, mg/dl	55	112.00	54.00 - 151.00
Alanine Aminotransferase, IU/l	70	60.00	28.00 - 186.00
Aspartate Aminotransferase, IU/l	70	150.00	54.00 - 586.00
Creatine Kinase, IU/l	70	81.00	20.00 - 241.00
Lactate Dehydrogenase, IU/l	-	-	-
Gamma glutamyl Transpeptidase, IU/l	50	1.00	0.00 - 3.60
Calcium, mg/dl	60	10.90	9.00 - 13.40
Chloride, meq/l	71	105.00	90.00 - 110.00
Phosphorus, mg/dl	60	6.20	4.00 - 8.70
Potassium, meq/l	71	5.70	4.10 - 6.30
Sodium, meq/l	71	145.00	139.00 - 151.00
Total Cholesterol, mg/dl	60	99.00	36.00 - 161.00
Triglycerides, mg/dl	60	138.00	31.00 - 289.00





