Commercial
Chemicals Division/3M

3M Center
St. Paul, Minnesota 55101
612/733 1110

September 4, 1979

Dr. Blaine C. McKusick
Associate Director
Haskell Laboratory for Toxicology
and Industrial Medicine
E. I. duPont deNemours & Co., Inc.
Wilmington, Delaware 19898

Dear Dr. McKusick:

As agreed upon in our July 20th meeting, I am sending you the following:

1. Slides presented by 3M at the July 20th meeting.

2. Ninety Day Subacute Rat Toxicity Study on FC-143.

3. Ninety Day Subacute Rhesus Monkey Toxicity Study on FC-143.

4. Summary of levels of $C_7F_{15}CO_2^-$ in Serum and Liver of Rats From Study in 2.

If I can be of further help, please do not hesitate to call me. My number is (612) 733-9296.

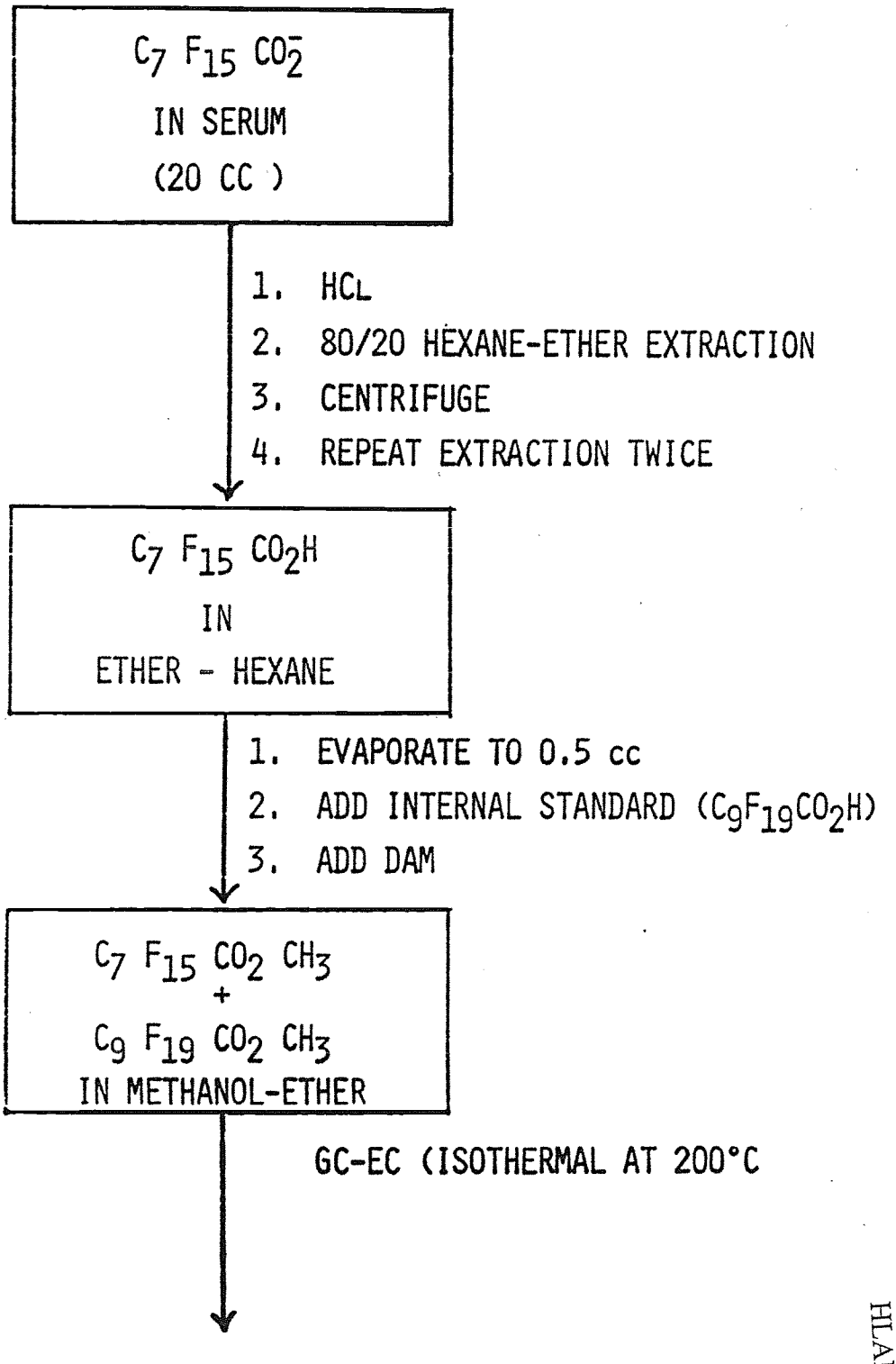
Sincerely,

R. A. Prokop
Manager, Research
Commercial Chemicals Division

RAP:df

Enc.

ANALYSIS OF FC-143 IN SERUM



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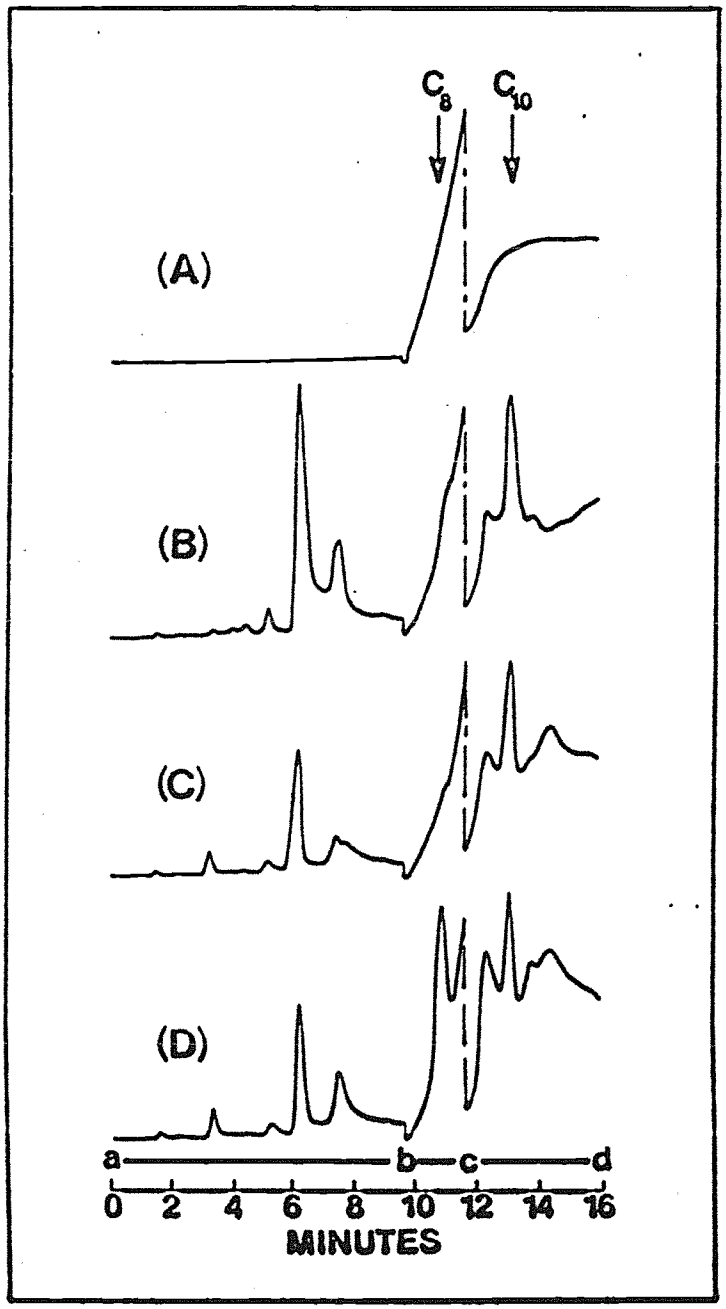

FIGURE 2

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TABLE 3

ACCURACY[a] AND PRECISION OF PERFLUOROOCTANOIC ACID ANALYSIS IN HUMAN PLASMA BY GAS CHROMATOGRAPHY

Perfluorooctanoic Acid added to 20 ml Plasma (ppm)	Perfluorooctanoic Acid recovered from 20 ml Plasma (ppm)
0.015	0.016
	0.017
	0.016
	0.016
	0.018
	0.018
	Mean ± SD 0.017 ± 0.001
0.038	0.040
	0.039
	0.037
	0.043
	0.040
	0.036
	Mean ± SD 0.039 ± 0.003
0.075	0.062
	0.062
	0.082
	0.068
	0.077
	0.086
	Mean ± SD 0.073 ± 0.010
0.15	0.146
	0.158
	0.162
	0.154
	0.146
	0.150
	Mean ± SD 0.153 ± 0.007
0.30	0.282
	0.292
	0.321
	0.304
	0.275
	0.307
	Mean ± SD 0.297 ± 0.017

[a]See text for discussion

ANALYSIS OF FC-143 IN URINE

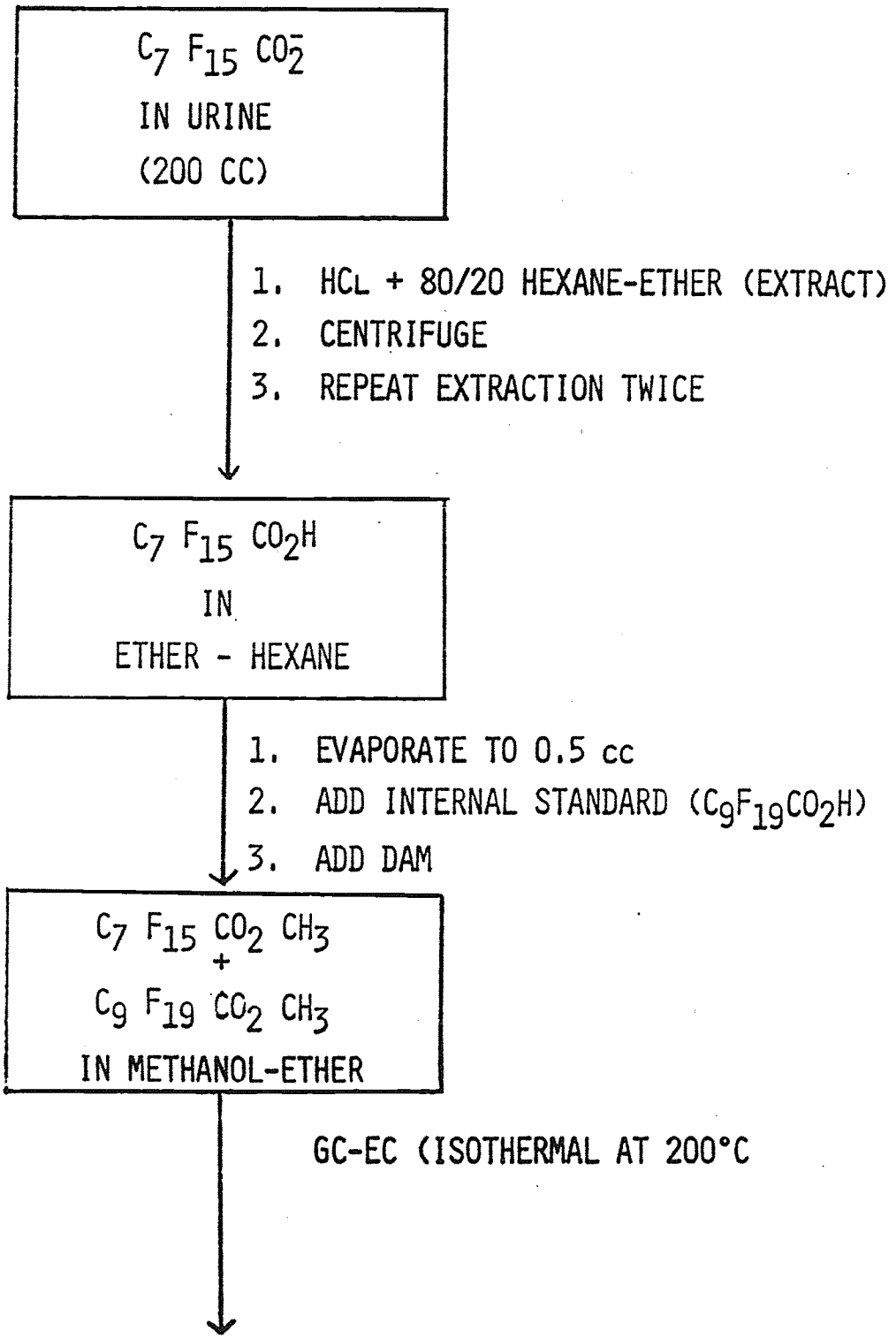


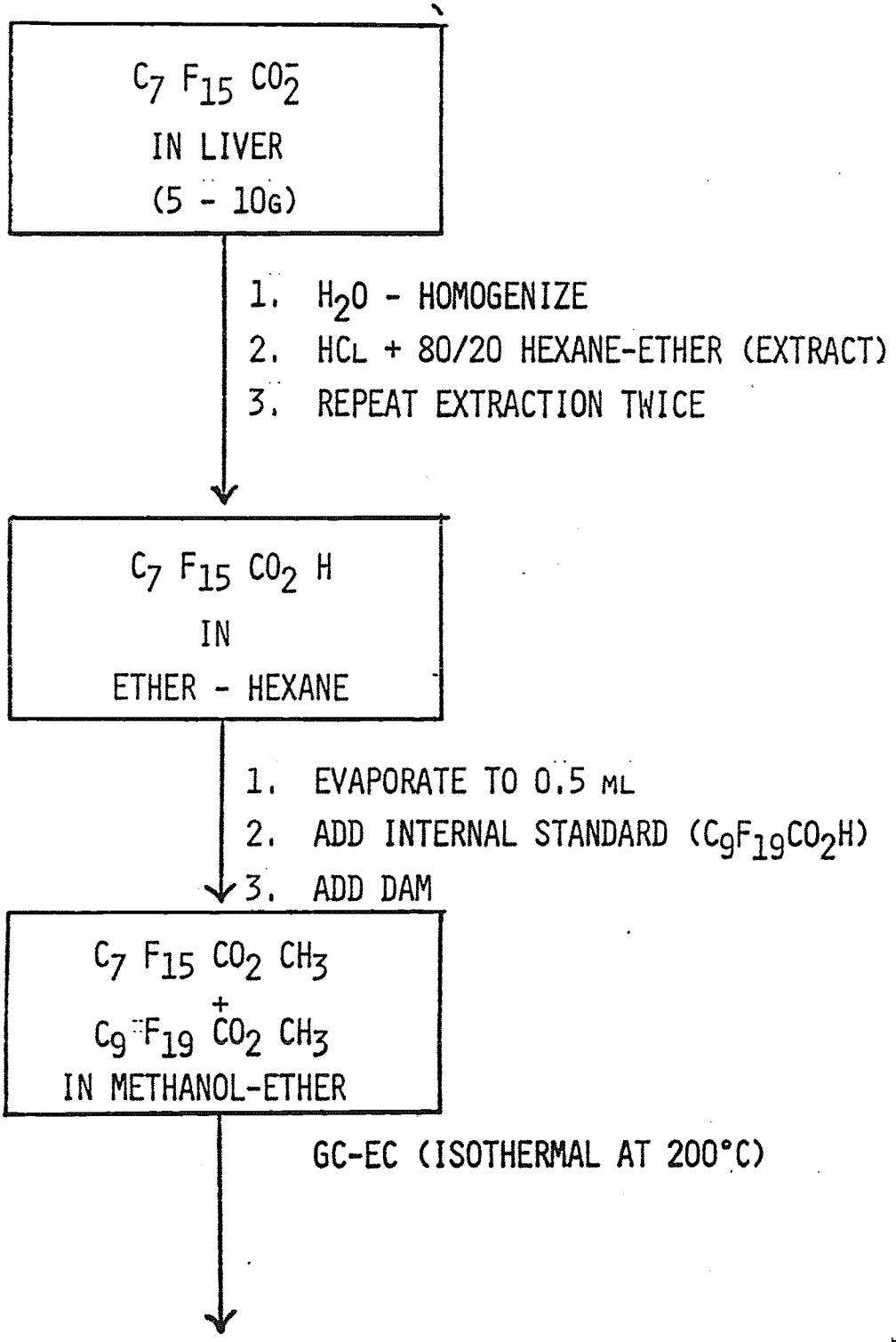
TABLE 2

EXTRACTION RECOVERY OF PERFLUOROOCTANOIC ACID FROM HUMAN URINE[a]

Perfluorooctanoic Acid Added (ppm)	Perfluorooctanoic Acid Recovered (ppm)
0.0050	0.0052
	0.0050
	0.0048
	0.0050
	0.0046
	0.0052
	Mean ± SD 0.0050 ± 0.0002

[a] 1.0 µg perfluorooctanoic acid added to 200 ml of urine

ANALYSIS OF FC-143 IN LIVER



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EID123363

P000031467

TABLE 3

EXTRACTION RECOVERY OF PERFLUOROOCTANOIC ACID FROM LIVER TISSUE[a]

Perfluorooctanoic Acid Added (ppm)	Perfluorooctanoic Acid Recovered (ppm)
0.57	0.55
	0.59
	0.57
	0.57
	0.53
	0.55
	Mean ± SD 0.56 ± 0.02

[a]2.0 µg perfluorooctanoic acid added to 3.5 g of homogenized rat liver

FC-143

SPECIES: RAT DURATION: 90 DAYS

DIETARY LEVELS: 0 - 1000 (6 LEVELS)
(PPM)

MORTALITY: NONE

SUMMARY: EVIDENCE OF LIVER EFFECTS.

SPECIES: MONKEY DURATION: 90 DAYS

DOSE LEVELS: (MG/KG/DAY)	0	3	10	30	100
MORTALITY:	0/4	0/4	0/4	3/4	4/4

SUMMARY: EVIDENCE OF GASTROINTESTINAL AND HEMOTOPOIETIC EFFECTS.

AMES: NEGATIVE

FC-95

SPECIES: RAT DURATION: 90 DAYS

DIETARY LEVELS: (PPM)	0	30	100	300	1000	3000
MORTALITY:	0/10	0/10	5/10	10/10	10/10	10/10

SUMMARY: EVIDENCE OF LIVER, GASTROINTESTINAL, HEMATOPOIETIC, MUSCLE AND SKIN EFFECTS.

SPECIES: MONKEY DURATION: 90 DAYS

DOSE LEVELS: (MG/KG/DAY)	0	0.5	1.5	4.5	4 HIGHER
MORTALITY:	0/4	0/4	0/4	4/4	100%

SUMMARY: EVIDENCE OF LIVER, GASTROINTESTINAL AND CNS EFFECTS.

AMES: NEGATIVE

FM-3422

SPECIES: RAT DURATION: 90 DAYS

DIETARY LEVELS: (PPM)	0	30	100	300	1000	2 HIGHER
MORTALITY:	0/10	0/10	0/10	0/10	10/10	100%

SUMMARY: EVIDENCE OF LIVER, GASTROINTESTINAL AND KIDNEY EFFECTS.

SPECIES: MONKEY DURATION: 90 DAYS

DOSE LEVELS: (MG/KG/DAY)	0	1	3	10	30
MORTALITY:	0/4	0/4	0/4	0/4	1/4

SUMMARY: EVIDENCE OF GASTROINTESTINAL EFFECTS.

AMES: NEGATIVE

CHINA SERUM SAMPLES

	ORGANIC ppm	INORGANIC ppm
1.	.008	.051
2.	.013	.054
3.	.011	.046
4.	.014	.046
5.	.009	.044
6.	.009	.049
7.	.004	.046
8.	.017	.076

SERUM ORGANIC FLUORINE
LEVELS OF PLANT EMPLOYEE

	BLOOD PPM			URINE
	Rf	F -	FC 143	FC143 µg/24 hrs.
JULY 1976	38.8	0.05		
OCTOBER 1977	40.5	0.03		
APRIL 1978	71		53	
MAY 1978	67			
- - - - - - - - STOP FC EXPOSURE -				
JUNE 6, 1978	66.2 ± 5			484
JUNE 13, 1978	70.8 ± 5			272
JUNE 20, 1978	-			216
JULY 18, 1978	65.6 ± 5			160
AUGUST 15, 1978	55 ± 5			175
OCTOBER 24, 1978	59 ± 5			160
JANUARY 16, 1979	45 ± 5			220
APRIL 1979	47			

SPONSOR: 3M Company

COMPOUND: Fluorad® Fluorochemical FC-143

SUBJECT: Ninety Day Subacute Rat Toxicity Study.

Edwin I. Goldenthal, Ph.D.
Vice President and
Director of Research

Collaborators:

D. C. Jessup, Ph.D., Associate
Director of Research
R. G. Geil, D.V.M., Vice President
and Director of Pathology
N. D. Jefferson, B.A., Acting Director
of Small Animal Toxicology
R. J. Arceo, M.D., Staff Pathologist

Date: November 6, 1978

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I. SYNOPSIS

Fluorad® Fluorochemical FC-143 was fed in the diet at levels of 10, 30, 100, 300 and 1,000 ppm to Charles River CD rats for 90 days. Five male and five female rats were initiated at each dosage level and in the control group. The rats were observed twice daily for overt signs of toxicity and mortality. Individual body weights and sex-group food consumption were recorded weekly. Hematologic, biochemical and urinalysis studies were conducted during the pretest period and at 1 and 3 months of study.

No changes considered to be directly related to the compound were seen in general behavior, appearance or survival. A slight decrease in body weight gain and food consumption was seen for male rats at the 300- and 1,000-ppm dosage levels.

Hematologic, biochemical and urinalysis values for the female rats showed no changes considered to be related to the compound. A few values obtained for the males showed a slight deviation from the control values (i.e. slightly lower erythrocyte count, and elevated blood urea nitrogen and alkaline phosphatase values).

Compound-related gross observations such as enlargement and varying degrees of discoloration on the surface of the liver were observed among male rats in the 1,000-ppm group. There were no such observations amoung female rats from the 1,000-ppm group or in males or females from lower dietary levels.

Statistically significant variations in sex-group mean organ weights, which were considered compound related, occurred in the liver of rats in the 300- and 1,000-ppm dosage groups. All other variations were unaccompanied by any morphologic alterations.

Microscopically, compound-related lesions were confined to the liver. The lesions consisted of focal to multifocal, very slight to slight, cytoplasmic enlargement of hepatocytes located in centrilobular-midzonal regions of the affected liver lobules, accompanied in some instances by increased amount of yellowish-brown pigment resembling lipofuscin in cytoplasm of hepatocytes and occasionally in sinusoidal lining cells. The incidence and relative severity of the above lesions were predominantly amoung males and more pronounced among rats at 1,000 ppm. The other changes recorded in the liver and other tissues were lesions of naturally occurring diseases and they were present in most instances among the control and test rats.

II. COMPOUND

The compound was received from 3M Company, Saint Paul, Minnesota on October 24, 1977 as indicated below:

Label	Description
Fluorad® Flurochemical FC-143 3M Stock No. 98-0211-0008-0 Lot 340	white powder

III. CLINICAL METHODS

A. METHOD:

1. General Procedure:

Thirty male (222 to 254 grams) and 30 female (151 to 179 grams) Charles River CD rats purchased from The Charles River Breeding Laboratories, Inc., Portage, Michigan were used in this study. The rats were distributed among the groups, based upon a computer-generated table of random numbers. The rats were housed individually in suspended wire-mesh cages and maintained in a temperature-, humidity- and light-controlled room. During the pretest period, rats were provided Purina® Laboratory Chow® and water ad libitum. During the test period, the rats were provided the appropriate test diet and water ad libitum.

This study was initiated on November 1, 1977 and terminated by sacrifice of all remaining rats on January 30, 1978.

2. Compound Administration:

The test compound was mixed weekly with ground Purina® Laboratory Chow® (i.e., ground basal diet) to provide dosage levels of 10, 30, 100, 300 and 1,000 ppm. Five male and five female rats were used at each dosage level and in a control group. The control rats received the basal diet only, on the same regimen as treated rats. Samples of diet (100 grams each) were taken immediately after preparation and after 7 days standing in weeks 1, 4 and 12. The samples were frozen and subsequently shipped to the sponsor. Diets were prepared in the following manner: to produce a premix, the required amount of Fluorad® Fluorochemical FC-143 was mixed with 500 grams of Purina® Laboratory Chow® using a Hobart blender. To provide the proper dosage level diets, appropriate quantities of the premix were combined with additional ground basal diet in a twin-shell blender. The diets were prepared weekly.

3. Observations:

The rats were observed twice daily for overt signs of toxicity and for mortality. Detailed observations were recorded weekly. Individual body weights and food consumption were recorded weekly during the pretest and treatment periods.

4. Laboratory Tests:

Once during the pretest period and at 1 month and 3 months of the study, blood (orbital sinus puncture technique) and urine samples were obtained for analysis from all surviving rats. Food and water were withheld overnight prior to the sample collection.

a. Hematology:

Hematological studies included: hemoglobin[1], hematocrit[2], total erythrocytes[3], reticulocytes[4], and total[3] and differential leucocyte counts.

b. Biochemistry:

Biochemical studies included: fasting glucose[5], blood urea nitrogen (BUN)[5], plasma glutamic pyruvic transaminase (PGPT)[5] and plasma glutamic oxalacetic transaminase (PGOT)[5] activity, plasma alkaline phosphatase[5] activity, γ-glutamyl peptidase[6], creatinine phosphokinase[7] and calcium[8]. Alkaline phosphatase activity was not determined in the pretest period because of interference by the anticoagulant.

c. Urinalysis:

Urinalysis included: description of color and appearance; measurement of volume, pH[9], and specific gravity[9]; qualitative tests for protein[9], glucose[9], ketone[9], bilirubin[9], and occult blood; and microscopic examination of the sediment.

d. Serum Samples:

Serum samples were obtained for all surviving rats at 13 weeks of study. The samples were pooled by sex and group, frozen, and subsequently shipped to the sponsor.

5. Statistical Analysis:

All statistical analyses compared the treatment groups with the control group, by sex. Body weights (week 13) food consumption (weeks 1-13), hematological, biochemical and urinalysis parameters and absolute and relative organ weights were compared by analysis of variance (one-way classification), Bartlett's test for homogeneity of variances and the appropriate t-test (for equal or unequal variances) as described by Steel and Torrie[10] using Dunnett's[11] multiple comparison tables to judge significance of differences.

B. RESULTS:

1. General Behavior, Appearance and Survival:

No changes considered to be related to the compound were observed in general behavior or appearance. Incidental findings noted for control and treated rats included ocular discharge and pupil dilation.

Survival (prior to sacrifice) after 3 months of compound consumption was as follows:

Dosage Level	No. Surviving/No. Initiated	
	Male	Female
Control	5/5	5/5
10 ppm	5/5	5/5
30 ppm	5/5	5/5
100 ppm	5/5	4/5
300 ppm	5/5	4/5
1,000 ppm	5/5	5/5

Both deaths occurred following collection of blood. Neither death was preceded by any signs of toxicity.

2. Body Weights (Tables 1-2):

Comparison of group mean body weights, by sex showed a decrease in body weight gain for male rats at the 300- and 1,000-ppm dosage

levels. Changes in body weight were similar for control and treated female rats. At 13 weeks, the group mean body weight for male rats was significantly ($p<0.05$) lower than the control group mean. The group mean body weights at 13 weeks of study were as follows:

Dosage Level	Mean Body Weights, g	
	Male	Female
Control	466	259
10 ppm	478	260
30 ppm	500	268
100 ppm	457	278
300 ppm	431	263
1,000 ppm	362	255

3. Food Consumption (Table 3):

Declines in food consumption were noted at the higher dosage levels for male rats (100, 300 and 1,000 ppm). Food consumption values were similar for control and treated female rats. The average food consumption through the 13-week study were as shown below:

Dosage Level	Average Food Consumption (g/rat/day)	
	Male	Female
Control	27.0	19.7
10 ppm	26.7	19.2
30 ppm	28.7	20.7
100 ppm	25.8	21.5
300 ppm	25.7	19.6
1,000 ppm	23.0	19.5

4. Laboratory Tests (Tables 5-14):

a. Hematology:

A comparison of male rats, by dosage group, to the control group, showed a slight decrease in erythrocytes at 3 months of study. However, the individual values were within the normal range for Charles River CD rats of this age in this laboratory. A similar comparison of female rats showed no variations that could be attributable to compound consumption.

b. Biochemistry:

A comparison of male rats, at the higher dosage levels, to the control male rats, showed a slight increase in the BUN and alkaline phosphatase values. A similar comparison of female rats showed no variations that could be attributable to compound consumption.

c. Urinalysis:

The presence of occult blood was of a higher frequency in females than males at all dosage levels. No changes considered to be related to compound consumption were observed in urinalysis values.

IV. PATHOLOGICAL STUDIES:

A. METHODS:

1. Gross Pathology:

After 90 days of compound administration, five rats/sex/group were sacrificed with carbon dioxide and were necropsied. At necropsy, organs and tissues were examined for gross abnormalities and collected in 10% neutral buffered formalin (eyes in Russell's fixative). Liver samples, obtained from all of the rats at terminal sacrifice, were frozen and subsequently shipped to the sponsor.

Two female rats which died prior to termination were also necropsied and tissues collected as above.

2. Histopathology:

Microscopic examination of formalin-fixed, hematoxylin and eosin stained, paraffin sections was performed for all rats in control, 100-, 300-, and 1,000-ppm groups. The following tissues were examined histologically.

brain with cervical cord	aorta	pancreas
lumbar spinal cord	spleen	liver
peripheral nerve	mesenteric lymph node	kidneys
eyes	thymus	urinary bladder
pituitary	bone with marrow (sternum)	testes
thyroid with parathyroid	salivary gland	ovaries
adrenals	small intestines (duodenum, jejunum, ileum)	prostate
lung	colon	uterus
heart with coronary vessels		skin (mammary gland)
		any tissue(s) with gross lesions

In addition, the livers from rats from the 10- and 30-ppm dosage level were also microscopically examined.

B. RESULTS:

1. Gross Pathology (Table 15) and Organ Weights (Tables 16-17):

Gross necropsy observations in liver, such as enlargement, and varying degrees of discoloration on the surface were present among male rats at the 1,000-ppm level and were considered compound related. No such observation was present among the females at 1,000 ppm or in males or females from lower dietary-level groups.

Statistically significant variations in sex-group mean weights of several organs occurred between the control and experimental groups. These variations were of unknown biological significance with the exception of the increase in liver weight noted in males at the 300- and 1,000-ppm dosage levels. This variation in liver weights was accompanied by morphologic alterations. One female rat at 1,000-ppm, also had morphologic alterations noted in the liver.

Organ	Group	Sex	Weight	Change	p<
Liver	30 ppm	M	absolute, relative	increase	0.01, 0.05
	300 ppm	M	absolute, relative	increase	0.01, 0.01
	1,000 ppm	M	absolute, relative	increase	0.01, 0.01
		F	absolute, relative	increase	0.05, 0.05
Kidney	10 ppm	F	relative	increase	0.05
	30 ppm	M	absolute	increase	0.05
	100 ppm	M	relative	increase	0.05
	300 ppm	M	relative	increase	0.05
	1,000 ppm	M	relative	increase	0.01
Brain	1,000 ppm	M	relative	increase	0.01

2. Histopathology (Table 18):

Compound-related liver lesions occurred in almost all male test rats at 100, 300 and 1,000 ppm and one female at 1,000 ppm. The lesions consisted of focal to multifocal, very slight to slight cytoplasmic enlargement (hypertrophy) of hepatocytes in centrilobular to midzonal regions of the affected liver lobules. These were accompanied in some instances by increased amount of yellowish-brown pigment resembling lipofuscin in cytoplasm of hepatocytes and occasionally in sinusoidal lining cells. The incidence and relative severity of the above lesions were more pronounced among male rats at the 1,000-ppm dietary level.

References

1. Coulter Hemoglobinometer, Coulter Electronics, 590 W. 20th Street, Hialeah, Florida.

2. Microhematocrit, John B. Miale, 3rd Ed., 1967, The C. V. Mosby Company, p. 1154.

3. Coulter Particle Size Counter, Model Z_B, Coulter Electronics, 590 W. 20th Street, Hialeah, Florida.

4. Gradwhol's Clinical Laboratory Methods and Diagnosis, Frankel and Reitman, Editors 6th Ed., 1963, The C. V. Mosby Company, p. 1132.

5. Technicon Auto Analyzer 6/60 Micro Methodology.

6. Glutamyl Peptidase - Sigma GGTP Procedure Bulletin #545, Sigma Chemical Co., St. Louis, MO.

7. Micro Auto Analyzer II, 6/60 Micro Methodology.

8. Photovolt PV4, Photovolt Corporation.

9. Multistix (Ames Reagent Strips).

10. Steel, R. G. D. and Torrie, J. H. (1960), Principles and Procedures of Statistics, McGraw-Hill, New York, N. Y.

11. Dunnett, C. W., New Tables for Multiple Comparisons with a Control, Biometrics, Sept. 1964.

Fluorad® Fluorochemical FC-143:

Ninety Day Subacute Rat Toxicity Study.

TABLE 1.

Group Mean Body Weights, Grams; Weight Ranges; and Survival.

Week of Study	Control			10 ppm			30 ppm			100 ppm			300 ppm			1,000 ppm		
	Mean Body Wt.	Weight Ranges	Survival	Mean Body Wt.	Weight Ranges	Survival	Mean Body Wt.	Weight Ranges	Survival	Mean Body Wt.	Weight Ranges	Survival	Mean Body Wt.	Weight Ranges	Survival	Mean Body Wt.	Weight Ranges	Survival
MALES:																		
-1	238	224-251	5/5	245	233-254	5/5	241	229-250	5/5	244	222-254	5/5	240	234-244	5/5	231	225-245	5/5
0	272	248-293	5/5	271	250-283	5/5	272	262-287	5/5	274	236-297	5/5	271	260-285	5/5	270	257-280	5/5
1	307	285-321	5/5	319	294-338	5/5	325	304-343	5/5	322	305-338	5/5	287	270-310	5/5	245	220-288	5/5
2	342	318-372	5/5	345	310-373	5/5	352	335-380	5/5	345	319-368	5/5	296	275-325	5/5	257	210-310	5/5
3	378	340-406	5/5	380	338-408	5/5	385	364-410	5/5	368	334-384	5/5	316	290-354	5/5	283	210-338	5/5
4	380	340-400	5/5	376	332-404	5/5	382	360-402	5/5	370	334-388	5/5	331	306-364	5/5	298	242-340	5/5
5	404	368-424	5/5	410	368-438	5/5	419	392-445	5/5	387	339-420	5/5	344	308-380	5/5	315	251-378	5/5
6	424	378-450	5/5	436	384-466	5/5	448	418-476	5/5	411	364-444	5/5	374	348-408	5/5	342	274-400	5/5
7	427	383-450	5/5	437	386-468	5/5	449	414-486	5/5	410	368-445	5/5	377	345-418	5/5	331	265-384	5/5
8	460	412-483	5/5	465	373-510	5/5	484	452-528	5/5	441	380-483	5/5	406	373-456	5/5	350	277-414	5/5
9	462	420-490	5/5	467	376-510	5/5	486	450-530	5/5	431	350-484	5/5	408	380-450	5/5	350	286-414	5/5
10	477	428-504	5/5	477	375-527	5/5	501	463-539	5/5	446	355-500	5/5	427	397-475	5/5	368	303-432	5/5
11	479	437-510	5/5	493	392-542	5/5	512	474-556	5/5	470	417-515	5/5	445	412-492	5/5	374	305-432	5/5
12	485	442-512	5/5	501	408-544	5/5	518	479-552	5/5	481	426-518	5/5	448	418-495	5/5	379	320-426	5/5
13	466	420-489	5/5	478	390-523	5/5	500	462-540	5/5	457	403-500	5/5	431	402-478	5/5	362*	305-408	5/5
FEMALES:																		
-1	163	154-174	5/5	161	158-171	5/5	160	151-172	5/5	166	158-179	5/5	168	158-172	5/5	163	154-174	5/5
0	174	166-187	5/5	174	168-185	5/5	177	165-186	5/5	180	172-191	5/5	182	179-186	5/5	179	173-191	5/5
1	207	193-214	5/5	205	198-220	5/5	212	203-220	5/5	217	198-234	5/5	209	206-214	5/5	205	194-226	5/5
2	218	195-228	5/5	217	207-230	5/5	221	208-239	5/5	219	198-245	5/5	218	207-226	5/5	211	190-237	5/5
3	234	214-246	5/5	236	220-252	5/5	236	220-260	5/5	244	216-260	5/5	232	224-240	5/5	225	210-256	5/5
4	234	220-244	5/5	232	218-260	5/5	241	230-260	5/5	251	240-270	4/5	235	230-240	4/5	228	210-256	5/5
5	252	226-265	5/5	251	224-276	5/5	256	241-278	5/5	265	256-275	4/5	247	242-254	4/5	245	234-274	5/5
6	278	218-370	5/5	258	244-294	5/5	266	248-288	5/5	281	268-294	4/5	257	252-264	4/5	253	236-282	5/5
7	245	219-262	5/5	249	232-291	5/5	261	242-288	5/5	271	255-288	4/5	250	238-257	4/5	241	224-264	5/5
8	262	236-293	5/5	263	241-301	5/5	274	259-295	5/5	285	260-303	4/5	262	254-268	4/5	261	241-290	5/5
9	268	234-290	5/5	269	246-310	5/5	282	260-306	5/5	293	270-320	4/5	264	258-270	4/5	260	232-294	5/5
10	274	233-299	5/5	273	253-313	5/5	291	266-324	5/5	309	288-340	4/5	268	261-277	4/5	267	248-298	5/5
11	275	240-313	5/5	278	258-322	5/5	290	277-299	5/5	305	284-316	4/5	275	270-282	4/5	270	254-300	5/5
12	275	240-300	5/5	279	255-326	5/5	290	268-310	5/5	306	290-326	4/5	279	276-285	4/5	276	258-304	5/5
13	259	224-285	5/5	260	237-308	5/5	268	252-285	5/5	287	268-308	4/5	263	256-274	4/5	255	233-284	5/5

*Significantly lower than the control group mean, p<0.05

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Fluoral Fluorochemical FF-143: Ninety Day Subacute Rat Toxicity Study

Table 2. Cont. Individual Weekly Body Weights, Grams.

Group, Rat No.	Sex	Pretest		Week of Study												
				1	2	3	4	5	6	7	8	9	10	11	12	13
100 ppm:																
73591	M	244	272	270	275	300	312	308	348	345	380	382	397	419	420	422
73593	M	241	260	272	279	290	299	322	350	356	373	380	400	422	428	437
73594	M	239	266	284	282	290	310	329	360	352	385	394	405	423	430	433
73595	M	234	274	310	315	354	364	390	404	412	436	430	475	492	498	479
73596	M	241	285	300	322	348	364	380	408	416	438	436	456	477	484	484
73597	F	170	184	208	226	230	234	249	258	253	268	270	268	276	276	283
73598	F	172	179	206	220	234	234	243	252	250	254	256	261	270	276	280
73599	F	166	180	209	207	224	230	242	252	238	262	260	264	270	279	286
73600	F	172	183	214	221	240	240	254	264	257	262	268	277	282	288	274
73601	F	158	180	208	216	230	Died									
1,000 ppm:																
73602	M	228	257	288	310	338	340	378	400	384	414	414	432	426	426	406
73603	M	248	280	305	291	274	280	276	320	310	309	300	323	320	338	324
73604	M	231	270	321	340	294	314	330	348	333	354	352	362	386	364	378
73605	M	225	266	229	210	220	242	251	274	265	277	286	303	305	320	305
73606	M	230	273	253	273	300	316	342	370	362	394	400	417	432	424	406
73607	F	163	173	194	190	210	210	234	236	224	242	232	248	254	258	256
73608	F	157	174	198	207	222	220	235	242	234	244	248	249	257	259	255
73609	F	174	191	216	237	256	256	274	282	264	290	294	298	300	304	284
73610	F	154	174	200	201	210	220	236	242	230	254	254	263	262	274	262
73611	F	167	183	207	220	230	236	248	264	252	275	270	278	278	284	268

[redacted]

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 1. Mean Food Consumption.

Week of Study	Control g/rat/day	Control g/kg/day	10 ppm g/rat/day	10 ppm g/kg/day	30 ppm g/rat/day	30 ppm g/kg/day	100 ppm g/rat/day	100 ppm g/kg/day	300 ppm g/rat/day	300 ppm g/kg/day	1,000 ppm g/rat/day	1,000 ppm g/kg/day
MALES:												
1	26.3	85.6	24.9	77.9	27.4	84.3	25.8	80.1	19.9	69.4	14.7	60.2
2	24.2	70.7	24.4	70.7	25.2	71.6	23.9	69.4	21.1	71.3	18.3	71.4
3	26.3	69.6	24.3	64.1	25.4	65.9	24.1	65.5	22.7	71.8	22.2	78.5
4	27.3	71.8	27.6	71.4	28.2	73.8	27.1	73.3	27.7	83.8	26.5	88.8
5	27.8	68.9	27.9	67.9	28.6	68.3	23.2	59.9	24.2	70.3	21.8	69.2
6	29.0	68.5	28.1	64.5	30.5	68.0	27.9	67.8	28.7	76.9	28.1	82.2
7	26.0	60.8	25.8	59.0	27.7	61.7	25.1	61.3	25.3	67.2	22.7	68.5
8	27.9	60.7	26.8	57.6	29.7	61.5	26.2	59.3	26.9	66.2	20.3	58.1
9	28.9	62.5	28.0	60.0	30.9	63.6	24.8	57.5	27.9	68.3	24.9	71.2
10	25.5	53.4	26.2	54.9	28.6	57.0	25.5	57.3	27.1	61.5	23.6	64.1
11	27.5	57.4	26.8	54.3	30.0	58.6	26.8	57.0	27.2	61.7	24.1	64.5
12	28.4	58.6	29.3	58.5	30.4	58.6	28.1	58.5	28.1	62.8	25.0	65.9
13	25.7	55.1	27.3	57.1	30.7	60.5	26.8	58.7	27.9	64.8	26.5	71.3
FEMALES:												
1	19.6	94.7	19.3	94.4	20.3	95.6	20.3	93.4	20.6	98.6	20.0	97.7
2	17.1	78.2	18.1	83.5	18.9	85.6	20.0	91.5	16.5	75.8	17.4	82.5
3	18.6	79.6	19.3	81.6	20.6	87.4	20.4	83.6	19.0	81.8	19.4	86.3
4	21.9	93.7	20.6	88.8	22.7	94.2	24.8	98.9	20.2	85.8	21.0	92.1
5	19.2	76.2	20.1	79.9	21.3	83.0	19.0	71.8	19.0	77.1	18.3	74.9
6	21.3	76.5	19.6	76.0	22.0	82.7	24.8	88.2	22.2	86.4	21.0	81.1
7	18.9	77.0	17.7	71.3	18.6	70.6	20.4	75.1	18.0	72.0	17.1	70.9
8	20.3	77.4	18.5	70.4	20.2	73.6	21.6	75.8	20.1	76.9	20.2	77.5
9	19.8	73.8	19.8	73.7	21.4	75.8	22.7	77.5	20.4	77.1	20.1	78.0
10	19.5	71.1	18.3	67.2	19.9	68.2	21.5	69.6	18.6	69.4	18.2	68.1
11	19.6	71.2	19.6	70.4	21.4	73.7	21.9	71.8	19.4	70.4	19.6	72.7
12	21.1	77.4	19.6	70.3	20.1	69.4	20.9	68.3	20.1	72.1	20.5	74.3
13	19.0	73.5	19.6	75.4	21.4	80.0	20.6	71.8	20.8	79.1	20.4	80.0

Fluorad[1] Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 4. MALES: Summary of Means and Significance[a] of Hematological Values.

Hematology	Study Month	Control	10 ppm	30 ppm	100 ppm	300 ppm	1,000 ppm
Erthrocytes, 10^6 cmm	Pretest	6.01	6.55	6.00	5.93	5.91	6.35
	1	6.88	7.36	6.89	6.62	6.34	6.93
	3	7.95	7.46	7.05*	7.16*	6.72**	6.94**
Hematocrit, %	Pretest	47	49	44	46	46	50
	1	50	50	47	47	46	47
	3	49	47	46*	46	45*	47
Hemoglobin, g/100 ml	Pretest	15.9	16.6	15.6	15.0	15.2	16.2
	1	16.4	17.0	16.2	15.7	15.1	15.9
	3	16.2	14.7*	15.0	15.4	14.9	15.1
Leucocytes, 10^3/cmm	Pretest	12.57	10.58	10.39	9.94	8.50	13.01
	1	12.67	12.57	11.27	13.54	10.71	14.13
	3	10.64	8.88	9.33	9.35	7.63*	8.06
Neutrophils, %	Pretest	9	13	12	11	12	9
	1	9	10	9	10	11	8
	3	11	11	16	11	16	11
Lymphocytes, %	Pretest	90	86	87	88	87	90
	1	88	88	90	88	87	89
	3	88	88	82	86	82	82
Eosinophils, %	Pretest	1	1	1	1	1	1
	1	1	1	1	2	1	1
	3	1	1	2	2	2	1
Monocytes, %	Pretest	0	0	0	0	0	0
	1	2	1	0*	0*	1	2
	3	0	0	0	1	0	0
Basophils, %	Pretest	0	0	0	0	0	0
	1	0	0	0	0	0	0
	3	0	0	0	0	0	0
Reticulocytes, %	Pretest	7.7	6.3	7.5	5.5	6.9	6.9
	1	3.1	2.8	3.0	2.8	3.5	2.6
	3	2.4	2.9	3.2	2.8	2.8	2.8

*Significantly different from Control group mean, $p<0.05$.
**Significantly different from Control group mean, $p<0.01$.
[a] Statistical analysis not conducted on pretest values

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Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 4. Cont. FEMALES: Summary of Means and Significance[a] of Hematological Values.

Hematology	Study Month	Control	10 ppm	30 ppm	100 ppm	300 ppm	1,000 ppm
Erythrocytes, 10^6/ cmm	Pretest	6.19	6.35	6.41	6.12	6.18	6.49
	1	6.99	6.96	7.15	6.94	6.74	6.85
	3	7.15	7.07	6.94	6.90	6.86	7.31
Hematocrit, %	Pretest	45	47	46	46	46	49
	1	50	49	52	50	49	48
	3	46	46	47	47	47	47
Hemoglobin, g/100 ml	Pretest	15.6	16.4	16.2	15.2	15.1	16.2
	1	16.3	16.4	17.1	16.5	16.6	16.5
	3	15.6	15.4	15.1	15.3	16.1	15.8
Leucocytes, 10^3/ cmm	Pretest	7.35	8.61	7.22	7.87	7.28	10.72
	1	7.35	9.56	9.35	9.63	9.70	10.89
	3	6.60	5.77	6.74	5.74	5.00	6.04
Neutrophils, %	Pretest	11	9	8	16	11	6
	1	17	11	14	8	18	15
	3	15	17	20	19	19	16
Lymphocytes, %	Pretest	88	90	91	84	88	93
	1	80	86	84	91	80	83
	3	84	82	79	80	79	82
Eosinophils, %	Pretest	1	1	1	0	1	1
	1	2	2	1	1	2	2
	3	1	1	1	1	2	1
Monocytes, %	Pretest	0	0	0	0	0	0
	1	1	1	1	0	0	0
	3	0	0	0	0	0	0
Basophils, %	Pretest	0	0	0	0	0	0
	1	0	0	0	0	0	0
	3	0	0	0	0	0	0
Reticulocytes, %	Pretest	4.7	7.3	3.8	5.2	3.5	3.2
	1	2.7	1.8	2.0	2.6	2.7	2.1
	3	3.0	2.4	3.2	3.3	2.4	2.4

[a] Statistical analysis not conducted on pretest values

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TABLE 5. Individual Hematological Values - Pretest.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hematocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophilia Seg. %	Neutrophilia Non-Seg. %	Lymphocytes %	Eosinophilia %	Monocytes %	Basophilia %	Reticulocytes %
Control:												
73552	M	5.76[a]	47	15.8	9.19	5	0	94	1	0	0	7.8
73553	M	6.25[a]	50	16.9	12.84	11	0	89	0	0	0	8.2
73554	M	6.34	47	16.2	14.27	12	0	85	1	0	0	9.5
73555	M	6.08	48	16.5	15.48	5	0	93	1	1	0	6.5
73556	M	5.64	43	14.3	11.08	11	0	89	0	0	0	6.4
Mean		6.01	47	15.9	12.57	9	0	90	1	0	0	7.7
73557	F	6.04	46	15.8	7.29	8	0	91	1	0	0	5.6
73558	F	5.91	44	14.6	7.88	9	0	91	0	0	0	6.3
73559	F	5.99	45	15.1	7.86	10	0	89	1	0	0	4.8
73560	F	6.69	49	16.9	7.22	14	0	84	2	0	0	4.7
73561	F	6.32	40	15.7	6.49	13	0	87	0	0	0	2.3
Mean		6.19	45	15.6	7.35	11	0	88	1	0	0	4.7
10 ppm:												
73562	M	7.07	51	17.0	9.84	13	0	85	2	0	0	5.6
73563	M	6.76	52	17.2	11.88	10	0	89	1	0	0	7.3
73564	M	6.46	47	16.5	11.38	17	0	82	1	0	0	6.7
73565	M	6.27	49	16.2	10.12	14	0	85	1	0	0	5.9
73566	M	6.21	47	15.9	9.68	10	0	86	2	1	1	6.0
Mean		6.55	49	16.6	10.58	13	0	86	1	0	0	6.3
73567	F	6.55	50	18.1	13.93	12	0	88	0	0	0	9.3
73568	F	6.26	48	16.2	8.00	6	0	94	0	0	0	12.0
73569	F	5.31	40	13.5	5.43	13	0	87	0	0	0	3.1
73570	F	7.12	50	17.8	6.22	8	0	91	1	0	0	6.4
73571	F	6.53	47	16.6	9.45	6	0	91	3	0	0	5.8
Mean		6.35	47	16.4	8.61	9	0	90	1	0	0	7.1
30 ppm:												
73572	M	6.04	45	15.3	8.29	9	0	90	1	0	0	10.8
73573	M	6.46	46	16.9	10.87	19	0	80	1	0	0	5.0
73574	M	5.85[a]	46	15.6	8.96	12	0	88	0	0	0	3.4
73575	M	5.36	41	14.4	8.67	6	0	94	0	0	0	9.6
73576	M	6.22	44	15.9	15.16	14	0	85	1	0	0	8.5
Mean		6.00	44	15.6	10.39	12	0	87	1	0	0	7.5
73577	F	6.11	43	16.3	7.67	5	0	92	3	0	0	3.2
73578	F	6.20	47	16.6	6.71	14	0	85	1	0	0	4.3
73579	F	6.22	48	16.4	6.74	6	0	94	0	0	0	3.1
73580	F	7.12	49	16.2	7.44	12	0	87	1	0	0	2.9
73581	F	6.19	45	15.3	7.56	5	0	94	1	0	0	5.1
Mean		6.41	46	16.2	7.22	8	0	91	1	0	0	1.8

* 1+ Polychromasia, all rats
[a] Repeat determination

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TABLE 5. Cont. Individual Hematological Values - Pretest.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hematocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes %	Eosinophils %	Monocytes %	Basophils %	Reticulocytes %
100 ppm:												
73582	M	5.87	46	14.8	8.53	13	0	86	1	0	0	5.2
73583	M	6.34	47	15.6	10.65	7	0	93	0	0	0	7.8
73584	M	5.76[a]	49	15.6	9.98	26	0	71	3	0	0	7.1
73585	M	5.71	43	14.0	10.30	2	0	98	0	0	0	6.1
73586	M	6.01	47	15.2	10.25	7	0	92	1	0	0	6.1
Mean		5.91	46	15.0	9.94	11	0	88	1	0	0	5.5
73587	F	5.77	44	14.9	8.89	5	0	95	0	0	0	5.7
73588	F	6.19	46	15.5	7.63	6	0	93	1	0	0	6.4
73589	F	5.91	46	15.1	9.87	15	0	85	0	0	0	6.7
73590	F	6.38	44	14.6	6.52	8	0	92	0	0	0	5.4
73591	F	6.36	49	16.1	6.43	44	0	56	0	0	0	1.9
Mean		6.12	46	15.2	7.87	16	0	84	0	0	0	5.2
300 ppm:												
73592	M	5.76	44	14.9	6.67	11	0	88	1	0	0	9.1
73593	M	6.27	46	15.5	9.08	8	0	92	0	0	0	9.3
73594	M	5.64	45	14.9	7.60	14	0	85	1	0	0	6.4
73595	M	6.08[a]	49	16.1	7.50	20	0	79	1	0	0	2.6
73596	M	5.82	45	14.7	11.64	5	0	95	0	0	0	7.3
Mean		5.91	46	15.2	8.50	12	0	87	1	0	0	6.9
73597	F	6.14	47	15.9	9.58	10	0	89	1	0	0	4.0
73598	F	5.82	43	14.7	4.20	13	0	84	3	0	0	1.2
73599	F	6.00	44	14.1	8.45	8	0	92	0	0	0	4.1
73600	F	6.35	49	15.9	8.71	11	0	89	0	0	0	4.0
73601	F	6.57	46	15.1	5.48	13	0	84	2	1	0	4.1
Mean		6.18	46	15.1	7.28	11	0	88	1	0	0	3.5
1,000 ppm:												
73602	M	6.07	49	16.3	16.93	5	0	93	2	0	0	6.8
73603	M	6.22	51	15.8	9.86	11	0	89	0	0	0	3.2
73604	M	6.65	49	16.0	14.54	12	0	87	1	0	0	10.2
73605	M	6.98[a]	55	17.1	14.13	7	0	93	0	0	0	7.6
73606	M	6.04	47	15.6	9.57	9	0	90	1	0	0	6.9
Mean		6.39	50	16.2	13.01	9	0	90	1	0	0	6.9
73607	F	6.34	50	16.6	14.82	4	0	95	1	0	0	1.3
73608	F	6.53	48	16.2	10.11	5	0	95	0	0	0	1.1
73609	F	6.52	50	16.3	9.95	6	0	94	0	0	0	2.8
73610	F	6.79	48	15.9	9.20	9	0	88	3	0	0	5.0
73611	F	6.27	47	15.9	9.53	5	0	95	0	0	0	3.7
Mean		6.49	49	16.2	10.72	6	0	93	1	0	0	3.2

* 11 Polychromasia, all rats

[a] Repeat determination

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Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 6. Individual Hematological Values - 1 Month.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hemotocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes %	Eosinophils %	Monocytes %	Basophils %	Reticulocytes %
Control:												
73553	M	7.10	51	16.6	15.14	10	0	89	0	1	0	2.9
73554	M	6.56	45	15.3	11.04	8	0	91	0	1	0	4.0
73554	M	6.91	51	17.0	11.86	9	0	86	1	4	0	2.4
73555	M	6.87	50	16.4	13.40	8	0	90	1	1	0	3.1
73556	M	6.99	51	16.6	11.93	11	0	85	1	3	0	3.0
Mean		6.88	50	16.4	12.67	9	0	88	1	2	0	3.1
73557	F	6.72	50	16.1	8.23	23	0	73	3	1	0	3.4
73558	F	6.73	49	15.8	6.43	20	0	77	1	2	0	2.0
73559	F	7.28	50	16.7	8.27	26	0	72	0	2	0	2.5
73560	F	7.19	48	16.1	7.16	11	0	86	2	1	0	3.1
73561	F	7.05	51	16.7	6.68	6	0	91	2	1	0	2.4
Mean		6.99	50	16.3	7.35	17	0	80	2	1	0	2.7
10 ppm:												
73562	M	7.79	51	17.7	7.97	12	0	87	1	0	0	1.2
73563	M	7.76	50	17.8	14.20	9	0	89	1	1	0	2.4
73564	M	7.27	51	17.0	12.54	11	0	88	1	0	0	2.3
73565	M	7.15	50	16.9	15.56	12	0	83	3	2	0	2.8
73566	M	6.83	47	15.8	12.60	7	0	92	0	1	0	3.5
Mean		7.36	50	17.0	12.57	10	0	88	1	1	0	2.8
73567	F	7.03	49	16.9	10.22	5	0	88	4	3	0	1.5
73568	F	7.02	51	17.0	10.96	6	0	94	0	0	0	1.2
73569	F	6.83	48	15.7	9.97	16	0	78	5	1	0	1.6
73570	F	7.11	51	17.1	8.46	15	0	83	1	1	0	2.4
73571	F	6.80	46	15.5	8.21	12	1	85	1	1	0	2.5
Mean		6.96	49	16.4	9.56	11	0	86	2	1	0	1.8
30 ppm:												
73572	M	6.99	47	16.2	9.53	5	0	94	1	0	0	1.8
73573	M	7.48	48	16.4	10.96	12	0	86	2	0	0	1.2
73574	M	6.90	45	15.7	9.41	14	0	85	1	0	0	1.3
73575	M	6.69	47	16.5	11.38	10	0	89	0	1	0	1.0
73576	M	6.79	49	16.3	15.09	6	0	91	3	0	0	1.8
Mean		6.89	47	16.2	11.27	9	0	90	1	0	0	1.0
73577	F	6.94	51	16.6	8.81	11	0	89	0	0	0	2.7
73578	F	6.74	49	16.9	9.12	16	0	80	1	3	0	2.5
73579	F	6.80	50	16.8	11.96	9	0	88	2	1	0	1.2
73580	F	7.95	56	18.0	8.02	16	0	80	2	2	0	2.0
73581	F	7.39	54	17.1	8.83	17	0	81	1	1	0	1.8
Mean		7.15	52	17.1	9.35	14	0	84	1	1	0	2.0

* Normal

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TABLE 6, Cont. Individual Hematological Values - 1 Month.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hematocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes %	Eosinophils %	Monocytes %	Basophils %	Reticulocytes %
100 ppm:												
71582	M	7.51	51	16.6	15.46	14	0	81	5	0	0	2.2
71583	M	6.96	49	16.4	14.97	10	0	88	2	0	0	2.9
71584	M	6.12	46	15.8	16.41	11	0	85	3	1	0	4.6
71585	M	6.13	45	15.2	17.54	10	0	89	1	0	0	3.1
71586	M	6.16	46	14.5	8.32	7	0	92	1	0	0	2.1
Mean		6.62	47	15.7	13.54	10	0	88	2	0	0	2.8
71587	F	6.88	50	16.1	11.79	12	0	88	0	0	0	2.5
71588	F	6.87	48	17.0	8.97	6	0	92	1	1	0	4.8
71589	F	6.65	50	15.8	12.92	5	0	94	1	0	0	2.7
71590	F	7.56	51	17.2	7.83	11	0	86	3	0	0	1.6
71591	F	6.74	49	16.5	6.65	5	0	93	2	0	0	1.2
Mean		6.94	50	16.5	9.63	8	0	91	1	0	0	2.6
300 ppm:												
71592	M	6.01	40	13.9	10.05	13	0	84	2	1	0	4.0
71593	M	6.71	50	16.0	9.50	15	0	81	3	1	0	3.2
71594	M	6.00	45	13.9	10.90	7	0	93	0	0	0	4.1
71595	M	6.69	50	16.3	8.35	13	0	85	1	1	0	2.0
71596	M	6.10	46	15.5	14.76	9	0	91	0	0	0	4.4
Mean		6.34	46	15.1	10.71	11	0	87	1	1	0	3.5
71597	F	6.30	47	15.6	13.70	17	1	82	0	0	0	3.2
71598	F	6.83	49	16.7	7.50	24	0	74	1	1	0	1.2
71599	F	7.15	51	17.1	11.15	13	0	85	2	0	0	2.4
71600	F	6.67	49	16.8	9.39	18	0	78	4	0	0	3.2
71601	F	6.76	49	16.6	6.76	16	0	83	1	0	0	3.6
Mean		6.74	49	16.6	9.70	18	0	80	2	0	0	2.7
1,000 ppm:												
71602	M	7.15	47	15.6	13.59	8	0	90	0	2	0	3.4
71603	M	6.89	48	16.2	10.92	10	0	85	1	4	0	3.2
71604	M	6.84	46	15.8	16.32	9	0	89	1	1	0	2.6
71605	M	7.52	48	17.4	19.36	5	0	92	1	2	0	1.2
71606	M	6.27	47	14.6	10.50	7	0	90	1	0	0	2.5
Mean		6.93	47	15.9	14.13	8	0	89	1	2	0	2.6
71607	F	7.14	49	17.9	17.41	7	0	92	1	0	0	1.0
71608	F	6.81	47	16.3	9.96	21	0	79	0	0	0	2.5
71609	F	7.08	47	15.7	9.64	35	0	64	1	0	0	2.3
71610	F	6.47	46	15.4	7.83	8	0	90	2	0	0	3.1
71611	F	6.76	51	17.0	9.58	5	0	90	4	1	0	1.5
Mean		6.85	48	16.5	10.89	15	0	83	2	0	0	2.1

* Normal

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TABLE 7. Individual Hematological Values - 3 Months.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hematocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes %	Eosinophils %	Monocytes %	Basophils %	Reticulocytes %
Control:												
73552	M	7.96	48	15.2	8.14	4	0	96	0	0	0	2.6
73553	M	8.21	52	16.6	11.07	18	0	79	1	0	0	2.0
73554	M	8.37	50	16.7	13.71	9	0	89	2	0	0	2.5
73555	M	7.72	48	16.3	10.55	6	0	94	0	0	0	3.0
73556	M	7.47	49	16.2	9.72	16	0	84	0	0	0	2.0
Mean		7.95	49	16.2	10.64	11	0	88	1	0	0	2.4
73557	F	6.98	45	15.2	7.04	23	0	73	4	0	0	3.0
73558	F	7.11	46	16.1	5.97	12	0	87	1	0	0	2.7
73559	F	7.42	45	14.8	5.58	9	0	90	1	0	0	2.5
73560	F	7.49	48	16.6	8.41	26	0	73	1	0	0	3.2
73561	F	6.74	44	15.2	5.99	5	0	95	0	0	0	3.8
Mean		7.15	46	15.6	6.60	15	0	84	1	0	0	3.0
10 ppm:												
73562	M	7.05	47	15.2	7.32	10	0	89	1	0	0	2.0
73563	M	7.63	47	13.9	8.90	11	0	88	1	0	0	3.1
73564	M	7.59	50	16.2	10.00	6	0	94	0	0	0	3.5
73565	M	7.95	45	14.2	10.19	19	0	80	1	0	0	2.6
73566	M	7.07	45	13.9	8.01	10	0	88	2	0	0	3.2
Mean		7.46	47	14.7	8.88	11	0	88	1	0	0	2.9
73567	F	6.65	46	16.3	7.11	8	0	92	0	0	0	2.0
73568	F	7.32	47	15.5	5.40	7	0	90	2	1	0	2.1
73569	F	6.92	43	14.0	5.10	10	0	88	2	0	0	2.5
73570	F	7.48	49	16.4	5.41	33	0	66	0	1	0	2.7
73571	F	6.98	45	15.0	5.81	26	0	73	1	0	0	2.6
Mean		7.07	46	15.4	5.77	17	0	82	1	0	0	2.4
30 ppm:												
73572	M	7.05	46	14.7	8.18	16	0	83	1	0	0	3.4
73573	M	7.10	48	15.5	8.47	11	0	86	1	0	0	3.5
73574	M	7.44	45	14.7	8.56	25	0	72	1	0	0	2.3
73575	M	6.54	44	14.6	9.27	12	0	87	1	0	0	3.4
73576	M	7.14	47	15.7	12.17	16	0	81	1	0	0	3.5
Mean		7.05	46	15.0	9.33	16	0	82	2	0	0	3.2
73577	F	6.94	46	14.9	5.92	19	0	81	0	0	0	3.6
73578	F	6.34	46	14.2	5.42	5	0	95	0	0	0	3.5
73579	F	6.88	46	14.3	8.81	20	0	76	4	0	0	3.5
73580	F	7.53	51	16.7	7.24	28	0	70	2	0	0	3.8
73581	F	6.99	47	15.5	6.29	29	0	70	1	0	0	3.7
Mean		6.94	47	15.1	6.74	20	0	79	1	0	0	3.2

* Normal

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TABLE 7. Cont.

Individual Hematological Values - 3 Months.

Group, Rat Number	Sex	Erythrocytes* 10^6/cmm	Hematocrit %	Hemoglobin g/100 ml	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes %	Eosinophils %	Monocytes %	Basophils %	Reticulocytes %
100 ppm:												
73582	M	7.56	46	15.7	7.80	8	0	91	1	0	0	1.0
73583	M	7.42	47	15.4	9.16	20	0	74	3	3	0	2.8
73584	M	7.19	47	16.1	12.34	13	0	85	2	0	0	3.5
73585	M	6.74	45	15.0	9.69	7	0	92	0	1	0	2.8
73586	M	6.91	46	14.9	7.76	8	0	89	3	0	0	2.0
Mean		7.16	46	15.4	9.35	11	0	86	2	1	0	2.8
73587	F	6.77	44	14.6	5.68	21	0	78	1	0	0	4.1
73588	F	7.01	49	16.2	4.24	15	0	81	2	0	0	3.2
73589	F	6.80	45	14.5	7.31	16	1	81	2	0	0	3.0
73590	F	Died										
73591	F	6.98	48	15.9	5.72	18	1	80	1	0	0	3.0
Mean		6.90	47	15.3	5.74	18	1	80	1	0	0	3.1
800 ppm:												
73592	M	6.96	47	15.5	7.55	16	0	80	4	0	0	2.9
73593	M	6.92	47	15.1	8.11	18	0	81	1	0	0	3.0
73594	M	6.39	43	13.8	7.47	11	0	87	2	0	0	2.0
73595	M	6.28	44	14.9	7.29	17	0	82	1	0	0	3.4
73596	M	7.07	45	15.1	7.74	16	0	82	2	0	0	3.0
Mean		6.72	45	14.9	7.63	16	0	82	2	0	0	2.8
73597	F	6.68	44	14.8	6.53	21	0	78	1	0	0	2.6
73598	F	6.95	48	17.6	3.83	19	0	79	2	0	0	1.8
73599	F	7.12	47	15.8	5.29	17	0	81	0	0	0	2.6
73600	F	6.68	48	16.0	4.36	19	0	77	4	0	0	2.5
73601	F	Died										
Mean		6.86	47	16.1	5.00	19	0	79	2	0	0	2.4
1,000 ppm:												
73602	M	6.81	44	14.4	7.74	16	0	84	0	0	0	3.3
73603	M	6.77	47	14.6	7.62	14	0	84	2	0	0	2.6
73604	M	6.66	43	13.8	5.38	20	0	79	1	0	0	2.5
73605	M	8.25	51	16.7	11.18	13	0	87	0	0	0	2.6
73606	M	6.19	48	16.0	8.89	21	0	78	1	0	0	3.2
Mean		6.94	47	15.1	8.06	17	0	82	1	0	0	2.8
73607	F	7.51	48	16.2	7.61	24	0	75	1	0	0	3.1
73608	F	7.28	47	15.3	4.92	16	0	81	1	0	0	2.0
73609	F	7.08	46	15.5	4.60	11	0	83	4	0	0	2.1
73610	F	7.33	47	15.7	5.14	12	0	86	2	0	0	2.7
73611	F	7.35	48	16.1	7.92	11	0	86	1	0	0	2.0
Mean		7.31	47	15.8	6.04	16	0	82	2	0	0	2.4

* Normal

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[redacted]

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 8. MALES: Summary of Means and Significance[b] of Biochemical Values.

Biochemistry	Study Month	Control	10 ppm	30 ppm	100 ppm	300 ppm	1,000 ppm
Glucose, mg/100 ml	Pretest	91	92	89	94	106	100
	1	112	112	133*	127	127	121
	3	121	120	136**	134	143*	135**
B.U.N., mg/100 ml	Pretest	24.7	11.3	9.6	10.9	11.0	14.1
	1	15.4	14.8	17.9	17.0	19.6**	20.9*
	3	16.2	18.8	18.0	20.4*	23.9*	35.1
γ-Glutamyl, Peptidase Sigma units/ml	Pretest	19	1	1	1	1	0
	1	3	2	2	2	2	1
	3	1	1	1	1	1	3
C.P.K.[a], Sigma units/ml	Pretest	7	13	15	16	10	12
	1	17	17	14	19	15	13
	3	11	8	10	13	14	15
S.G.O.T., Int'l units/l	Pretest	94	89	89	114	106	105
	1	155	143	128	121**	108*	113*
	3	113	105	94	128	108	119
S.G.P.T., Int'l units/l	Pretest	78	90	83	67	61	116
	1	89	78	71	76	75	97
	3	38	39	41	63	54	54
Calcium, mg/100 ml	Pretest	9.6	10.4	10.0	9.7	9.5	10.3
	1	12.7	11.6*	11.3*	12.0*	11.8*	12.0*
	3	9.8	9.3	9.2**	9.5	9.3	9.5
Alk. Phos., Int'l units/l	Pretest[c]						
	1	194	225	220	216	249	299
	3	104	137	120	147*	204*	212

*Significantly different from Control group mean, $p<0.01$.
**Significantly different from Control group mean $p<0.05$.
[a]Creatinine phosphokinase.
[b]Statistical analysis not conducted on pretest values.
[c]Not determined because of anticoagulant interference

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TABLE 8. Cont. FEMALES: Summary of Means and Significance[b] of Biochemical Values.

Biochemistry	Study Month	Control	10 ppm	30 ppm	100 ppm	300 ppm	1,000 ppm
Glucose, mg/100 ml	Pretest	91	100	99	108	107	89
	1	111	117	120	124	106	116
	3	119	126	131	127	122	125
B.U.N., mg/100 ml	Pretest	11.7	11.9	8.0	10.6	9.9	12.4
	1	18.1	18.3	17.0	16.1	15.4	19.3
	3	21.4	17.5	16.7	19.4	17.6	20.6
γ-Glutamyl, Peptidase Sigma units/ml	Pretest	1	1	0	0	0	0
	1	2	2	2	2	2	1
	3	1	1	1	2	2	2
C.P.K.**, Sigma units/ml	Pretest	9	13	13	14	17	10
	1	14	17	12	25	17	15
	3	14	9	7	18	12	15
P.G.O.T., Int'l units/l	Pretest	75	86	74	96	111	112
	1	156	149	158	135	133	135
	3	110	131	96	109	113	117
P.G.P.T., Int'l units/l	Pretest	80	88	75	64	67	103
	1	71	78	80	82	71	89
	3	25	50	26	32	39*	38
Calcium, mg/100 ml	Pretest	10.4	10.3	9.7	9.8	9.5	10.2
	1	11.8	11.6	11.4	12.2*	12.2*	12.1
	3	9.7	9.4	9.4	9.8	9.0	9.4
Alka. Phos., Int'l units/l	Pretest [b]						
	1	115	133	121	106	106	112
	3	69	69	57	52	53	64

*Significantly different from Control group mean, $p \leq 0.05$

**Creatine phosphokinase

[b]Statistical analysis not conducted on pretest values

[c]Not determined because of anticoagulant interference

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TABLE 9. Individual Biochemical Values - Pretest

Group, Rat Number	Sex	Glucose mg/100 ml	B.U.N. mg/100 ml	γ-Glutamyl Peptidase Sigma units/ml	C.P.K.* Sigma units/ml	S.G.O.T. int'l units/l	S.G.P.T. int'l units/l	Calcium meq/liter
Control:								
73551	M	87	12.3	0	9	90	69	9.6
73553	M	93	15.0	1	7	114	96	8.8
73554	M	90	66.0	86	5	87	60	9.2
73555	M	90	14.7	2	9	96	87	10.3
73556	M	93	15.3	2	7	81	78	9.9
Mean		91	24.7	19	7	94	78	9.6
73557	F	90	10.2	1	10	69	78	10.0
73558	F	87	8.7	1	7	78	72	9.3
73559	F	96	9.3	1	14	78	87	9.5
73560	F	90	15.0	1	5	78	78	12.8
73561	F	90	15.3	1	7	72	84	10.2
Mean		91	11.7	1	9	75	80	10.4
10 ppm:								
73562	M	99	14.7	1	13	99	84	9.9
73563	M	102	15.0	0	14	93	117	10.4
73564	M	99	9.3	1	18	84	93	11.1
73565	M	78	9.0	1	12	81	87	10.2
73566	M	81	8.7	2	8	87	69	10.5
Mean		92	11.3	1	13	89	90	10.4
73567	F	90	9.3	1	17	87	90	10.8
73568	F	108	10.8	0	8	75	84	10.2
73569	F	87	11.4	1	19	90	99	11.9
73570	F	111	14.4	1	12	90	87	9.6
73571	F	102	13.5	2	10	90	81	9.9
Mean		100	11.9	1	13	86	88	10.3
30 ppm:								
73572	M	84	9.9	0	16	84	69	10.0
73573	M	78	8.7	2	14	120	90	10.2
73574	M	78	10.2	2	22	90	96	9.7
73575	M	102	7.5	1	13	66	72	9.5
73576	M	102	11.7	1	11	84	87	10.4
Mean		89	9.6	1	15	89	83	10.0
73577	F	120	6.9	0	13	84	87	9.1
73578	F	93	6.6	0	18	84	66	10.2
73579	F	99	7.2	0	16	69	66	9.4
73580	F	93	9.3	0	10	72	84	10.2
73581	F	90	10.2	0	10	63	72	9.5
Mean		99	8.0	0	13	74	75	9.7

*Creatinine phosphokinase

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TABLE 9. Cont. Individual Biochemical Values - Protect.

Rep. No. Number	Sex	Glucose mg/100 ml	S.U.N. mg/100 ml	Peptidase Sigma units/ml	[illegible] units/ml	[illegible] units/ml	[illegible] units/ml	[illegible] g/dl
100 ppm:								
73584	F	111	12.9	1	13	94	93	10.6
73585	F	115	9.7	1	14	114	97	9.4
73586	F	91	11.4	0	13	108	84	9.4
73587	F	91	9.6	0	18	117	98	9.1
73588	M	90	11.7	1	10	135	90	9.8
Mean		94	10.9	1	13	114	92	9.7
73587	F	114	9.0	0	9	90	84	9.7
73588	F	94	9.0	0	20	96	84	9.4
73589	F	108	14.4	1	15	93	84	9.8
73590	F	101	9.3	0	12	102	90	9.6
73591	F	117	11.4	0	11	99	69	10.1
Mean		108	10.6	0	14	96	84	9.8
300 ppm:								
73592	M	90	10.2	0	8	99	80	9.6
73593	M	117	12.0	1	9	111	69	9.7
73594	M	105	9.6	1	10	120	97	10.1
73595	M	111	12.0	1	15	111	90	9.7
73596	M	108	11.4	0	7	87	80	9.7
Mean		106	11.0	1	10	106	81	9.8
73597	F	99	9.0	0	18	111	87	9.8
73598	F	111	9.0	0	14	99	85	9.4
73599	F	102	9.0	0	19	99	78	9.6
73600	F	111	11.4	0	22	129	97	9.9
73601	F	111	11.1	1	10	117	66	9.8
Mean		107	9.9	0	17	111	87	9.8
1,000 ppm:								
73602	M	131	17.4	1	16	125	115	10.7
73603	M	90	15.0	0	10	93	99	10.6
73604	M	99	15.0	0	9	114	129	10.1
73605	M	78	10.8	1	19	102	114	9.9
73606	M	102	12.3	0	6	93	90	9.1
Mean		100	14.1	0	12	105	110	10.1
73607	F	93	12.3	1	12	123	117	10.1
73608	F	102	11.4	0	13	108	117	9.8
73609	F	96	12.0	1	10	120	99	10.1
73610	F	90	11.7	0	7	108	96	10.6
73611	F	63	14.7	0	7	99	84	10.8
Mean		89	12.4	0	10	112	103	10.2

Alkaline phosphatase

[illegible]

TABLE 10. Individual Biochemical Values - 1 Month.

Group. Rat Number	Sex	Glucose mg 100 ml	B.U.N. mg/100 ml	γ-Glutamyl Peptidase Sigma units/ml	C.P.K.* Sigma units/ml	P.G.O.T. int'l units/l	P.G.P.T. int'l units/l	Calcium meq liter	Alk. Phos. int'l units/l
Control:									
73551	M	108	15.6	5	11	129	87	11.6	17[illegible]
73553	M	120	16.8	4	13	180	93	12.8	228
73554	M	108	14.7	3	20	180	93	12.6	156
73555	M	117	14.7	2	19	132	90	12.6	222
73556	M	108	15.0	1	20	156	84	12.6	192
Mean		112	15.4	3	17	155	89	12.7	194
73557	F	111	12.0	2	9	129	66	11.6	114
73558	F	105	9.6	2	14	141	72	11.8	102
73559	F	117	10.8	2	16	180	78	11.8	165
73560	F	108	19.5	1	11	162	63	12.2	87
73561	F	114	38.7	1	20	168	75	11.4	105
Mean		111	18.1	2	14	156	71	11.8	115
10 ppm:									
73562	M	120	12.0	1	20	123	72	11.8	168
73563	M	105	14.7	1	22	153	87	11.4	201
73564	M	111	15.0	2	15	138	66	11.8	318
73565	M	108	17.7	3	11	138	75	11.4	210
73566	M	117	14.4	3	16	165	90	11.4	228
Mean		112	14.8	2	17	143	78	11.6	225
73567	F	117	14.7	1	9	150	96	11.6	105
73568	F	120	17.7	2	18	153	78	11.6	126
73569	F	117	23.7	3	15	144	54	11.8	147
73570	F	114	17.4	3	28	150	93	11.6	138
73571	F	117	18.0	QNS	13	147	69	11.6	150
Mean		117	18.3	2	17	149	78	11.6	133
30 ppm:									
73572	M	117	20.7	3	15	123	60	11.4	267
73573	M	129	16.8	2	16	138	84	11.8	240
73574	M	123	15.3	3	8	114	48	11.2	198
73575	M	144	15.3	1	15	123	69	11.2	177
73576	M	153	21.6	1	15	141	93	11.0	216
Mean		133	17.9	2	14	128	71	11.3	220
73577	F	132	21.0	3	16	129	93	11.6	99
73578	F	123	15.0	3	9	147	60	11.2	117
73579	F	123	18.3	2	13	165	75	11.2	171
73580	F	114	15.3	0	12	195	96	11.6	108
73581	F	108	15.3	3	12	156	78	11.4	108
Mean		120	17.0	2	12	158	80	11.4	121

QNS - Quantity not sufficient
*Creatinine phosphokinase

137-084

Fluorad[1] Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 10. Cont. Individual Biochemical Values - 1 Month.

Group, Rat Number	Sex	Glucose mg 100 ml	B.U.N. mg 100 ml	γ-Glutamyl Peptidase Sigma units/ml	C.P.K.* Sigma units ml	P.G.O.T. int'l units/l	P.G.P.T. int'l units l	Calcium meq liter	Alk. Phos. int'l units/l
100 ppm:									
73582	M	105	15.0	2	18	135	78	12.4	231
73583	M	135	17.7	2	18	135	90	12.2	246
73584	M	138	15.3	2	17	96	63	11.8	189
73585	M	132	16.3	3	24	126	81	11.8	219
73586	M	123	18.6	1	16	114	66	11.8	195
Mean		127	17.0	2	19	121	76	12.0	216
73587	F	114	14.7	3	12	132	81	12.6	123
73588	F	105	14.7	1	55	132	72	12.0	75
73589	F	138	18.3	3	17	120	87	12.2	111
73590	F	144	17.7	2	31	174	108	11.8	123
73591	F	120	15.0	QNS	11	117	60	12.4	99
Mean		124	16.1	2	25	135	82	12.2	106
300 ppm:									
73592	M	123	20.7	0	11	108	78	11.6	213
73593	M	132	17.7	1	15	117	81	11.8	258
73594	M	123	18.0	1	11	84	48	11.8	186
73595	M	132	20.7	3	10	117	78	12.0	228
73596	M	123	21.0	3	26	114	90	12.2	360
Mean		127	19.6	2	15	108	75	11.8	249
73597	F	102	19.5	3	21	123	63	12.2	132
73598	F	105	15.0	1	10	135	72	11.8	78
73599	F	105	15.3	3	12	108	57	12.6	90
73600	F	117	12.3	1	14	144	96	12.4	105
73601	F	102	15.0	1	28	156	66	12.2	123
Mean		106	15.4	2	17	133	71	12.2	106
1,000 ppm:									
73602	M	126	24.0	1	9	99	93	12.2	168
73603	M	114	20.4	1	14	120	96	12.0	264
73604	M	120	23.4	2	18	126	123	12.0	561
73605	M	120	17.4	1	13	105	96	12.2	246
73606	M	126	19.2	1	11	114	78	11.8	255
Mean		121	20.9	1	13	113	97	12.0	299
73607	F	105	18.9	0	16	165	117	12.2	141
73608	F	120	15.3	1	10	114	66	12.0	105
73609	F	129	18.0	1	10	132	90	12.0	75
73610	F	114	22.8	2	17	120	87	12.2	132
73611	F	114	21.3	1	20	126	87	12.0	105
Mean		116	19.3	1	15	135	89	12.1	112

QNS - Quantity not sufficient
*Creatinine phosphokinase

137-089

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE II. Individual Biochemical Values - 3 Months.

Group, Rat Number	Sex	Glucose mg 100 ml	B.U.N. mg/100 ml	γ-Glutamyl Peptidase Sigma units/ml	C.P.K.* Sigma units ml	F.G.O.T. int'l units/l	F.G.P.T. int'l units/l	Calcium meq liter	Alk. Phos. int'l units/l
Control:									
73552	M	114	15.9	1	9	95	32	9.6	95
73553	M	125	17.4	1	14	138	31	10.1	125
73554	M	119	17.0	1	10	106	43	9.7	86
73555	M	126	15.0	0	12	111	30	10.3	97
73556	M	123	15.9	0	9	115	55	9.2	129
Mean		121	16.2	1	11	113	38	9.8	104
73557	F	122	18.8	0	7	95	30	10.1	54
73558	F	114	16.1	1	26	99	28	9.1	42
73559	F	125	16.1	1	13	107	17	9.5	101
73560	F	117	19.9	1	10	118	29	9.8	43
73561	F	116	36.1	1	10	130	21	9.9	104
Mean		119	21.4	1	14	110	25	9.7	69
10 ppm:									
73562	M	125	16.6	0	5	88	33	9.2	86
73563	M	104	22.0	1	9	126	36	9.1	127
73564	M	111	17.0	1	12	111	52	9.8	195
73565	M	126	20.4	1	8	115	42	9.3	130
73566	M	134	18.2	0	8	84	30	9.0	144
Mean		120	18.8	1	8	105	39	9.3	137
73567	F	117	16.9	2	6	106	40	9.5	48
73568	F	125	19.0	1	10	96	40	9.8	51
73569	F	135	16.8	0	7	92	37	9.5	86
73570	F	119	16.1	0	16	249	105	9.9	65
73571	F	130	18.9	1	8	111	30	9.1	97
Mean		126	17.5	1	9	131	50	9.4	69
30 ppm:									
73572	M	135	17.0	1	6	90	35	9.0	126
73573	M	129	16.0	1	7	80	32	9.4	124
73574	M	134	17.1	1	5	91	41	9.2	127
73575	M	137	16.9	2	10	102	54	8.7	85
73576	M	145	23.0	1	22	105	44	9.6	139
Mean		136	18.0	1	10	94	41	9.2	120
73577	F	129	16.0	1	6	71	21	9.2	41
73578	F	128	15.9	1	4	80	21	9.1	56
73579	F	124	15.1	2	10	100	25	9.2	71
73580	F	141	16.6	2	9	105	21	10.2	53
73581	F	132	20.0	1	6	125	43	9.2	66
Mean		131	16.7	1	7	96	26	9.4	57

DNS - Quantity not sufficient
*Creatinine phosphokinase

137-054

Fluorad® Fluorochemical FC-1-3: Ninety Day Subacute Rat Toxicity Study.

TABLE II. Cont. Individual Biochemical Values - 3 Months.

Group, Rat Number	Sex	Glucose mg/100 ml	B.U.N. mg/100 ml	γ-Glutamyl Peptidase Sigma units/ml	C.P.K.* Sigma units/ml	S.G.O.T. int'l units/l	S.G.P.T. int'l units/l	Calcium mec liter	Alk. Phos. int'l units/l
100 ppm:									
73582	M	Tube broke in centrifuge - no sample							
73583	M	121	20.1	2	19	192	101	9.8	150
73584	M	154	20.7	1	14	83	42	9.7	151
73585	M	130	20.0	1	7	106	45	9.1	144
73586	M	130	20.7	1	11	130	62	9.3	144
Mean		134	20.4	1	13	128	63	9.5	147
73587	F	126	16.4	1	20	105	30	9.6	51
73588	F	140	15.9	2	16	110	24	10.3	56
73589	F	125	24.2	2	13	120	42	9.3	44
73590	F	Died							
73591	F	116	21.0	2	24	101	30	9.6	55
Mean		127	19.4	2	18	109	31	9.8	51
300 ppm:									
73592	M	144	29.0	1	22	95	42	9.5	249
73593	M	145	22.1	1	13	143	86	9.1	210
73594	M	144	20.1	1	11	91	57	9.9	148
73595	M	139	23.0	1	13	120	50	9.3	154
73596	M	144	25.5	1	11	91	37	9.6	228
Mean		143	23.9	1	14	108	54	9.3	204
73597	F	121	17.1	2	14	98	29	8.9	59
73598	F	116	17.0	2	12	127	41	9.4	46
73599	F	123	19.1	2	10	117	41	9.2	50
73600	F	127	17.1	1	12	111	42	9.8	56
73601	F	Died							
Mean		122	17.6	2	12	113	39	9.6	53
1,000 ppm:									
73602	M	130	27.0	2	13	90	48	10.0	121
73603	M	136	23.5	2	12	83	26	9.3	182
73604	M	140	79.1	7	16	139	76	9.4	350
73605	M	124	21.1	2	14	141	37	9.9	224
73606	M	144	24.8	1	22	141	81	9.8	181
Mean		135	35.1	3	15	119	54	9.5	212
73607	F	139	21.0	1	16	150	49	9.0	95
73608	F	122	17.0	2	21	112	30	10.0	70
73609	F	121	18.8	2	11	126	45	9.8	34
73610	F	117	22.1	1	17	97	33	8.8	64
73611	F	126	24.0	2	7	99	31	9.4	56
Mean		125	20.6	2	15	117	38	9.4	64

*Creatinine phosphokinase

137-099

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 12. Individual Urinalysis Values - Pretest.

Group, Rat Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Total Protein	Glucose	Bilirubin	Occult Blood	Ketones	Leucocytes	Erythrocytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
Control:																	
/3552	M	2.0	S-C	7.1	1.031	N	N	N	3+	N				F	F		M
/3553	M	3.0	LS-C	7.0	1.036	N	N	N	N	N				occ	F		M
/3554	M	3.5	LS-C	7.1	1.032	N	N	N	tr	N				occ	occ		M
/3555	M	5.5	DS-cl	7.0	1.032	N	N	N	tr	N				occ	F		M
/3556	M	2.5	LS-C	7.1	1.028	N	N	N	tr	N				occ	M		M
/3557	F	2.5	DS-cl	6.0	1.045	N	N	N	4+	N			occ	F	F		M
/3558	F	3.0	LS-C	7.2	1.024	N	N	N	tr	N				occ	occ		M
/3559	F	2.0	DS-cl	8.0	1.025	N	N	N	4+	N			occ	F	F		M
/3560	F	2.0	LS-C	6.4	1.032	N	N	N	1+	N				occ	F		M
/3561	F	1.5	S-C	7.0	1.041	N	N	N	2+	N		1-3		F	M		M
10 ppm:																	
/3562	M	3.0	LS-C	7.2	1.031	N	N	N	N	N		occ		occ	F		M
/3563	M	3.5	LS-C	7.2	1.030	N	N	N	tr	N				occ	F		M
/3564	M	2.5	LS-cl	7.2	1.029	N	N	N	4+	N				occ	F		M
/3565	M	5.0	LS-C	6.4	1.033	N	N	N	N	N				occ	M		M
/3566	M	2.5	S-C	6.5	1.037	N	N	N	tr	N				occ	F		M
/3567	F	2.0	DS-cl	8.0	1.031	N	N	N	4+	N		1-3		F	F		M
/3568	F	1.5	DS-cl	7.9	1.050	N	N	N	4+	N		1-3		F	F		M
/3569	F	0.5	LS-C	5.7	1.047	N	N	N	1+	N				occ	F		M
/3570	F	2.5	LS-cl	6.8	1.033	N	N	N	tr	N			occ	occ	M		M
/3571	F	1.0	S-cl	8.0	1.037	N	N	N	2+	N				occ	F		M
30 ppm:																	
/3572	M	4.0	LS-C	6.8	1.037	N	N	N	N	N				occ	F		M
/3573	M	2.0	LS-C	6.6	1.039	N	N	N	N	N				occ	occ		M
/3574	M	0.5	LS-C	5.6	1.057	N	N	N	1+	N				occ	occ		M
/3575	M	4.5	LS-C	6.1	1.035	N	N	N	1+	N			occ	F	F		M
/3576	M	5.0	S-C	6.3	1.034	N	N	N	N	N				occ	M		M
/3577	F	4.0	LS-C	5.9	1.029	N	N	N	N	N			occ	occ	occ		M
/3578	F	3.5	LS-C	6.1	1.021	N	N	N	tr	N				occ	F		M
/3579	F	2.5	DS-C	6.2	1.040	N	N	N	tr	N		occ		occ	F		M
/3580	F	0.5	LS-C	5.9	1.052	N	N	N	N	N				occ	F		F
/3581	F	3.0	S-C	6.5	1.029	N	N	N	3+	N		occ		F	M		M

Code: tr - Trace; 1+ - Trace to Slight; 2+ - Slight to moderate; 3+ - Moderate; 4+ - Marked; S - Straw; LS - Light Straw; DS - Dark Straw; LAm - Light Amber; DAm - Dark Amber; cl - Cloudy; C - Clear; N - Negative; F - Few; L - Loaded; M - Many; R - Rare; occ - Occasional

117 089

TABLE 12. Cont. Individual Urinalysis Values - Pretest.

Group, Rat Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Total Protein	Glucose	Bilirubin	Occult Blood	Ketones	Leucocytes	Erythrocytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
100 ppm:																	
71582	M	5.0	S-C	7.0	1.028	N	N	N	N	N				F	F		M
71583	M	6.0	LS-C	7.0	1.026	N	N	N	N	N		occ		occ	F		M
71584	M	2.5	LS-C	6.1	1.028	N	N	N	N	N				occ	F		F
71585	M	2.5	S-C	6.7	1.026	N	N	N	N	1+		occ		occ	F		M
71586	M	3.5	DS-cl	6.8	1.045	N	N	N	2+	N				F	F		M
71587	F	5.0	LS-C	6.7	1.040	N	N	N	tr	N				occ	M		M
71588	F	3.5	LS-C	6.8	1.035	N	N	N	1+	N				occ	M		M
71589	F	2.0	DS-C	7.2	1.021	N	N	N	3+	N			occ	F	F		M
71590	F	3.0	LS-C	7.0	1.028	N	N	N	N	N		1-3		occ	F		M
71591	F	5.5	LS-C	6.0	1.030	N	N	N	N	N				occ	occ		M
300 ppm:																	
71592	M	3.0	S-C	6.5	1.009	N	N	N	tr	N		occ		F	F		M
71593	M	3.5	LS-C	7.3	1.020	N	N	N	1+	N				occ	occ		M
71594	M	3.5	LS-C	6.6	1.040	N	N	N	N	N				occ	occ		M
71595	M	5.5	LS-C	6.9	1.033	N	N	N	N	N				occ	F		M
71596	M	3.5	DS-cl	7.9	1.034	N	N	N	2+	N				F	F		M
71597	F	1.0	DS-C	8.0	1.034	N	N	N	4+	N		occ	occ	occ	F		M
71598	F	3.5	LS-C	5.9	1.023	N	N	N	tr	N				occ	occ		M
71599	F	5.0	LS-C	7.0	1.022	N	N	N	tr	N				occ	M		M
71600	F	5.0	S-C	7.3	1.036	N	N	N	tr	N				occ	F		M
71601	F	1.0	S-C	7.0	1.036	N	N	N	3+	N				occ	F		M
1,000 ppm:																	
71602	M	1.0	S-C	6.8	1.028	N	N	N	tr	N				F	F		M
71603	M	1.5	LS-C	7.0	1.032	N	N	N	1+	N				occ	occ		M
71604	M	7.0	LS-C	6.9	1.016	N	N	N	2+	N				occ	F	occ	M
71605	M	1.5	S-C	6.9	1.027	N	N	N	N	N				occ	F		M
71606	M	7.5	LS-C	6.8	1.021	N	N	N	N	N				occ	F		I
71607	F	1.5	DS-C	6.2	1.045	N	N	N	tr	N				occ	F		M
71608	F	2.0	S-C	6.3	1.038	N	N	N	1+	N			occ	occ	F		M
71609	F	1.0	DS-C	6.1	1.060	N	N	N	tr	N		occ		occ	F		M
71610	F	1.0	DS-C	7.6	1.028	N	N	N	1+	N				occ	F		M
71611	F	7.0	LS-C	7.2	1.020	N	N	N	N	N				occ	F		M

Code: tr - Trace; 1+ - Trace to slight; 2+ - Slight to moderate; 3+ - Moderate; 4+ - Marked; S - Straw; LS - Light Straw; DS - Dark Straw; LAm - Light Amber; DAm - Dark Amber; cl - Cloudy; C - Clear; N - Negative; F - Few; L - Loaded; M - Many; R - Rare; occ - Occasional

117 089

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 11. Individual Urinalysis Values - 1 Month.

Group, Rat Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Total Protein	Glucose	Bilirubin	Occult Blood	Ketones	Leucocytes	Erythrocytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
Control:																	
73552	M	6.0	LS-cl	6.5	1.053	N	N	N	tr	N				occ	occ		F
73553	M	3.0	LS-cl	6.5	1.051	N	N	N	N	N				occ	F		M
73554	M	8.0	LS-cl	7.5	1.037	N	N	N	tr	N				occ	F		F
73555	M	4.0	S-cl	6.1	1.078	N	N	N	N	N		occ		occ	F		F
73556	M	1.5	DS-cl	8.2	1.064	N	N	N	1+	N		1-3	occ	occ	M		M
73557	F	4.0	S-cl	7.2	1.064	N	N	N	tr	N		occ		occ	F		M
73558	F	3.0	LS-C	6.0	1.054	N	N	N	N	N				occ	occ		F
73559	F	2.0	LS-C	6.3	1.066	N	N	N	N	N				occ	F		F
73560	F	1.0	DS-cl	8.2	1.058	N	N	N	2+	N			occ	F	M		M
73561	F	1.0	LS-C	6.0	1.050	N	N	N	N	N				occ	F		F
10 ppm:																	
73562	M	3.0	S-cl	6.1	1.076	N	N	N	N	N		occ		F	M		F
73563	M	1.5	S-cl	6.4	1.098	N	N	N	N	N				occ	F		F
73564	M	2.0	DS-cl	8.2	1.058	N	N	N	1+	N			occ	F	F		M
73565	M	4.0	DS-cl	8.2	1.060	N	N	N	1+	N		occ	occ	F	M		M
73566	M	8.0	LS-C	6.3	1.041	N	N	N	N	N			occ	occ	F	M	F
73567	F	1.0	DS-cl	7.1	1.080	N	N	N	tr	N				occ	M		M
73568	F	2.0	DS-cl	8.5	1.038	N	N	N	3+	N		occ		occ	F		M
73569	F	3.0	LS-C	6.2	1.050	N	N	N	N	N				occ	F		M
73570	F	1.0	LS-C	6.0	1.076	N	N	N	1+	N				occ	occ		F
73571	F	4.0	LS-C	6.1	1.052	N	N	N	N	N				occ	F		F
30 ppm:																	
73572	M	5.0	LS-C	6.0	1.068	N	N	N	N	N		1-3		occ	occ		F
73573	M	1.5	LS-C	6.0	1.088	N	N	N	N	N		1-3		F	F		F
73574	M	8.0	LS-C	6.2	1.044	N	N	N	tr	N		1-3		occ	occ		F
73575	M	9.0	LS-C	6.5	1.041	N	N	N	N	N				occ	M		M
73576	M	4.0	LS-C	5.9	1.064	N	N	N	N	N		occ		occ	occ		F
73577	F	2.0	LS-C	5.9	1.056	N	N	N	N	N		1-3		occ	occ		F
73578	F	3.0	LS-cl	6.1	1.049	N	N	N	tr	N				occ	F		F
73579	F	1.0	DS-cl	8.8	1.056	N	N	N	3+	N		occ		F	F		M
73580	F	3.0	DS-cl	8.9	1.050	N	N	N	2+	N		occ		occ	occ		M
73581	F	2.0	LS-C	5.9	1.080	N	N	N	N	N				occ	occ		F

Code:

tr - Trace
1+ - Trace to slight
2+ - Slight to moderate
3+ - Moderate
4+ - Marked

S - Straw
LS - Light Straw
DS - Dark Straw
LAm - Light Amber
DAm - Dark Amber
cl - Cloudy
C - Clear

N - Negative
F - Few
I - Loaded
M - Many
R - Rare
occ - Occasional

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EID123405

P000031609

HLAB003854

TABLE 11, Cont. Individual Urinalysis Values - 1 Month.

Group, Rat Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Total Protein	Glucose	Bili-rubin	Occult Blood	Ketones	Leuco-cytes	Erythro-cytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
100 ppm:																	
71582	M	6.0	DS-cl	8.5	1.055	N	N	N	1+	N				F	occ	F	M
71583	M	8.0	LS-C	7.0	1.038	N	N	N	N	N				occ	M		M
71584	M	6.0	S-C	7.3	1.046	N	N	N	tr	N				F	F		M
71585	M	4.0	DS-cl	8.1	1.062	N	N	N	tr	N				F	M	F	M
71586	M	8.0	LS-C	6.9	1.036	N	N	N	N	N		1-3		occ	F		M
71587	F	6.0	S-cl	8.8	1.037	N	N	N	2+	N		occ		F	occ		M
71588	F	6.0	LS-C	7.9	1.034	N	N	N	N	N		occ		occ	F		M
71589	F	2.5	S-cl	8.3	1.044	N	N	N	1+	N			occ	F	M	occ	M
71590	F	4.0	S-cl	8.4	1.041	N	N	N	1+	N		occ		occ	occ		M
71591	F	4.0	LS-C	6.1	1.042	N	N	N	N	N				occ	F		M
300 ppm:																	
71592	M	4.0	DS-cl	8.1	1.045	N	N	N	1+	N				F	F		M
71593	M	6.0	LS-C	8.2	1.036	N	N	N	N	N				occ	occ		M
71594	M	2.0	LS-C	6.8	1.060	N	N	N	N	N				F	M	occ	M
71595	M	12.0	LS-C	7.1	1.040	N	N	N	N	N				F	F		M
71596	M	10.0	LS-C	6.5	1.041	N	N	N	N	N				F	M		M
71597	F	3.5	DS-cl	8.9	1.043	N	N	N	2+	N		1-3		F	F		M
71598	F	2.0	LS-C	5.9	1.064	N	N	N	N	N		occ		occ	F	occ	F
71599	F	4.0	S-cl	8.0	1.060	N	N	N	1+	N				occ	M		M
71600	F	3.0	LS-C	7.1	1.047	N	N	N	tr	N		1-3		occ	F		F
71601	F	<0.5	DS-cl	QNS	QNS	QNS	QNS	QNS	QNS	QNS				occ	occ		M
1,000 ppm:																	
71602	M	9.0	LS-C	7.2	1.039	N	N	N	N	N		occ		occ	F		M
71603	M	6.5	LS-C	6.8	1.037	N	N	N	tr	N				F	F		M
71604	M	9.0	LS-C	7.2	1.040	N	N	N	tr	N				occ	M		M
71605	M	8.5	LS-C	8.8	1.026	N	N	N	tr	N				occ	occ		F
71606	M	6.0	S-cl	7.2	1.042	N	N	N	tr	N				occ	F		M
71607	F	2.0	LS-cl	7.3	1.049	N	N	N	1+	N				occ	occ		M
71608	F	5.5	DS-C	8.8	1.041	N	N	N	2+	N		occ		F	F		F
71609	F	8.0	DS-cl	8.7	1.019	N	N	N	2+	N		1-3		F	occ		M
71610	F	4.0	S-cl	7.2	1.062	N	N	N	tr	N				occ	occ		F
71611	F	6.0	DS-cl	8.2	1.041	N	N	N	2+	M		occ		F	occ		M

Code:

tr - Trace
1+ - Trace to slight
2+ - Slight to moderate
3+ - Moderate
4+ - Marked

S - Straw
LS - Light Straw
DS - Dark Straw
LAm - Light Amber
DAm - Dark Amber
cl - Cloudy
C - Clear

N - Negative
F - Few
L - Loaded
M - Many
R - Rare
occ - Occasional
QNS - Quantity not sufficient

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 14. Individual Urinalysis Values - 3 Months.

Group, Rat Number	Sex	Volume ml	Color and Appear	pH	Spec. Grav.	Total Protein	Glucose	Bilirubin	Occult Blood	Ketones	Leucocytes	Erythrocytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
Control:																	
/1552	M	3.0	DS-cl	6.0	1.080	N	N	N	1+	N				occ	F		F
/1553	M	5.5	LS-C	7.0	1.052	N	N	N	tr	N		occ		F	M		M
/1554	M	7.5	LS-C	7.3	1.018	N	N	N	tr	N			occ	occ	F		M
/1555	M	5.0	LS-C	6.0	1.054	N	N	N	N	N		1-3		F	F		F
/1556	M	>0.5	DS-cl	8.0	1.070	N	N	N	3+	N		occ		F	M	occ	M
/1557	F	1.5	LS-C	6.1	1.080	N	N	N	N	N				F	F		M
/1558	F	1.0	LS-C	6.1	1.094	N	N	N	N	N		1-3		F	M		F
/1559	F	>0.5	S-C	6.1	1.094	N	N	N	N	N		occ		F	F	occ	M
/1560	F	4.5	LS-cl	6.4	1.042	N	N	N	N	N		1-3		M	F		M
/1561	F	1.5	S-cl	6.6	1.070	N	N	N	N	N				F	F		M
10 ppm:																	
/1562	M	2.0	S-C	6.5	1.082	N	N	N	N	N		occ		F	F		F
/1563	M	4.5	LS-C	6.4	1.044	N	N	N	N	N			occ	occ	F		F
/1564	M	2.5	DS-cl	8.0	1.078	N	N	N	1+	N		1-3	occ	M	F		M
/1565	M	4.0	S-cl	6.1	1.067	N	N	N	N	N		1-3		F	M		M
/1566	M	5.5	LS-cl	6.2	1.042	N	N	N	tr	N		occ		occ	occ		M
/1567	F	1.0	DS-cl	8.0	1.054	N	N	N	2+	N				M	M		M
/1568	F	2.5	DS-cl	7.0	1.062	N	N	N	1+	N				F	F	F	M
/1569	F	2.0	LS-C	6.0	1.074	N	N	N	tr	N				F	F	occ	F
/1570	F	1.0	LS-C	6.0	1.076	N	N	N	N	N				occ	F	occ	F
/1571	F	2.0	LS-cl	8.0	1.055	N	N	N	tr	N	occ	1-3		F	F		M
30 ppm:																	
/1572	M	2.0	DS-cl	6.0	1.092	N	N	N	N	N				occ	F		F
/1573	M	1.0	LS-C	6.2	1.096	N	N	N	N	N		occ		occ	M		F
/1574	M	6.0	LS-C	6.9	1.066	N	N	N	4+	N		L		F	F		M
/1575	M	6.0	S-C	6.1	1.064	N	N	N	tr	N		5-8		occ	occ		F
/1576	M	2.5	DS-cl	6.2	1.073	N	N	N	N	N				F	M	occ	M
/1577	F	1.5	LS-C	6.0	1.046	N	N	N	tr	N		1-3	occ	F	F		F
/1578	F	2.0	LS-C	6.2	1.067	N	N	N	tr	N				occ	F		F
/1579	F	2.0	DS-cl	6.9	1.044	N	N	N	4+	N		occ		F	F		M
/1580	F	3.0	LS-C	6.9	1.050	N	N	N	tr	N		occ		F	occ		F
/1581	F	0.5	DS-cl	6.3	1.090	N	N	N	N	N		occ		occ	occ	occ	M

Code:

tr - Trace
1+ - Trace to slight
2+ - Slight to moderate
3+ - Moderate
4+ - Marked

S - Straw
LS - Light Straw
DS - Dark Straw
LAm - Light Amber
DAm - Dark Amber
cl - Cloudy
C - Clear

N - Negative
F - Few
L - Loaded
M - Many
R - Rare
occ - Occasional

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TABLE 14. Cont. Individual Urinalysis Values - 3 Months.

Group, Rat Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Total Protein	Glucose	Bilirubin	Occult Blood	Ketones	Leucocytes	Erythrocytes	Epi. Cells	Amor. Urates	Triple Phos.	Calc. Ox.	Bacteria
100 ppm:																	
73582	M	4.0	DS-cl	6.3	1.074	N	N	N	N	N				M	F		N
73583	M	6.0	LS-cl	8.4	1.042	tr	N	N	tr	N		1-3	occ	F	F		N
73584	M	6.0	LS-cl	6.8	1.042	N	N	N	tr	N			occ	F	F		F
73585	M	2.0	LS-cl	6.5	1.066	N	N	N	N	N		1-3		F	F		F
73586	M	5.5	LS-cl	6.8	1.045	N	N	N	N	N			occ	F	F	F	N
73587	F	4.5	S-cl	8.0	1.042	N	N	N	3+	N				M	M		N
73588	F	6.0	S-cl	8.7	1.034	N	N	N	3+	N		1-3		M	F		N
73589	F	3.0	LS-cl	7.0	1.052	N	N	N	1+	N				F	M		N
73590	F	Died															
73591	F	1.0	S-cl	7.2	1.065	N	N	N	4+	N		1-3		F	M		N
300 ppm:																	
73592	M	4.5	S-cl	7.0	1.045	N	N	N	2+	N			occ	F	F		F
73593	M	3.5	S-cl	7.5	1.072	N	N	N	N	N				F	F	occ	N
73594	M	3.5	S-cl	6.5	1.062	N	N	N	4+	N				F	F		N
73595	M	4.0	S-cl	6.8	1.080	N	N	N	N	N			1-3	F	F		N
73596	M	7.0	LS-cl	6.8	1.042	N	N	N	N	N				F	F		N
73597	F	0.0															
73598	F	1.0	S-cl	6.0	1.068	N	N	N	2+	n				F	M		N
73599	F	1.0	S-cl	7.3	1.080	N	N	N	2+	N			occ	M	F		F
73600	F	2.0	S-cl	6.8	1.063	N	N	N	tr	N				F	F		N
73601	F	Died															
1,000 ppm:																	
73602	M	7.5	LS-cl	8.2	1.040	N	N	N	N	N		1-3		M	F		N
73603	M	5.0	LS-cl	6.2	1.039	N	N	N	tr	N		1-3	occ	F	M		N
73604	M	8.0	LS-cl	6.8	1.040	N	N	N	tr	N				F	F		N
73605	M	4.0	LS-cl	6.0	1.042	N	N	N	N	N				F	F		F
73606	M	6.0	LS-cl	7.0	1.042	N	N	N	N	N		1-3		F	M		N
73607	F	5.0	LS-cl	7.0	1.038	N	N	N	2+	N		occ		F	F		N
73608	F	1.0	S-cl	6.0	1.080	tr	N	N	4+	N				F	F		N
73609	F	3.0	DS-cl	8.0	1.060	tr	N	N	3+	N			occ	F	F		N
73610	F	1.0	LS-cl	6.0	1.080	N	N	N	N	N				F	F		F
73611	F	3.0	LS-cl	6.5	1.060	N	N	N	N	N			occ	F	M	F	N

Code: tr - Trace; 1+ - Trace to slight; 2+ - Slight to moderate; 3+ - Moderate; 4+ - Marked; S - Straw; LS - Light Straw; DS - Dark Straw; LAm - Light Amber; DAm - Dark Amber; cl - Cloudy; C - Clear; N - Negative; F - Few; M - Many; R - Rare; occ - Occasional

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TABLE 15. Summary of Gross Necropsy Observations.

Site / Lesion	Terminal Sacrifice: Control M	Control F	10 ppm M	10 ppm F	30 ppm M	30 ppm F	100 ppm M	100 ppm F	300 ppm M	300 ppm F	1000 ppm M	1000 ppm F	Deaths: 100 ppm F	Deaths: 300 ppm F
Number necropsied	5	5	5	5	5	5	5	4	5	4	5	5	1	1
No gross lesions	2	5	4	2	3	3	3	2	3	3		4		
External														
dark red material around eyes/nose/mouth							1							1
Eyes														
right eye small, lens missing								1						
right eye, cataract											1			
Lung														
white/grayish/yellow foci	1								1					
dark brown foci													1	
Lymph Node														
slightly enlarged - submaxillary								1						
Stomach														
raised white foci	1													
dark red foci					1						1		1	1
Large Intestine - Cecum and Colon														
semi-solid, blood tinged contents					1									
mucosal congestion					1									
Liver														
enlarged											2			
dark brown/brownish in color											3			
accentuated lobulation							1				1			
yellow/grayish white foci									1		4			
cyst, yellowish in color				1										
Kidney														
hydronephrosis	1		1	1				1						
granular surface			1											
Uterus														
hydrometra				2		2		2		1		1		

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TABLE 16. Absolute (Grams) and Relative (% Body Weight) Organ Weights.

Group, Sex	Body Wt. g	Spleen g	Spleen %	Liver g	Liver %	Kidneys g	Kidneys %	Brain g	Brain %	Adrenals mg	Adrenals %x10²	Thyroid Parathyroid mg	Thyroid Parathyroid %x10²	Pituitary mg	Pituitary %x10²
Control:															
M	445	0.70	0.16	13.43	3.01	3.54	0.79	2.25	0.51	80	1.79	40	0.90	17	0.38
F	271	0.47	0.17	7.66	2.85	2.16	0.81	2.02	0.75	101	3.80	35	1.33	18	0.65
10 ppm:															
M	482	0.69	0.14	15.26	3.18	4.13	0.86	2.24	0.47	73	1.50	35	0.72	17	0.36
F	237	0.49	0.20	7.25	3.06	2.50	1.05*	1.95	0.82	79	3.32	27	1.15	17	0.72
30 ppm:															
M	500	0.67	0.14	20.31*	4.09	4.40*	0.88	2.21	0.44	74	1.48	37	0.74	15	0.30
F	254	0.49	0.19	7.73	3.04	2.37	0.94	2.01	0.79	83	3.25	27	1.07	16	0.62
100 ppm:															
M	438	0.75	0.17	18.59	4.21	4.19	0.96*	2.29	0.52	70	1.61	33	0.75	17	0.39
F	271	0.57	0.21	7.97	2.95	2.47	0.91	2.10	0.78	89	3.27	27	0.98	17	0.60
300 ppm:															
M	412	0.66	0.16	20.13**	4.88**	3.91	0.95*	2.13	0.52	67	1.62	36	0.87	16	0.38
F	246	0.45	0.18	7.44	3.03	2.40	0.98	2.00	0.82	89	3.64	25	1.02	17	0.70
1000 ppm:															
M	360	0.49	0.14	19.16**	5.70**	3.47	1.03**	2.17	0.65**	69	2.04	36	1.06	13	0.38
F	240	0.46	0.19	8.76*	3.65*	2.15	0.90	2.08	0.87	92	3.89	28	1.18	18	0.75

Group mean relative organ weights shown in this table were calculated by averaging the individually calculated relative organ weights.

*Significantly different from control group mean, p<0.05.
**Significantly different from control group mean, P<0.01.

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Fluorad™ Fluorochemical
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Ninety Day Subacute Rat Toxicity Study.

TABLE 17. Individual Organ Weights - Terminal Sacrifice.

Group Rat No.	Sex	Body Wt. g	Spleen g	Liver g	Kidneys g	Brain g	Adrenals mg	Thyroid/ Parathyroid mg	Pituitary mg
Control:									
73552	M	457	0.60	14.46	3.83	2.18	91	47	19
73553	M	422	0.62	12.15	2.99	2.41	70	45	16
73554	M	474	0.84	13.86	3.94	2.30	80	36	11
73555	M	471	0.88	15.04	3.73	2.16	87	44	19
73556	M	402	0.54	11.64	3.22	2.21	75	28	19
73557	F	272	0.41	8.30	2.00	2.03	101	32	17
73558	F	251	0.56	7.80	2.25	2.00	110	56	23
73559	F	244	0.42	6.96	2.40	1.97	91	25	17
73560*	F	256	0.47	6.85	2.01	2.22	92	34	20
73561	F	315	0.47	7.57	1.97	2.06	81	28	18
10 ppm:									
73562	M	442	0.53	16.37	3.88	2.16	56	-	21
73563*	M	377	0.66	10.61	3.82	2.36	68	28	17
73564	M	483	0.74	15.87	3.85	2.25	64	40	13
73565	M	503	0.79	21.56	4.14	2.31	99	35	18
73566	M	499	0.68	7.25	4.66	2.23	72	31	16
73567	F	230	0.46	7.05	2.27	1.90	76	30	18
73568*	F	247	0.50	7.82	2.35	1.91	87	25	14
73569*	F	294	0.72	10.72	2.72	1.96	130	25	19
73570*	F	226	0.37	7.78	2.26	1.95	99	23	18
73571	F	243	0.51	7.44	2.72	2.00	81	24	16
30 ppm:									
73572	M	516	0.68	19.91	4.12	2.33	62	33	17
73573*	M	441	0.50	17.80	4.21	2.35	60	47	16
73574	M	519	0.52	18.51	4.74	2.14	93	39	13
73575*	M	449	0.77	16.70	4.22	2.27	88	34	20
73576	M	466	0.82	22.52	4.33	2.17	68	38	15
73577	F	248	0.38	7.91	2.32	2.06	68	32	18
73578	F	273	0.58	8.58	2.46	2.06	97	27	15
73579	F	261	0.48	7.14	2.17	1.85	80	22	15
73580	F	253	0.59	7.51	2.30	2.00	86	28	12
73581	F	235	0.43	7.47	2.62	2.09	82	26	18
100 ppm:									
73582	M	456	0.77	16.12	4.12	2.39	77	25	18
73583	M	384	0.65	14.92	4.01	2.09	57	39	14
73584	M	480	0.77	29.52	5.23	2.27	69	37	20
73585	M	406	0.85	16.30	3.79	2.25	81	29	17
73586	M	462	0.70	16.10	3.79	2.43	64	33	16
73587	F	283	0.59	8.24	2.75	2.16	102	32	22
73588	F	291	0.55	8.61	2.67	2.05	86	31	18
73589	F	254	0.61	7.45	2.11	1.99	80	29	17
73591	F	254	0.53	7.57	2.34	2.18	86	15	9

* - Died following terminal bleeding, not included in statistical analysis
- - Data not available.

[redacted]

Fluorad™ Fluorochemical
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Ninety Day Subacute Rat Toxicity Study.

TABLE 17. Cont.

Individual Organ Weights - Terminal Sacrifice.

Group Rat No.	Sex	Body Wt. g	Spleen g	Liver g	Kidneys g	Brain g	Adrenals mg	Thyroid/ Parathyroid mg	Pituitary mg
300 ppm:									
71592	M	384	0.78	20.04	4.23	2.31	54	23	15
71593	M	383	0.50	17.53	3.63	1.98	69	30	15
71594	M	394	0.47	17.93	3.88	2.10	59	36	15
71595	M	459	0.73	21.85	3.82	2.11	74	44	18
71596	M	439	0.73	21.31	3.98	2.15	78	47	15
71597	F	247	0.46	7.20	2.42	1.82	78	27	16
71598	F	242	0.47	7.93	2.51	2.07	107	28	18
71599	F	239	0.43	7.26	2.27	2.00	91	22	15
71600	F	255	0.45	7.37	2.40	2.12	81	21	20
1,000 ppm:									
71602	M	383	0.67	19.98	3.89	2.19	79	44	6
71603	M	304	0.38	19.42	3.47	2.05	67	28	13
71604	M	341	0.54	18.29	3.14	2.35	75	36	14
71605	M	288	0.42	17.87	3.20	2.08	60	34	12
71606	M	381	0.42	20.25	3.66	2.19	63	38	19
71607	F	221	0.49	7.90	2.11	2.28	111	32	17
71608	F	223	0.39	8.20	2.10	1.88	93	31	15
71609	F	267	0.52	9.83	2.17	1.96	85	23	17
71610	F	236	0.43	8.59	2.11	2.20	99	24	24
71611	F	252	0.48	9.27	2.26	2.06	73	30	17

Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 18. Histomorphologic Observations.

Tissue Lesion	Group, Rat No. Sex	10 ppm									
		73562 M	73563 M	73564 M	73565 M	73566 M	73567 F	73568 F	73569 F	73570 F	73571 F
Liver											
focal periportal/sinusoidal lymphoid infiltrates		2	2	2	2	2	2	2	2	2	2
focal bile duct proliferation		2	2				2				
congestion, diffuse		2		2	3		2				
focal vacuolation in cytoplasm of hepatocytes						2					

Code: x - Condition present; - = Not available

1 - Not remarkable
2 - Very slight
3 - Slight
4 - Moderate
5 - Marked
6 - Extreme

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Fluorad® Fluorochemical FC-143: Ninety Day Subacute Rat Toxicity Study.

TABLE 18. Cont. Histomorphologic Observations.

Tissue Lesion	Group, Rat No. Sex	30 ppm									
		73572 M	73573 M	73574 M	73575 M	73576 M	73577 F	73578 F	73579 F	73580 F	73581 F
Liver					1			1			
focal periportal and sinusoidal lymphoid infiltrates			2	2		3	2		2	2	2
focal sinusoidal dilatation											2
hepatocellular necrosis				2		2			2		
sinusoidal congestion, diffuse			2	2		2					

Code: x - Condition present; - = Not available; 1 - Not remarkable; 2 - Very slight; 3 - Slight; 4 - Moderate; 5 - Marked; 6 - Extreme

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Fluorad™ Fluorochemical
FC-143:

Ninety Day Subacute Rat Toxicity Study.

TABLE 18. Cont. Histomorphologic Observations.

Tissue / Lesion	Group, Sex	Control										100 ppm										300 ppm										1,000 ppm									
		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	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
	Cat No.	73552	73553	73554	73555	73556	73557	73558	73559	73560	73561	73582	73583	73584	73585	73586	73587	73588	73589	73590	73591	73592	73593	73594	73595	73596	73597	73598	73599	73600	73601	73602	73603	73604	73605	73606	73607	73608	73609	73610	73611
Brain (With Cervical Cord)		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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
focal perivascular lymphoid infiltrates																														2													
Spinal Cord (Lumbar)		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	-	1	1	1	1	-	1	1	1	1	1	1	1
Peripheral Nerve		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	1	1	1	-		1	1	1	1	1		1	1	1	1	1	1
focal perivascular lymphoid infiltrates																																				2							
Eyes		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	-	1	1	1			1	1	1	1	1	1	1
acute focal myositis involving extra-ocular muscles				3																				2																			
focal retinal degeneration				2			2	2																2											3								
Pituitary			1		1	1	1	1	1	1						1	1	1	-	1						1	1	1	1	1								1	1	1	1	1	
focal cytoplasmic vacuolation of basophils		2		2								2	2	3		2						2	2	3	2							2	2	2	2	2						
remnant of craniopharyngeal cyst															x																												
Thyroid			1			1			1	1	1			1	1	1			1		1	1	1	1		1		1			1	1	1		1	1			1	1	1	1
remnant of ultimobranchial rest		x		x	x		x			x		x				x	x	x							x		x		x	x				x		x						
focal interstitial lymphoid infiltrates				2															2																		2						
Parathyroid										1	1	1		-	1	1		-	-	1	1							1	-	1	-	-		-	-	1	-	1	1	1	-	1	1
Adrenal		1					1		1									1		1	1	1				1			1	1			1	1		1	1					
focal cytoplasmic vacuolation of cortical cells			3	2	2	2							3	2	2	2	2		2				3	4	3	4								2		2						
hematocyst							2			2																															2	2	2
congestion									3						2	2									2		2		2														
Lungs																										1																	
focal peribronchial lymphoid hyperplasia		3	2	2	3	2	3	2	2	2	2	2	2	2	3	2	2	2	2	2	1	2	2	2	2		2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2
focal perivascular lymphoid infiltrates		2	2	2	3		3					2			2	2	2	2	2	2		2					2	2		2							2	2					
focal mineralization of pulmonary artery		2								2																																
focal interstitial inflammatory cell infiltrates			2		3																									2												
congestion (agonal)				2					2	2	2																									2						
focal aggregates of alveolar macrophages					4		2						2			2	2		3						2		2									2	2					
Heart		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	1	1	1	1	1	1	1
focal interstitial lymphoid infiltrates myocardium			2	2								2				2				2												2									
focal necrosis of mononuclear cell infiltrates, myocardium																			3				2																			
Aorta		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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Codes: x = Condition present
- = Not available

1 - Not remarkable
2 - Very slight
3 - Slight
4 - Moderate
5 - Marked
6 - Extreme

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TABLE 18. Cont. Histomorphologic Observations.

Tissue / Lesion	Group	Rat No.	Sex	Control										100 ppm										300 ppm										1,000 ppm									
				73552	73553	73554	73555	73556	73557	73558	73559	73560	73561	73582	73583	73584	73585	73586	73587	73588	73589	73590	73591	73592	73593	73594	73595	73596	73597	73598	73599	73600	73601	73602	73603	73604	73605	73606	73607	73608	73609	73610	73611
Liver																																												
focal periportal and sinusoidal lymphoid infiltrates				3	2	2		3	2	2	2	3		2		2	2	2		2		2		2			2	2		2	2	2		2		3						2	2
focal portal and sinusoidal extramedullary hematopoiesis				2			2	2				2	2		2	2			2								2										2							
focal cytoplasmic vacuolation (probably lipid)						2			2										2																								
focal capsular fibrosis										2									2																								
focal sinusoidal dilatation												2														2																	
focal hepatocellular hypertrophy														2	2		2																										
multifocal hepatocellular hypertrophy																3								2	3	2	3	3						2	3	3	2	3			2		
hepatocellular necrosis																2	2							2							2	2					2	4	2				
increased yellowish-brown pigment in cytoplasm of hepatocytes and occasionally in sinusoidal lining cells														2														3						3	4	5	2					
sinusoidal congestion, diffuse																	3	2			2						2	2				2		2	2	2							2
Kidney									1		1										1	1	1			1		1		1												
focal interstitial lymphoid infiltrates				2		2	2	2		2		2	2	2			2	2						2	2						2	2		2		2	2	2		2	2	2
hydronephrosis					2				2					2		2	2		3	3								2	2							2			2				
tubular nephrosis						2												2	2																							
yellowish-brown pigment in cytoplasm of proximal convoluted tubules														2	2									3		2				2			1									
proteinaceous tubular casts																2																										
mineralized microconcretions in tubules																												2									2		2		
Urinary Bladder				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		1	1	1	1	1	1	1	1	1	1
submucosal edema												2																			2											
proteinaceous plug in lumen															x									x																	
focal submucosal lymphoid infiltrates																												2													
Testes				1	1	1	1	1						1	1	1	1	1						1	1	1	1	1						1	1		1						
focal testicular degeneration																																			2	2							
Ovary									1	1	1	1	1						1	1	1	1	1						1	1	1	1	1						1	1	1	1	1
Prostate							-							1	1		1							1	1	1	1							1	1	1	1	1					
focal interstitial lymphoid infiltrates				3	2	2	2									2		2										2															
Uterus									1	1	1	1	1						1		1	1	1						1	1	1	1	1						1	1	1	1	1
hydrometra																			4																				2				
Skeletal Muscle				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	1	1	1	1	1	1	1	1	1	1	1	1
focal myodegeneration																2															2											

Code: x - Condition present
- - Not available

1 - Not remarkable
2 - Very slight
3 - Slight
4 - Moderate
5 - Marked
6 - Extreme

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Fluorad® Electrochemical
P-151:

Ninety Day Subacute Rat Toxicity Study.

TABLE 18. Cont.

Histomorphologic Observations.

Tissue / Lesion	Control										100 ppm										300 ppm										1,000 ppm									
Group, Rat No., Sex	73552 M	73553 M	73554 M	73555 M	73556 M	73557 F	73558 F	73559 F	73560 F	73561 F	73582 M	73583 M	73584 M	73585 M	73586 M	73587 F	73588 F	73589 F	73590 F	73591 F	73592 M	73593 M	73594 M	73595 M	73596 M	73597 F	73598 F	73599 F	73600 F	73601 F	73602 M	73603 M	73604 M	73605 M	73606 M	73607 F	73608 F	73609 F	73610 F	73611 F
Spleen																																								
increased hemosiderin pigment in red pulp			1								1			1	1				1		1							1		1									1
			2		2	3	2	2	3	2		2	2		3	2	3				2		2	3	3	3	3				2	3			2	2	3	2		
Mesenteric Lymph Node																																								
focal aggregates of sinusoidal macrophages	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	1	1	1	1	1	1	1		1	1	
focal sinusoidal dilatation							2	2					2				2																			2				
Thymus																					2															2				
	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bone Marrow (Sternum)	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Salivary Gland	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stomach	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
submucosal edema in glandular portion						2								2															1										
mucosal lymphoid infiltrates in glandular portion			2										2															2			2	3							
submucosal cyst in forestomach (nonglandular)		2																2																					
Small Intestine (Duodenum, Jejunum, Ileum)	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Large Intestine (Colon)	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
nematode parasite in lumen																															x									
Pancreas	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
focal interstitial lymphoid infiltrates		2		2	2							2	2					2						2															
focal cytoplasmic vacuolation of acinar cells																																2								2

Code: x - Condition present
- Not available

1 - Not remarkable
2 - Very slight
3 - Slight
4 - Moderate
5 - Marked
6 - Extreme

Fluorad™ Fluorochemical
FC 143:

Ninety Day Subacute Rat Toxicity Study.

TABLE 18 Cont.

Histomorphologic Observations.

Tissue / Lesion	Group	Rat No.	Sex	Control	100 ppm	300 ppm	1,000 ppm
Skin (Mammary Gland)							
focal epidermal acanthosis				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 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1
		73552	M				
		73553	M				
		73554	M				
		73555	M				
		73556	M				
		73557	M				
		73558	M				
		73559	M				
		73560	M				
		73561	M				
		73582	M				
		73583	M				
		73584	M				
		73585	M				
		73586	M				
		73587	M				
		73588	M				
		73589	M				
		73590	M				
		73591	M				
		73592	M				
		73593	M				
		73594	M				
		73595	M				
		73596	M				
		73597	M				
		73598	M				
		73599	M				
		73600	M				
		73601	M				
		73602	M				
		73603	M				
		73604	M				
		73605	M				
		73606	M				
		73607	M				
		73608	M				
		73609	M				
		73610	M				
		73611	M				

Code: x - Condition present
- - Not available

1 - Not remarkable
2 - Very slight
3 - Slight
4 - Moderate
5 - Marked
6 - Extreme

SPONSOR: 3M Company

COMPOUND: Fluorad® Fluorochemical FC-143

SUBJECT: Ninety Day Subacute Rhesus Monkey Toxicity Study.

Edwin I. Goldenthal, Ph.D.
Vice President and
Director of Research

Collaborators:

D. C. Jessup, Ph.D., Associate Director of Research
R. G. Geil, D.V.M., Vice President and Director of Pathology
J. S. Mehring, Ph.D., Director of Large Animal Toxicology

Date: November 10, 1978

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I. SYNOPSIS

In a ninety day oral study in rhesus monkeys, Fluorad® Fluorochemical FC-143 was administered at dosage levels of 0 (control, treated only with 0.5% Methocel®), 3, 10, 30 and 100 mg/kg/day. Two male and two female monkeys were initiated at each dosage level and also in a control group. The monkeys were observed twice daily for general physical appearance and behavior and pharmacotoxic signs. Body weights were recorded weekly. Hematological, biochemical and urinalysis studies were conducted once in the control period, at the end of the first and third months of study.

The monkeys treated with the higher dose, (100 mg/kg/day) all died during weeks 2 through 5 of the study. At the 30 mg/kg/day dosage level, three monkeys died during weeks 7-12. They all showed signs of toxicity in the gastrointestinal tract (anorexia, emesis, sometimes brown in color, black stools), pale face and gums, swollen face and eyes, slight to severe decreased activity and prostration. The monkeys of the 30 and 100 mg/kg/day dosage level showed body weight losses from the first week of the study.

Because of the early deaths of the monkeys at the 100 mg/kg/day dosage level, the clinical laboratory tests were not conducted.

The monkeys at the 30 mg/kg/day dosage level showed, in the first month of the study, slight increase in prothrombin time and in activated partial thromboplastin time (A.P.T.T.) values, as well as decreased alkaline phosphatase activity in the serum (statistically significant). Only one monkey from this dosage level in this period showed a low albumin value. At the end of the study, the only remaining monkey from the 30 mg/kg/day dosage level showed apparent anemia, low blood glucose, alkaline phosphatase, total protein and albumin values.

There was no mortality at the 10 mg/kg/day dosage level. One monkey had black stool on several days in week 12 and occasionally

anorexia and one monkey exhibited pale face and gums. At this dosage level there was a very slight increase in the activated P.T.T. values in the female monkeys during the first month of the study (not statistically significant). There were no changes in the other indices and no changes in the body weight. In single monkeys from the 3 and 10 mg/kg/day dosage levels, there were trends toward decreased alkaline phosphatase in the serum.

In the control and the 3 mg/kg/day dosage level there was no mortality, no changes in the body weights and no signs of toxicity. Soft stool, diarrhea or emesis were observed occasionally.

The mortality and the above mentioned signs of toxicity in the 30 and 100 mg/kg/day dosage levels were compound-related. There was a trend toward the same signs of toxicity in single monkeys at the 10 mg/kg/day dosage level. The 3 mg/kg/day dosage level seems to be free of signs of toxicity. There is an evident relationship between the administered doses and the degree of the toxicity.

No gross or microscopic lesions which were considered compound-related were seen in tissues other than the adrenals, bone marrow, spleen and lymph nodes for male and female monkeys at the 30 and 100 mg/kg/day dosage levels. Microscopically, the adrenals from male and female monkeys at the 30 and 100 mg/kg/day dosage levels had compound-related marked diffuse lipid depletion; the bone marrow from male and female monkeys at the 30 and 100 mg/kg/day dosage levels had compound-related slight to moderate hypocellularity; the spleen and lymph nodes from male and female monkeys at the 30 and 100 mg/kg/day dosage levels had compound related moderate atrophy of lymphoid follicles.

Statistically significant variations in sex group mean weights of a few organs occurred between the control and experimental groups. These variations were of unknown biological significance and were not accompanied by morphologic alterations.

II. COMPOUND

The compound was received from 3M Company, Saint Paul, Minnesota on October 24, 1977 as shown below:

Label	Description
Fluorad® Fluorochemical FC-143 3M Stock No. 98-0211-0008-0 Lot 340	white powder

III. CLINICAL STUDIES

A. METHODS:

1. General Procedure:

Ten male rhesus monkeys (weighing from 2.60 to 3.90 kilograms) and 10 females (weighing from 2.95 to 3.80 kilograms) were initiated on this study. The monkeys were purchased from Primate Imports Corporation, Port Washington, N. Y. 11050. The monkeys were housed individually in hanging wire mesh, "squeeze type" cages and maintained in a temperature, humidity and light controlled enviroment. Purina® Monkey Chow® was fed twice each day and fresh apples were fed 3 times a week. Water was available ad libitum.

During the conditioning period, the monkeys were tattooed on the inner surface of the thigh and intrapalpebral tuberculin tests were conducted. Tuberculin tests were conducted at bimonthly intervals during the treatment period. Also a complete physical examination was conducted by the staff veterinarian prior to initiation of compound administration. Only monkeys in good health were selected for the study.

This study was initiated on January 11, 1978. Terminal sacrifices were conducted on April 12, 1978.

2. Compound Administration:

At the end of the conditioning period the monkeys were divided into five groups on a random basis, so that the initial average body weights were similar:

Number of Monkeys		Dosage Level
Male	Female	
2	2	Control
2	2	3 mg/kg/day
2	2	10 mg/kg/day
2	2	30 mg/kg/day
2	2	100 mg/kg/day

The test compound, suspended in 0.5% Methocel®, was administered by gavage, 7 days each week. All doses were given in a constant volume. Also the same volume of 0.5% Methocel® was given to the vehicle control group. Individual daily doses were based upon the body weights obtained weekly.

3. Observations:

The monkeys were observed twice daily for general physical appearance and behavior and pharmacotoxic signs. Individual body weights were recorded weekly. General physical examinations were conducted in the control period and monthly during the study.

4. Clinical Laboratory Tests:

Blood and urine samples were obtained for analysis from all monkeys once during the control period and at 1 and 3 months of study. The monkeys were fasted overnight prior to the collection of blood and urine samples.

a. Hematology:

Hematological studies included: hemoglobin[1], hematocrit[2], erythrocyte count[3], total[3] and differential leucocyte counts, reticulocyte count[4], platelet count[5], prothrombin time[6], activated partial thromboplastin time[7] (A.P.T.T.). Mean corpuscular hemoglobin, mean corpuscular volume and mean corpuscular hemoglobin concentration were calculated.

b. Biochemistry:

Biochemical studies included: fasting blood glucose[c], blood urea nitrogen[8], serum alkaline phosphatase[8], serum glutamic oxalacetic and pyruvic transaminase activities[8], cholesterol[9], total protein[9], albumin[8], sodium[10], potassium[10], chloride[9], inorganic phosphate[9], γ-glutamyl transpeptidase[11] (γ-G.T.P.) and creatinine phosphokinase[9].

c. Urinalysis:

Urinalysis included: measurement of volume, pH[12] and specific gravity; description of color and appearance; qualitative tests for protein[12], glucose[12], ketones[12], occult blood[12] and microscopic examination of the sediment.

d. Statistical Analysis:

Analysis of body weights and clinical laboratory tests were performed. All statistical analyses compared the treatment groups with the control group, by sex. The tests were compared by analysis of variance (one-way classification) Bartlett's test for homogeneity and the appropriate t-test (for equal or unequal variances) as described by Steel and Torrie[13] using Dunnett's[14] multiple comparison tables to judge significance of differences.

B. RESULTS:

1. General Behavior, Appearance and Survival:

There was no mortality in monkeys at 0, 3 and 10 mg/kg/day dosage levels.

The monkeys from the control and 3 mg/kg/day dosage levels did not show any unusual behavior or signs of toxicity. Soft stool or moderate to marked diarrhea were noted occasionally. Frothy emesis was also noted occasionally.

At the 10 mg/kg/day dosage level the monkeys did not show any unusual signs of toxicity, except Monkey 7363. In week 7 its face appeared swollen and pale. It had been occasionally anorexic in week 4 and black stools appeared for several days in week 12 of the study.

At the 30 mg/kg/day dosage level, three monkeys died during weeks 7, 12 and 13 of the study. From week 4, the monkeys were anorexic. Slight to moderate and sometimes severe decreased activity was noted occasionally to frequently for the four monkeys. Emesis and ataxia were very rarely noted, for one monkey.

Swollen face, eyes and vulva, as well as pallor of the face and gums were noted. From week 6, for two monkeys, black stools were noted. Monkey 7387 showed slight to moderate dehydration and ptosis of the eyelids.

All monkeys from the 100 mg/kg/day dosage level died during weeks 2 through 5 of study. They showed the same symptoms of toxicity as the previous group, but they appeared sooner in the study (from week 1) and were more marked: anorexia, frothy emesis (sometimes brown in color) pale face and gums, swollen face and eyes, decreased activity from slight to severe, prostration and body trembling.

2. Body Weights (Tables 1-3):

Changes in body weight were similar for monkeys from the control and the 3 and 10 mg/kg/day dosage levels. Monkeys at the 30 and 100 mg/kg/day dosage levels lost body weight after the first week of study. There was statistically significant decreases in the body weight for the male monkeys at the 30 mg/kg/day dosage level in week 13 of the study. The female monkeys of the same dosage level and the monkeys from the 100 mg/kg/day dosage level were dead in this period.

3. Laboratory Test (Tables 4-15):

a. Hematology:

There were no noteworthy changes in monkeys from the 3 and 10 mg/kg/day dosage levels. In the first month of the study there was a slight increase (not statistically significant) of the A.P.T.T. values in the females at the 10 mg/kg/day dosage level and a statistically significant increase of the A.P.T.T. and prothrombin time values in monkeys at the 30 mg/kg/day dosage level. In the third month of the study there was a high increase in the above mentioned indices for the one surviving monkey from the 30 mg/kg/day dosage level. The same monkey (#7455) had pronounced anemia as well.

The statistically significant increase in the hematocrit in monkeys at the 10 mg/kg/day dosage level and in the platelet count in monkeys at the 3 mg/kg/day dosage level at 3 months of study, were within the normal physiological limits.

b. Biochemistry:

There were no noteworthy changes in monkeys from the control, 3 and 10 mg/kg/day dosage level. Only one monkey from the 3 mg/kg/day dosage level and one monkey from the 10 mg/kg/day dosage level showed trends toward decreases of alkaline phosphatase (432 and 474 units/l, respectively), without statistical significance.

In the first month of the study, decrease in serum alkaline phosphatase was noted in monkeys at the 30 mg/kg/day dosage level (statistically significant) and in one monkey in the same dosage level, the albumin in the serum was lower (3.22 g/100ml). The one surviving monkey (7455) from the 30 mg/kg/day dosage level showed decreasing of: blood sugar (66 mg/100ml), total protein (5.52 g/100ml) with albumin (2 g/100ml) and alkaline phosphatase (360 units/l) and slightly elevated cholesterol (240 mg/100ml).

c. Urinalysis:

No changes considered to be related to compound were seen in the urinalysis studies.

IV. PATHOLOGICAL STUDIES

A. METHODS:

1. Gross Pathology:

After completion of the compound administration period all surviving monkeys were anesthetized with Sernylan®*, exsanguinated and necropsied. At necropsy, the heart, liver,.adrenals, spleen, pituitary, kidneys, testes/ovaries and brain were weighed and representative tissues were collected in buffered neutral 10% formalin. Eyes were fixed in Russell's fixative. The thyroid/parathyroid was weighed after fixation.

Monkeys which died during the study were necropsied as above.

2. Histopathology:

Microscopic examination of formalin fixed hematoxylin and eosin stained paraffin sections was performed for all monkeys in the control and treatment groups. The following tissues were examined:

adrenals
aorta
bone
brain
esophagus
eyes
gallbladder
heart (with coronary vessels)
duodenum
ileum
jejunum
cecum
colon
rectum
kidneys
liver
lung
skin
mesenteric lymph node
retropharyngeal lymph node
mammary gland
nerve (with muscle)
spleen
pancreas
prostate/uterus
rib junction (bone marrow)
salivary gland
lumbar spinal cord
pituitary
stomach
testes/ovaries
thyroid
parathyroid
thymus
trachea
tonsil
tongue
urinary bladder
vagina
tattoo

and any other tissue(s) with lesions

*Phencyclidine HCl - Bio-Ceutic Laboratories, Inc., St. Joseph, Missouri.

B. RESULTS:

1. Gross Pathology (Table 16) and Organ Weights (Table 17):

No gross lesions considered compound related were seen in male and female rhesus monkeys which died on study or were sacrificed after 90 days of study.

Statistically significant variations in sex group mean weights of few organs occurred between the control and experimental groups. The following statistically significant organ weight variations occurred:

Organ	Dosage Level mg/kg/day	Sex	Weight	Change	P<
Heart	10	F	absolute,relative	decrease,decrease	0.05,0.01
Brain	10	F	absolute	decrease	0.01
Pituitary	3	M	relative	increase	0.05

The biological significance of these variations is unknown. These organ weight variations were not accompanied by morphologic changes which were considered compound related.

2. Histopathology (Table 18):

One male and two female rhesus monkeys at the 30 mg/kg/day dosage level and all male and female rhesus monkeys at the 100 mg/kg/day dosage level had marked diffuse lipid depletion in the adrenals. All male and female rhesus monkeys at the 30 and 100 mg/kg/day dosage levels had slight to moderate hypocellularity of the bone marrow. All male and female rhesus monkeys at the 30 and 100 mg/kg/day dosage levels had moderate atrophy of lymphoid follicles in the spleen. One female at the 30 mg/kg/day dosage level and all male and female rhesus monkeys at the 100 mg/kg/day dosage level had moderate atrophy of the lymphoid follicles in the lymph nodes.

No microscopic changes considered compound related were seen in the adrenals, bone marrow, spleen and lymph nodes of male and female rhesus monkeys at the 3 and 10 mg/kg/day dosage levels. No microscopic

lesions in tissues other than the adrenals, bone marrow, spleen and lymph nodes at the 30 and 100 mg/kg/day dosage levels were considered compound-related.

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FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 1. Mean Body Weights of Monkeys Week 13 of Study.

Sex	Group I (Control)	Group II (3 mg/kg/day)	Group III (10 mg/kg/day)	Group IV (30 mg/kg/day)	Group V (100 mg/kg/day)
M	3.78	3.50	3.68	2.30*	dead
F	3.55	3.68	3.78	dead	dead

*Statistical significance.

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 2. Individual Body Weights, Kilograms.

Group, Monkey Number	Sex	Control 1	Control 2	Week of Study 1	2	3	4	5	6	7	8	9	10	11	12	13
Control:																
7362	M	3.15	3.30	3.15	3.30	3.35	3.10	3.20	3.20	3.00	3.15	3.20	3.05	3.20	3.40	3.50
7365	M	3.50	3.50	3.50	3.50	3.50	3.40	3.55	3.60	3.60	3.80	3.75	3.75	3.80	4.00	4.05
7336	F	3.05	3.20	3.25	3.25	3.35	3.15	3.00	3.15	3.20	3.30	3.45	3.30	3.35	3.35	3.60
7386	F	3.90	3.70	3.70	3.65	3.55	3.45	3.40	3.55	3.40	3.40	3.55	3.40	3.50	3.50	3.50
Mean		3.40	3.43	3.40	3.43	3.44	3.28	3.29	3.38	3.30	3.41	3.49	3.38	3.46	3.56	3.66
3 mg/kg/day:																
7364	M	3.70	3.90	3.85	3.95	3.85	3.85	3.80	3.80	3.85	4.10	4.10	4.05	4.05	4.20	4.30
7366	M	2.60	2.60	2.70	2.60	2.65	2.65	2.70	2.70	2.50	2.70	2.70	2.45	2.55	2.50	2.70
7384	F	3.55	3.60	3.70	3.80	3.80	3.80	3.70	3.70	3.60	3.55	3.80	3.55	3.70	3.90	3.75
7385	F	3.50	3.55	3.45	3.45	3.45	3.45	3.40	3.40	3.50	3.55	3.60	3.40	3.30	3.40	3.60
Mean		3.34	3.41	3.43	3.45	3.44	3.44	3.40	3.40	3.36	3.48	3.55	3.36	3.40	3.50	3.59
10 mg/kg/day:																
7363	M	3.55	3.70	3.70	3.65	3.65	3.65	3.65	3.60	3.60	3.70	3.65	3.75	3.85	3.90	3.90
7458	M	3.10	3.10	3.25	3.20	3.10	3.05	2.95	3.20	3.00	3.15	3.10	3.10	3.25	3.25	3.45
7328	F	3.30	3.30	3.45	3.40	3.40	3.30	3.20	3.30	3.25	3.45	3.60	3.50	3.40	3.60	3.75
7383	F	3.60	3.60	3.50	3.80	3.60	3.55	3.50	3.60	3.60	3.65	3.80	3.65	3.75	3.75	3.80
Mean		3.39	3.43	3.48	3.51	3.44	3.39	3.33	3.43	3.36	3.49	3.54	3.50	3.56	3.63	3.73

TABLE 2. Cont. Individual Body Weights, Kilograms.

Group, Monkey Number	Sex	Control 1	Control 2	Week of Study 1	2	3	4	5	6	7	8	9	10	11	12	13
30 mg/kg/day:																
7367	M	3.40	3.40	3.25	3.25	3.10	2.95	2.65	2.30	2.10*	Died					
7455	M	3.50	3.30	3.20	3.05	2.85	2.65	2.45	2.50	2.55	2.60	2.70	2.70	2.65	2.50	2.30
7382	F	3.25	3.30	3.20	3.20	3.05	3.00	2.85	2.80	2.80	2.80	2.80	2.80	2.80	2.60	2.25* Di
7387	F	3.70	3.75	3.50	3.55	3.50	3.45	3.10	2.95	2.85	2.85	2.70	2.65	2.50	2.25*	Died
Mean		3.46	3.44	3.29	3.26	3.13	3.01	2.76	2.64	2.73	2.75	2.73	2.72	2.65	2.55	2.30
100 mg/kg/day:																
7361	M	3.50	3.85	3.50	3.30	3.00	2.55	2.40*	Died							
7456	M	3.10	3.10	2.60	2.70*	Died										
7335	F	2.80	2.95	2.70	2.45	2.05*	Died									
7381	F	3.85	3.80	3.55	3.20	2.80	2.60*	Died								
Mean		3.31	3.43	3.09	2.98	2.90	2.55									

*Terminal weight not included in mean.

TABLE 3. T-Test Comparison of Body Weights.

Study Week	Sex	Control	3 mg/kg/day	10 mg/kg/day	30 mg/kg/day	100 mg/kg/day
13	M	3.78	3.50	3.68	2.30[a]	-
	F	3.55	3.68	3.78	-	-

*p<0.05
**p<0.01
[a]Not included in statistical analysis due to only one surviving animal.
- Line indicates animals had died prior to week 13.

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 4. Means and Significance of Hematological Values.

Hematology	Month of Study	Control	3 mg/kg/day	10 mg/kg/day	30 mg/kg/day
Erythrocytes, 10^6/cmm	1	4.46	4.26	4.71	4.53
	3	4.90	4.74	5.47	3.84[a]
Hemoglobin, g/100 ml	1	11.7	11.4	12.1	11.7
	3	12.9	12.7	13.3	9.7[a]
Hematocrit, %	1	38	37	39	36
	3	37	37	40**	30[a]
Platelets, 10^3/cmm	1	253	233	210	219
	3	210	285*	216	261[a]
Reticulocytes, %	1	0.2	0.5	0.5	0.2
	3	0.3	0.2	0.2	0.2[a]
Prothrombin Time, sec	1	12	12	13	15**
	3	11	11	11	30[a]
Activated P.T.T., sec	1	28	28	31	35**
	3	26	26	24	65[a]
Leucocytes, 10^3/cmm	1	9.49	9.78	9.93	8.44
	3	9.40	9.83	11.96	10.14[a]
Neutrophils, %	1	24	19	26	15
	3	16	19	25	36[a]
Lymphocytes, %	1	75	76	72	85
	3	80	76	67	54[a]
Eosinophils, %	1	1	5*	2	0
	3	3	3	6	3[a]
Monocytes, %	1	0	0	0	0
	3	1	2	2	7[a]
Basophils, %	1	0	0	0	0
	3	0	0	0	0[a]
MCV, μ^3	1	86	86	82	80
	3	75	78	73	78[a]
MCH, µµg	1	27	27	26	26
	3	26	27	24	25[a]
MCHC, g/100 ml	1	31	31	32	32*
	3	36	35	34	32[a]

*Significantly different from control group, $p<0.05$.
**Significantly different from control group, $p<0.01$.
[a]Value not used in statistical analysis due to only one animal surviving.

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TABLE 5. Individual Hematological Values - Control 1.

Group, Monkey Number	Sex	Erythrocytes 10^6/cmm	Hemoglobin g/100 ml	Hematocrit %	Platelets 10^3/cmm	Reticulocytes %	Prothrombin Time sec	Activated P.T.T. sec	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes[a] %	Eosinophils[a] %	Monocytes[a] %	Basophils[a] %	MCV μ^3	MCH $\mu\mu$g	MCHC g/100 ml
Control:																		
7362	M	5.08	13.0	40	207	0.1	13	29	10.96	36	1	62	1	0	0	79	26	33
7365	M	4.72	11.9	38	319	0.3	13	30	14.79	27	0	72	1	0	0	81	25	31
7336	F	5.27	12.8	39	226	0.6	14	29	7.86	38	0	59	3	0	0	74	24	33
7386	F	4.20	11.1	34	227	0.5	14	21	12.09	59	0	39	1	1	0	81	26	33
Mean		4.82	12.2	38	245	0.4	14	27	11.43	40	0	58	2	0	0	79	25	33
1 mg/kg/day:																		
7364	M	4.50	11.5	37	155	0.4	13	25	8.98	42	0	57	0	1	0	82	26	31
7366	M	4.48	12.0	37	297	0.3	14	29	7.19	41	0	59	0	0	0	83	27	32
7384	F	4.55	11.7	38	160	0.2	13	30	14.72	31	0	64	5	0	0	84	26	31
7385	F	4.19	11.4	35	145	0.6	13	24	8.16	38	0	59	3	0	0	84	27	33
Mean		4.43	11.7	37	232	0.4	13	27	9.81	38	0	60	2	0	0	83	27	32
10 mg/kg/day:																		
7361	M	5.24	13.7	42	264	0.4	13	31	12.97	46	0	49	5	0	0	80	26	33
7458	M	5.29	12.2	36	263	0.2	13	29	17.34	16*	0	78	6	0	0	68	23	34
7328	F	5.32	12.5	39	192	0.8	13	31	7.89	35	0	65	0	0	0	73	23	32
7383	F	5.04	13.5	42	120	0.4	13	28	8.22	47	0	48	4	1	0	83	27	32
Mean		5.22	13.0	40	210	0.5	13	36	11.61	36	0	60	4	0	0	76	25	33
30 mg/kg/day:																		
7367	M	4.98	12.4	38	143	0.2	12	28	10.84	41	0	57	2	0	0	76	25	33
7455	M	5.16	13.6	40	133	0.5	12	24	8.65	21	0	76	3	0	0	78	26	34
7382	F	4.84	12.8	38	157	0.6	13	26	5.83	26	0	73	1	0	0	79	26	34
7387	F	4.67	12.2	35	113	0.6	14	27	5.10	29	0	68	1	2	0	75	26	35
Mean		4.91	12.8	38	137	0.5	13	26	7.61	29	0	68	2	1	0	77	26	34
100 mg/kg/day:																		
7363	M	4.75	12.4	36	282	0.3	12	27	10.77	30	0	67	3	0	0	76	26	34
7456	M	5.36	13.4	42	196	0.2	11	28	5.84	38	0	60	0	1	1	78	25	32
7335	F	5.46	12.8	40	185	0.2	14	28	12.8	38	0	57	5	0	0	73	23	32
7381	F	4.82	11.5	36	115	0.5	14	26	10.36	54	0	44	1	0	1	75	24	32
Mean		5.10	12.5	39	195	0.3	13	27	9.58	40	0	57	2	0	1	76	25	33

*Repeat determination

[a]The differential leucocyte means have been adjusted to equal 100%.

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TABLE 6. Individual Hematological Values - 1 Month.

Group, Monkey Number	Sex	Erythrocytes 10^6/cmm	Hemoglobin g/100 ml	Hematocrit %	Platelets 10^3/cmm	Reticulocytes %	Prothrombin Time sec	Activated P.T.T. sec	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes[a] %	Eosinophils[a] %	Monocytes[a] %	Basophils[a] %	MCV u^3	MCH uug	MCHC g/100 ml
Control:																		
7362	M	4.80	11.9	38	224	0.2	12	30	6.91	28	0	69	3	0	0	79	25	31
7365	M	4.71	11.9	39	349	0.2	12	28	14.58	15	0	84	1	0	0	83	25	31
7336	F	4.20	11.2	37	246	0.2	13	28	7.46	11	0	89	0	0	0	88	27	30
7386	F	4.13	11.9	38	191	0.3	12	27	8.99	42	0	58	0	0	0	92	29	31
Mean		4.46	11.7	38	253	0.2	12	28	9.49	24	0	75	1	0	0	86	27	31
3 mg/kg/day:																		
7364	M	4.35	11.6	37	264	0.5	11	27	6.81	17	0	80	3	0	0	85	27	31
7366	M	3.96	10.7	35	188	0.4	12	28	5.83	16	0	78	6	0	0	88	27	31
7384	F	4.46	11.9	39	234	0.2	13	28	17.07	22	1	73	3	1	0	87	27	31
7385	F	4.25	11.2	35	247	0.9	12	29	9.41	18	0	73	9	0	0	82	26	32
Mean		4.26	11.4	37	233	0.5	12	28	9.78	19	0	76	5	0	0	86	27	31
10 mg/kg/day:																		
7361	M	4.42	12.3	38	168	1.0	13	27	8.08	42	0	57	1	0	0	86	28	32
7458	M	4.81	11.3	37	281	0.3	13	31	17.98	11	0	87	1	0	1	77	23	31
7328	F	4.70	12.0	39	181	0.5	13	33	7.01	35	0	63	2	0	0	83	26	31
7383	F	4.92	12.8	40	209	0.1	12	33	6.64	18	0	79	3	0	0	81	26	32
Mean		4.71	12.1	39	210	0.5	13	31	9.93	26	0	72	2	0	0	82	26	32
30 mg/kg/day:																		
7367	M	4.59	11.2	36	135	0.1	13	34	7.92	12	0	88	0	0	0	78	24	31
7455	M	4.44	11.8	37	237	0.2	14	33	11.11	27	0	73	0	0	0	83	27	32
7382	F	4.51	11.9	35	268	0.3	15	35	6.19	9	0	90	1	0	0	78	26	34
7387	F	4.56	12.0	37	237	0.2	16	38	8.54	13	0	87	0	0	0	81	26	32
Mean		4.53	11.7	36	219	0.2	15	35	8.44	15	0	85	0	0	0	80	26	32
100 mg/kg/day:																		
7361	M	Died, week 1																
7456	M	Died, week 2																
7335	F	Died, week 3																
7381	F	Died, week 4																

[a]The differential leucocyte means have been adjusted to equal 100%.

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TABLE 7.

Individual Hematological Values - 3 Months.

Group, Monkey Number	Sex	Erythrocytes 10^6/cmm	Hemoglobin g/100 ml	Hematocrit %	Platelets 10^3/cmm	Reticulocytes %	Prothrombin Time sec	Activated P.T.T. sec	Leucocytes 10^3/cmm	Neutrophils Seg. %	Neutrophils Non-Seg. %	Lymphocytes[c] %	Eosinophils[c] %	Monocytes[c] %	Basophils[c] %	MCV μ^3	MCH uug	MCHC g/100 ml
Control:																		
7362	M	4.89	12.9	37	217	0.2	11	32	7.82	20	0	74	4	2	0	76	26	35
7365	M	5.29	13.1	37	218	0.3	10	25	12.84	10	0	85	4	1	0	70	25	35
7336	F	4.72	12.9	36	170	0.4	11	25	8.41	16	0	79	4	1	0	76	27	36
7386	F	4.69	12.8	36	234	0.3	11	20	8.51	18	1	80	0	1	0	77	27	36
Mean		4.90	12.9	37	210	0.3	11	26	9.40	16	0	80	3	1	0	75	26	36
3 mg/kg/day:																		
7364	M	4.86	12.9	37	299	0.1	11	24	7.33	24	0	71	4	1	0	76	27	35
7366	M	4.46	12.0	34	278	0.2	11	26	5.44	25	0	74	0	0	1	76	27	35
7384	F	4.92	13.0	39	313	0.2	11	28	18.21	16	0	76	5	3	0	79	26	33
7385	F	4.71	13.0	37	248	0.2	11	24	8.35	10	0	82	5	3	0	79	28	35
Mean		4.74	12.7	37	285	0.2	11	26	9.83	19	0	76	3	2	0	78	27	35
10 mg/kg/day:																		
7363	M	5.04	13.6	40	214	0.2	11	24	8.41	34	0	60	4	2	0	79	27	34
7458	M	5.70	12.6	40	218	0.3	11	23	20.18	4	0	94	2	0	0	70	22	32
7328	F	5.47	13.4	40	219	0.3	11	23	10.72	33	0	51	11	5	0	73	24	34
7383	F	5.65	13.5	39	212	0.1	11	27	8.52	30	0	64	5	1	0	69	24	35
Mean		5.47	13.3	40	216	0.2	11	24	11.96	25	0	67	6	2	0	73	24	34
30 mg/kg/day:																		
7367	M	Died, week 7																
7455	M	3.84[a,b]	9.7	30	261	0.2	30	65	10.14	36	0	54	3	7	0	78	25	32
7382	F	Died, week 13																
7387	F	Died, week 12																
Mean		3.84	9.7	30	261	0.2	30	65	10.14	36	0	54	3	7	0	78	25	32
100 mg/kg/day:																		
7361	M	Died, week 5																
7456	M	Died, week 2																
7335	F	Died, week 3																
7381	F	Died, week 4																

[a] 2+ Poikilocytosis

[b] 2 Nucleated erythrocytes/100 leucocytes

[c] The differential leucocyte means have been adjusted to equal 100%.

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TABLE 8. Means and Significance of Biochemical Values.

Biochemistry	Month of Study	Control	3 mg/kg/day	10 mg/kg/day	30 mg/kg/day
Glucose, mg/100 ml	1	89	117*	104	122
	3	81	96	88	66[a]
B.U.N., mg/100 ml	1	23.0	21.2	22.5	26.1
	3	27.6	20.2	22.0	22.6[a]
Alk. Phos., int'l units/l	1	597	847	601	365*
	3	851	783	743	360[a]
S.G.O.T., int'l units/l	1	29	35	34	59**
	3	45	41	35	88[a]
S.G.P.T. int'l units/l	1[b]	15	21	34*	44
	3[c]	31	31	34	46[a]
Cholesterol, mg/100 ml	1	165	154	158	174
	3	165	141	154	240[a]
Total Protein, g/100 ml	1	7.94	8.23	8.66	8.36
	3	8.21	8.24	8.43	5.52[a]
Albumin, g/100 ml	1	4.78	5.05	4.66	4.28
	3	4.82	5.12	5.17	2.00[a]
Sodium, meq/liter	1	153	152	155	152
	3	151	154	159**	150[a]
Potassium, meq/liter	1	5.1	5.1	5.2	5.7
	3	5.5	5.6	6.0	5.9[a]
Chloride, meq/liter	1	112	110	113	112
	3	113	112	114	113[a]
γ-G.T.P., Sigma units/ml	1	61	49	47	33
	3	44	38	51	49[a]
C.P.K., Sigma units/ml	1	9	14	16	19*
	3	7	6	9	10[a]
Inorganic Phosphate, mg/100 ml	1	7.9	7.2	7.0	6.7
	3	6.9	6.3	7.3	5.0[a]

*Significantly different from control group, $p<0.05$.
**Significantly different from control group, $p<0.01$.
[a]Value not used in statistical analysis due to only one animal surviving.
[b]I.U./l
[c]Sigma units/ml

TABLE 9.

Individual Biochemical Values - Control 1.

Group, Monkey Number	Sex	Glucose mg/100 ml	B.U.N. mg/100 ml	Alk. Phos. int'l units/l	S.G.O.T. int'l units/l	S.G.P.T. int'l units/l	Cholesterol mg/100 ml	Total Protein g/100 ml	Albumin g/100 ml	Sodium meq/l	Potassium meq/l	Chloride meq/l	Inorganic Phosphate mg/100 ml	γ-G.T.P. Sigma u/ml	Creatinine Phosphokinase Sigma u/ml
Control:															
7362	M	94	41.0	780	40	99	219	8.68	5.40	160	5.0	111	6.5	67	15
7365	M	82	16.7	659	61	88	123	9.50	4.30	155	5.3	110	6.7	44	18
7336	F	79	24.0	915	30	80	185	9.52	5.30	156	4.3	110	6.5	41	85
7386	F	85	21.0	960	39	86	190	8.52	5.12	162	5.0	111	6.5	37	16
Mean		85	25.7	829	43	88	179	9.06	5.03	158	4.9	111	6.6	47	34
3 mg/kg/day:															
7364	M	111	19.0	880	42	94	197	9.08	5.28	155	4.3	108	5.0	50	12
7366	M	71	28.7	580	60	89	172	9.12	5.80	157	4.9	108	7.1	30	26
7384	F	96	22.0	570	38	106	133	10.12	5.19	162	6.0	113	6.1	32	16
7385	F	107	22.0	1320	60	76	154	8.72	4.80	158	5.2	116	5.4	41	29
Mean		96	22.9	838	50	91	164	9.26	5.27	158	5.1	111	5.9	38	21
10 mg/kg/day:															
7363	M	89	27.2	1167	46	118	237	9.84	5.10	167	6.2	117	6.7	78	16
7458	M	180	24.2	806	63	136	107	10.08	3.99	150	4.9	107	7.7	55	14
7328	F	98	20.0	776	26	75	189	8.48	5.14	157	4.4	109	6.3	51	34
7383	F	98	27.3	581	31	91	168	8.32	5.25	159	5.1	112	6.0	59	64
Mean		116	24.7	833	42	105	175	9.18	4.87	158	5.2	111	6.7	61	32
30 mg/kg/day:															
7367	M	108	26.9	970	47	114	150	9.38	5.60	170	6.2	116	6.9	65	15
7455	M	110	24.0	687	37	86	205	9.50	5.31	163	5.3	111	6.6	59	9
7382	F	132	27.9	641	40	79	176	11.10	5.72	165	5.5	112	6.8	43	18
7387	F	117	23.8	978	45	138	194	9.44	5.60	155	3.9	113	5.4	39	16
Mean		117	25.7	819	42	104	181	9.86	5.56	163	5.2	113	6.4	52	15
100 mg/kg/day:															
7361	M	93	29.0	598	43	80	155	8.60	5.00	159	5.9	116	6.9	64	17
7456	M	100	23.0	799	40	104	202	9.00	5.69	157	4.5	109	5.7	44	22
7335	F	75	28.0	570	40	96	151	8.98	5.19	157	5.2	111	5.6	58	20
7381	F	119	22.1	1233	40	103	124	9.60	4.89	159	5.2	112	6.7	47	10
Mean		97	25.5	800	41	96	158	9.05	5.19	158	5.2	112	6.2	53	17

TABLE 10. Individual Biochemical Values - 1 Month.

Group, Monkey Number	Sex	Glucose mg/100 ml	B.U.N. mg/100 ml	Alk. Phos. int'l units/l	S.G.O.T. int'l units/l	S.G.P.T. int'l units/l	Cholesterol mg/100 ml	Total Protein g/100 ml	Albumin g/100 ml	Sodium meq/l	Potassium meq/l	Chloride meq/l	Inorganic Phosphate mg/100 ml	γ-G.T.P. Sigma u/ml	Creatinine Phosphokinase Sigma u/ml
Control:															
7362	M	87	33.9	611	27	18	191	7.30	4.82	153	5.4	117	6.6	81	8
7365	M	84	14.2	626	33	17	121	8.40	4.11	153	5.4	111	8.4	50	11
7336	F	87	23.9	672	25	15	142	7.90	4.89	148	4.2	109	8.4	68	7
7386	F	96	14.9	480	31	10	206	8.15	5.30	158	5.4	112	8.1	44	11
Mean		89	23.0	597	29	15	165	7.94	4.78	153	5.1	112	7.9	61	9
3 mg/kg/day:															
7364	M	112	18.0	970	30	36	173	8.15	5.20	150	4.3	106	6.9	77	4
7366	M	131	23.3	693	39	19	148	8.05	5.42	154	4.9	110	6.6	26	7
7384	F	105	24.2	539	30	15	141	8.70	4.85	152	5.8	111	7.5	47	39
7385	F	120	19.1	118[illegible]	40	13	153	8.00	4.72	152	5.2	114	7.8	47	7
Mean		117	21.2	847	35	21	154	8.23	5.05	152	5.1	110	7.2	49	14
10 mg/kg/day:															
7363	M	98	24.9	552	40	35	219	9.40	4.62	161	6.3	118	6.9	65	7
7458	M	97	22.5	737	40	43	134	9.05	4.32	151	4.9	109	8.4	44	20
7328	F	98	22.7	640	23	19	145	8.20	4.50	152	4.3	111	5.4	37	24
7383	F	124	20.0	480	31	37	132	8.00	5.19	154	5.2	113	7.2	43	14
Mean		104	22.5	601	34	34	158	8.66	4.66	155	5.2	113	7.0	47	16
30 mg/kg/day:															
7367	M	112	35.2	376	48	30	180	8.20	4.70	157	6.0	110	6.6	40	25
7455	M	86	21.0	322	61	80	177	8.55	3.22	148	5.2	112	6.9	40	16
7382	F	104	25.2	400	83	43	161	8.15	4.21	149	5.9	111	6.0	28	17
7387	F	185	22.8	360	45	23	179	8.55	5.00	153	5.6	114	7.2	24	18
Mean		122	26.1	365	59	44	174	8.36	4.28	152	5.7	112	6.7	33	19
100 mg/kg/day:															
7361	M	Died, week 5													
7456	M	Died, week 2													
7335	F	Died, week 3													
7381	F	Died, week 4													

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TABLE 11. Individual Biochemical Values - 3 Months.

Group, Monkey Number	Sex	Glucose mg/100 ml	B.U.N. mg/100 ml	Alk. Phos. int'l units/l	S.G.O.T. int'l units/l	S.G.P.T. Sigma units/ml	Cholesterol mg/100 ml	Total Protein g/100 ml	Albumin g/100 ml	Sodium meq/l	Potassium meq/l	Chloride meq/l	Inorganic Phosphate mg/100 ml	γ-G.T.P. Sigma u/ml	Creatinine Phosphokinase Sigma u/ml
Control:															
7362	M	95	41.9	804	55	44	197	7.59	4.99	150	5.5	114	5.6	37	7
7365	M	77	17.4	744	47	30	135	9.18	4.40	151	6.1	113	8.0	53	8
7336	F	67	33.1	786	39	24	150	8.31	4.98	151	5.1	114	7.3	42	7
7386	F	86	18.1	1068	39	27	177	7.76	4.90	153	5.1	109	6.7	45	6
Mean		81	27.6	851	45	31	165	8.21	4.82	151	5.5	113	6.9	44	7
3 mg/kg/day:															
7364	M	106	17.1	1092	41	28	164	7.72	5.09	153	5.8	112	7.0	45	7
7366	M	111	18.1	594	39	33	126	8.09	5.52	153	5.5	109	5.3	51	6
7384	F	94	23.4	432	39	33	132	8.93	4.91	153	5.2	112	6.5	27	6
7385	F	74	22.0	1014	43	29	142	8.21	4.97	155	6.0	114	6.4	29	6
Mean		96	20.2	783	41	31	141	8.24	5.12	154	5.6	112	6.3	38	6
10 mg/kg/day:															
7363	M	87	24.9	936	42	42	194	8.44	5.61	164	7.0	119	8.0	43	7
7458	M	88	21.1	936	38	31	139	9.71	4.69	159	6.2	112	9.0	52	12
7328	F	75	21.8	624	30	25	155	7.93	5.27	156	4.8	110	5.6	60	7
7383	F	100	20.0	474	30	37	128	7.62	5.11	158	5.8	113	6.5	48	9
Mean		88	22.0	743	35	34	154	8.43	5.17	159	6.0	114	7.3	51	9
30 mg/kg/day:															
7367	M	Died, week 7													
7455	M	66	22.6	360	88	46	240	5.52	2.00	150	5.9	113	5.0	49	10
7382	F	Died, week 13													
7387	F	Died, week 12													
Mean		66	22.6	360	88	46	240	5.52	2.00	150	5.9	113	5.0	49	10
100 mg/kg/day:															
7361	M	Died, week 5													
7456	M	Died, week 2													
7335	F	Died, week 3													
7381	F	Died, week 4													

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TABLE 12. Means and Significance of Urinalysis Values.

Urinalysis	Month of Study	Control	3 mg/kg/day	10 mg/kg/day	30 mg/kg/day
Volume, ml	1	35	33	51	41
	3	71	94	51	40[a]
pH	1	8.5	8.5	8.1	8.1
	3	8.3	7.6	8.2	6.6[a]
Specific Gravity	1	1.028	1.026	1.026	1.026
	3	1.018	1.015	1.024	1.031[a]

[a]Value not used in statistical analysis due to only one animal surviving.

TABLE 13. Individual Urinalysis Values - Control 1.

Group, Monkey Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Protein	Glucose	Occult Blood	Ketones	Leuco-cytes	Erythro-cytes	Epi. Cells	Urates	Triple Phos.	Cal. Oxal.	Uric Acid Crystals	Bacteria	Casts
Control:																		
7362	M	100	LS-cl	7.6	1.010	N	N	tr	N	-	occ	occ	F	occ	-	-	M	-
7365	M	28	LS-cl	7.2	1.037	N	N	N	N	-	1-3	occ	F	occ	-	-	M	-
7336	F	27	LS-C	7.0	1.036	N	N	N	1+	-	-	-	occ	occ	occ	-	F	-
7386	F	70	LS-cl	8.4	1.023	N	N	4+	N	-	-	occ	occ	occ	M	-	M	-
Mean		56		7.6	1.027													
3 mg/kg/day:																		
7364	M	25	LS-cl	7.8	1.032	N	N	tr	N	-	-	occ	F	F	F	-	M	-
7366	M	25	LS-cl	7.2	1.035	N	N	tr	N	-	-	occ	F	occ	occ	-	M	-
7384	F	215	LS-C	8.3	1.026	N	N	N	N	-	-	occ	occ	occ	-	-	M	-
7385	F	35	LS-cl	8.3	1.020	N	N	N	N	-	-	occ	F	occ	-	-	M	-
Mean		75		7.9	1.028													
10 mg/kg/day:																		
7363	M	20	LS-cl	7.7	1.020	N	N	tr	N	-	-	occ	F	F	-	-	M	-
7458	M	50	LS-cl	7.5	1.036	N	N	tr	N	-	-	occ	F	occ	F	-	M	-
7328	F	35	LS-cl	7.8	1.036	N	N	tr	N	-	-	1-3	F	occ	M	-	F	-
7383	F	35	LS-cl	8.2	1.020	N	N	3+	N	-	-	occ	occ	occ	-	-	F	-
Mean		35		7.8	1.028													
30 mg/kg/day:																		
7367	M	20	LS-cl	7.1	1.050	N	N	tr	N	-	1-3	1-3	occ	occ	occ	-	M	-
7455	M	35	LS-cl	6.8	1.030	N	N	tr	N	-	1-3	1-3	occ	F	-	-	M	-
7382	F	20	LS-cl	7.0	1.055	N	N	N	N	-	-	1-3	F	occ	-	-	F	-
7387	F	48	LS-cl	8.2	1.030	N	N	N	N	-	-	occ	F	occ	occ	-	M	-
Mean		31		7.3	1.041													
100 mg/kg/day:																		
7361	M	21	LS-cl	7.6	1.035	N	N	tr	N	-	occ	-	F	occ	-	-	M	-
7456	M	25	LS-cl	7.1	1.042	N	N	tr	3+	-	-	occ	F	occ	F	-	M	-
7335	F	25	LS-cl	7.2	1.041	N	N	tr	1+	-	1-3	-	occ	occ	F	-	F	-
7381	F	40	LS-cl	8.1	1.042	N	N	1+	1+	-	-	1-3	occ	occ	M	-	F	-
Mean		28		7.5	1.040													

Code:
tr - Trace
1+ - Trace to slight
2+ - Slight to moderate
3+ - Moderate
4+ - Marked

S - Straw
LS - Light Straw
DS - Dark Straw
LAm - Light Amber
DAm - Dark Amber
cl - Cloudy
C - Clear

N - Negative
F - Few
L - Loaded
M - Many
R - Rare
occ - Occasional

QNS - Quantity not sufficient
norm - Normal
- None seen

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TABLE 14. Individual Urinalysis Values - 1 Month.

Group, Monkey Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Protein	Glucose	Occult Blood	Ketones	Leuco-cytes	Erythro-cytes	Epi. Cells	Urates	Triple Phos.	Cal. Oxal.	Uric Acid Crystals	Bacteria	Casts
Control:																		
7362	M	55	LS-C	8.5	1.021	N	N	N	N	-	occ	-	occ	occ	M	-	M	-
7365	M	35	LS-C	8.5	1.028	N	N	N	N	-	-	-	occ	F	occ	-	M	-
7336	F	20	LS-C	8.5	1.033	N	N	3+	N	-	-	1-3	F	F	F	-	M	-
7386	F	90	LS-C	8.5	1.030	N	N	tr	N	-	-	occ	M	F	M	-	M	-
Mean		35		8.5	1.028													
3 mg/kg/day:																		
7364	M	20	LS-C	8.8	1.019	N	N	N	N	-	-	occ	F	M	occ	-	M	-
7366	M	20	LS-C	8.5	1.036	N	N	N	N	-	-	occ	F	F	F	-	M	-
7384	F	40	DS-cl	8.0	1.021	1+	N	4+	2+	-	8-12	-	F	occ	F	-	M	-
7385	F	50	LS-cl	8.5	1.027	N	N	N	N	-	-	occ	F	occ	M	-	M	-
Mean		33		8.5	1.026													
10 mg/kg/day:																		
7363	M	65	LS-cl	7.5	1.023	N	N	N	N	-	occ	-	F	occ	M	-	M	-
7458	M	35	LS-C	8.0	1.028	N	N	N	N	-	-	-	occ	occ	M	-	M	-
7328	F	55	LS-cl	8.5	1.026	N	N	N	N	-	-	1-3	occ	occ	M	-	M	-
7383	F	50	LS-cl	8.5	1.028	N	N	tr	N	-	occ	occ	F	occ	M	-	M	-
Mean		51		8.1	1.026													
30 mg/kg/day:																		
7367	M	30	LS-C	7.5	1.024	N	N	N	N	-	-	occ	occ	occ	-	-	L	-
7455	M	30	LS-cl	8.0	1.026	N	N	N	N	-	occ	occ	M	F	-	-	M	-
7382	F	60	LS-cl	8.3	1.022	N	N	N	N	-	occ	-	F	F	-	-	M	-
7387	F	45	LS-cl	8.5	1.032	N	N	N	N	-	-	occ	F	occ	occ	-	M	-
Mean		41		8.1	1.026													
100 mg/kg/day:																		
7361	M	Died, week 3																
7456	M	Died, week 1																
7335	F	Died, week																
7381	F	Died, week																

Code: tr - Trace
1+ - Trace to slight
2+ - Slight to moderate
3+ - Moderate
4+ - Marked

S - Straw
LS - Light Straw
DS - Dark Straw
LAm - Light Amber
DAm - Dark Amber
cl - Cloudy

N - Negative
F - Few
L - Loaded
M - Many
R - Rare
occ - Occasional

QNS - Quantity not sufficient
norm - Normal
- None seen

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TABLE 15. Individual Urinalysis Values - 3 Months.

Group, Monkey Number	Sex	Volume ml	Color and Appear.	pH	Spec. Grav.	Protein	Glucose	Occult Blood	Ketones	Leuco-cytes	Erythro-cytes	Epi. Cells	Urates	Triple Phos.	Cal. Oxal.	Uric Acid Crystals	Bacteria	Casts
Control:																		
7362	M	110	LS-C	8.2	1.012	N	N	N	N	-	-	occ	F	occ	-	-	M	-
7365	M	40	LS-cl	8.1	1.029	N	N	N	1+	-	occ	1-3	F	F	-	-	M	-
7336	F	85	LS-C	8.2	1.015	N	N	N	tr	-	-	occ	F	occ	F	-	M	-
7386	F	50	LS-C	8.8	1.016	N	N	3+	N	occ	-	occ	F	F	F	-	M	-
Mean		71		8.3	1.018													
3 mg/kg/day:																		
7364	M	50	LS-C	6.0	1.020	N	N	N	tr	-	-	-	F	occ	-	-	M	-
7366	M	150	LS-C	7.9	1.007	N	N	N	N	-	-	occ	F	occ	-	-	M	-
7384	F	125	LS-C	8.1	1.010	N	N	N	N	-	-	occ	F	F	F	-	M	-
7385	F	50	LS-C	8.5	1.021	N	N	tr	N	-	occ	1-3	M	F	M	-	M	-
Mean		94		7.6	1.015													
10 mg/kg/day:																		
7363	M	40	LS-C	8.0	1.027	N	N	N	N	-	-	occ	F	occ	occ	-	M	-
7458	M	35	LS-cl	8.7	1.022	N	N	N	N	-	-	-	F	occ	-	-	M	-
7328	F	50	LS-C	9.0	1.029	N	N	N	N	-	occ	occ	F	occ	-	-	M	-
7383	F	80	LS-cl	7.0	1.019	N	N	N	N	-	occ	occ	F	-	-	-	M	-
Mean		51		8.2	1.024													
30 mg/kg/day:																		
7367	M	Died, week 7																
7455	M	40	S-C	6.6	1.031	N	N	1+	N	1-3	occ	-	F	M	occ	-	M	-
7382	F	Died, week 13																
7387	F	Died, week 12																
Mean		40		6.6	1.031													
100 mg/kg/day:																		
7361	M	Died, week 5																
7456	M	Died, week 2																
7385	F	Died, week 3																
7381	F	Died, week 4																

Code: tr - Trace; 1+ - Trace to slight; 2+ - Slight to moderate; 3+ - Moderate; 4+ - Marked

S - Straw; LS - Light Straw; DS - Dark Straw; LAm - Light Amber; DAm - Dark Amber

N - Negative; F - Few; L - Loaded; M - Many; R - Rare

QNS - Quantity not sufficient; norm - Normal; - None seen

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TABLE 16. Summary of Gross Necropsy Observations, Terminal Sacrifice.

Site / Lesion	0 mg/kg/day				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
Group, Monkey Number	M 7362	M 7365	F 7336	F 7386	M 7364	M 7366	F 7384	F 7385	M 7363	M 7458	F 7328	F 7383	M* 7367	M 7455	F* 7382	F* 7387	M* 7361	M* 7456	F* 7335	F* 7381
No Gross Lesions		x			x															
External														x						
swelling, eye area																x				
alopecia																x				
dehydrated																x				
emaciated																x				
red vaginal discharge																x				
scab, facial area																x				
Lung																				
mite lesion	x	x		x		x		x	x	x	x	x		x	x					
adhesions		x						x	x		x			x		x		x		x
dark red foci/reddish purple area							x			x		x						x		
yellow, white foci													x				x			
nodules																				
Heart																		x	x	
hemorrhage, subendocardial																			x	
gelatinized fat, endocardial																				x
atrophy																				
Lymph Nodes																				
enlarged		x																x		
reddish black in color																				
Thymus															x					
atrophy																				
Abdominal Cavity																				x
depletion of fat																				
Stomach											x			x		x	x			
dark red foci													x							
erosion, mucosa, pyloric portion															x					
mucosal hyperemia																	x			
yellowish gelatinous material, fundic portion																			x	
hemorrhage, fundic mucosa																				x
ulcers																				
Small Intestine															x					
greenish-gray mucoid material																	x		x	x
dark red/brown mucoid material																		x		
liquid, blood tinged fluid																		x		
reddish brown in color																			x	
congestion, mucosa																				x
hemorrhage, mucosa																				
Large Intestine													x				x			
congestion, mucosa																	x	x	x	
hemorrhage, mucosa																		:		
dark reddish black foci																			x	
semi solid, blood stained contents																				

*Died on Study

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 16. Cont. Summary of Gross Necropsy Observations.

Site / Lesion	Group, Monkey Number	0 mg/kg/day				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
		M	M	F	F	M	M	F	F	M	M	F	F	M*	M	F*	F*	M*	M*	F*	F*
		7362	7365	7336	7386	7364	7366	7384	7385	7361	7458	7328	7383	7367	7455	7382	7387	7361	7456	7335	7381
Pancreas																					
accessory spleen									x												
Liver																					
cyst												x									
brownish color															x						
accentuated lobulations															x			x			
granular surface															x						
yellowish mottling																x					
reddish yellow color																			x		
Kidneys																					
brownish discoloration															x						
Skin																					
subcutaneous edema, abdomen																x					
subcutaneous hemorrhage, abdomen																			x		

*Died on Study

137-[illegible]

FC-141: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 17. Absolute (Grams) and Relative (% Body Weight) Organ Weights, Terminal Sacrifice and Deaths.

Group, Monkey Number	Sex	Body Wt. kg	Spleen g	Spleen %	Liver g	Liver %	Adrenals g	Adrenals %x10	Kidneys g	Kidneys %	Testes/ Ovaries g	Testes/ Ovaries %x10²
Terminal Sacrifice:												
Control:												
7362	M	3.25	2.35	0.07	70.73	2.18	0.65	0.20	11.82	0.36	0.85	0.03
7365	M	3.85	7.87	0.20	79.15	2.06	0.71	0.18	17.06	0.44	3.23	0.08
Mean		3.55	5.11	0.14	74.94	2.12	0.68	0.19	14.44	0.40	2.04	0.06
7336	F	3.40	5.03	0.15	84.79	2.49	-	-	13.80	0.41	0.28	0.82
7386	F	3.50	3.87	0.11	77.77	2.22	0.62	0.18	19.58	0.56	0.27	0.77
Mean		3.45	4.45	0.13	81.28	2.36	0.62[a]	0.18[a]	16.69	0.48	0.28	0.80
3 mg/kg/day:												
7364	M	4.10	4.67	0.11	91.40	2.23	0.77	0.19	19.76	0.48	3.66	0.09
7366	M	2.65	1.87	0.07	63.17	2.38	0.82	0.31	12.40	0.47	0.85	0.03
Mean		3.38	3.27	0.09	77.29	2.31	0.80	0.25	16.08	0.47	2.26	0.06
7384	F	3.70	6.82	0.18	102.64	2.77	0.78	0.21	17.60	0.48	0.18	0.49
7385	F	3.45	2.94	0.09	67.25	1.95	0.55	0.16	14.44	0.42	0.16	0.46
Mean		3.58	4.88	0.13	84.95	2.36	0.67	0.19	16.02	0.45	0.17	0.48
10 mg/kg/day:												
7361	M	3.80	2.39	0.06	87.25	2.30	0.74	0.19	16.84	0.44	1.75	0.05
7458	M	3.25	4.91	0.15	82.30	2.53	0.67	0.21	16.54	0.51	1.99	0.06
Mean		3.53	3.65	0.11	84.78	2.41	0.71	0.20	16.69	0.48	1.87	0.05
7328	F	3.55	4.06	0.11	83.00	2.34	0.66	0.19	15.32	0.43	0.29	0.82
7383	F	3.70	3.99	0.11	85.35	2.31	0.86	0.23	13.56	0.37	0.39	1.05
Mean		3.63	4.03	0.11	84.18	2.32	0.76	0.21	14.44	0.40	0.34	0.94
30 mg/kg/day[a]:												
7455	M	2.40	3.50	0.15	70.76	2.95	0.84	0.35	16.85	0.70	1.16	0.05
Deaths:												
30 mg/kg/day:												
7367	M	2.10	1.45	0.07	75.33	3.59	1.63	0.78	16.34	0.78	1.94	0.09
7382	F	2.25	3.01	0.13	112.87	5.02	1.74	0.77	19.03	0.85	0.21	0.93
7387	F	2.25	1.97	0.09	85.17	3.79	1.20	0.53	15.96	0.71	0.32	1.42
100 mg/kg/day:												
7361	M	2.40	1.65	0.07	79.02	3.29	1.59	0.66	21.88	0.91	1.37	0.06
7456	M	2.70	1.76	0.07	85.08	3.15	1.45	0.54	14.77	0.55	0.71	0.03
7335	F	2.05	2.49	0.12	74.28	3.62	1.03	0.50	15.40	0.75	0.10	0.51
7381	F	2.60	3.05	0.12	82.58	3.18	1.16	0.45	18.28	0.70	0.13	0.50

Group mean relative organ weights shown in this table were calculated by averaging the individually calculated relative organ weights.

*Significantly different from Control group mean, $p<0.05$.

**Significantly different from Control group mean, $p<0.01$.

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Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 17. Cont. Absolute (Grams) and Relative (% Body Weight) Organ Weights, Terminal Sacrifice and Deaths.

Group, Monkey Number	Sex	Body Wt. kg	Heart g	Heart %	Thyroid/ Parathyroid g	Thyroid/ Parathyroid %x10	Brain g	Brain %	Pituitary g	Pituitary %x10[2]
Terminal Sacrifice:										
Control:										
7362	M	3.25	11.69	0.36	1.050	0.32	87.04	2.68	0.053	0.16
7365	M	3.85	18.17	0.47	0.296	0.08	90.39	2.35	0.063	0.16
Mean		3.55	14.93	0.42	0.673	0.20	88.72	2.51	0.058	0.16
7336	F	3.40	15.30	0.45	-	-	82.64	2.43	0.050	0.15
7386	F	3.50	14.75	0.42	0.839	0.24	81.55	2.33	0.071	0.21
Mean		3.45	15.03	0.44	0.839[a]	0.24[a]	82.10	2.38	0.062	0.18
1 mg/kg/day:										
7364	M	4.10	18.90	0.46	0.893	0.22	96.01	2.34	0.080	0.20
7366	M	2.65	12.70	0.48	0.378	0.14	83.50	3.15	0.051	0.19
Mean		3.38	15.80	0.47	0.636	0.18	89.76	2.75	0.066	0.19*
7384	F	3.70	16.87	0.46	0.694	0.19	78.66	2.13	0.086	0.23
7385	F	3.45	15.19	0.44	0.543	0.16	80.21	2.32	0.053	0.15
Mean		3.58	16.03	0.45	0.619	0.17	79.44	2.23	0.070	0.19
10 mg/kg/day:										
7363	M	3.80	15.10	0.40	1.211	0.32	77.73	2.05	0.063	0.17
7458	M	3.25	14.14	0.44	0.488	0.15	83.38	2.57	0.047	0.14
Mean		3.53	14.62	0.42	0.850	0.23	80.56	2.31	0.055	0.16
7328	F	3.55	11.85	0.33	0.461	0.13	77.19	2.17	-	-
7381	F	3.70	11.69	0.32	0.537	0.15	75.88	2.05	0.071	0.19
Mean		3.63	11.77*	0.32**	0.499	0.14	76.54**	2.11	0.071[a]	0.19[a]
30 mg/kg/day[a]:										
7455	M	2.40	10.50	0.44	0.292	0.12	75.01	3.13	0.049	0.20
Deaths:										
30 mg/kg/day:										
7367	M	2.10	10.39	0.49	0.532	0.25	82.27	3.92	0.068	0.32
7382	F	2.25	11.93	0.53	0.543	0.24	83.22	3.70	0.070	0.31
7387	F	2.25	10.21	0.45	0.845	0.38	91.45	4.06	0.057	0.25
100 mg/kg/day:										
7361	M	2.40	14.54	0.61	0.791	0.33	92.43	3.85	0.072	0.30
7456	M	2.70	15.55	0.58	0.718	0.27	95.42	3.53	0.046	0.17
7335	F	2.05	11.44	0.56	0.479	0.23	74.28	3.62	0.056	0.27
7381	F	2.60	12.95	0.50	0.417	0.16	86.20	3.32	0.082	0.32

Group mean relative organ weights shown in this table were calculated by averaging the individually calculated relative organ weights.

*Significantly different from Control group mean, $p \leq 0.05$.

**Significantly different from Control group mean, $p \leq 0.01$.

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Microscopic Observations.

Tissue Lesion	Group, Sex, Monkey Number	Control				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
		M 7362	M 7365	F 7336	F 7386	M 7364	M 7366	F 7384	F 7385	M 7363	M 7458	F 7328	F 7383	M 7455	M 7367*	F 7382*	F 7387*	M 7456*	M 7361*	F 7335*	F 7381*
Brain		1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1
focal perivascular lymphoid infiltrates											3										
Spinal cord		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peripheral nerve		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Eye		1		1	1	1	1						1		1	1	1	1	1		1
Sarcocystis sp. in ocular muscle			x					x												x	
focal lymphoid infiltrates in sclera												3									
focal lymphoid infiltrates in lacrimal gland									3					3							
focal lymphoid infiltrate in palpebral conjunctiva										3	3										
cystic tarsal gland											3										
Pituitary		1	1	1	1	1	1	1	1	1		1	1	1		1			1		
diffuse congestion															3		3	3		3	3
small parenchymal cyst											x										
Thyroid		1	1	1		1		1	1	1	1	1	1	1	1				1	1	
foci of interstitial lymphoid infiltrates					3		2										2				
focal interstitial fibrosis					3												2				
diffuse congestion																3		3			3
Parathyroid		1	1	1	1	1	1	-	-	-	-	-	-	-	1	-	-		-	-	1
diffuse congestion																		3			
Tongue		1								1			1			1	1	1	1		
foci of inflammatory cell infiltrates in lamina propria and mucosal epithelium			3	3	4	2	3	2	3		3	3		2	2					2	2
foci of inflammatory cell infiltrates in muscle			2					3			3	2		2						2	
Sarcocystis sp.								x				x									

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; 5 - marked; 6 - extreme; - = not available; *Died or sacrificed in extremis

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FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

Tissue Lesion	Group, Sex	Control				3 mg/kg/day				10 mg/kg/day				20 mg/kg/day				100 mg/kg/day			
	Monkey Number	M 7362	M 7365	F 7336	F 7386	M 7364	M 7366	F 7384	F 7385	M 7363	M 7458	F 7328	F 7383	M 7455	M 7367*	F 7382*	F 7387*	M 7456*	M 7361*	F 7335*	F 7381*
Tonsil						1								-		1		-	-	-	
foci of inflammatory cell infiltrates in mucosal epithelium and tonsillar crypt		3	4	2	3		4	3	3	3	3	4	4		2		3				4
Sarcocystis sp. in muscle			x																		
Gongylonema sp. in mucosal epithelium					x																
atrophy of lymphoid follicles																	4				4
Adrenal							1														
foci of dystrophic mineralization		3	3	2	2	3		2			3	2	2					2			
diffuse congestion															3	4	3	3		4	3
diffuse lipid depletion															5	5	5	5	5	5	5
foci of lymphoid infiltrates in sinusoids				3		2		2	3	3	3		2								
acidophilic degeneration of individual to small groups of cells														2			3				
Trachea			1												1		1	1	1		
foci of inflammatory cell infiltrates in lamina propria		3		3	3	3	2	2	3	3	3	3	2	2		3				3	3
Salivary gland				1		1				1									1	1	
focal interstitial lymphoid infiltrates		2	3		2		3	4	3		2	2	3	3		2	3				
diffuse congestion															3	3		3			3
decreased cell size, loss of cytoplasmic granules															4			4			
Lung																					
acarian pigment (peribronchial, peribronchiolar, perivascular)		3	2	2	2	3	2	2	2	2	2	3	2	3	2	2	4	2		2	2
focal perivascular lymphoid infiltrates						3					3	3									
focal peribronchial/peribronchiolar lymphoid aggregates		4	4	3	4	3	3	4	3	3	4	4	3	3		2	2			3	3
lung mite in bronchiolar lumen		x			x														3		
interstitial pneumonia		3	4		4	3		3	4	3			3	4		4					
diffuse congestion															3	3	3	4			
foreign body pneumonia			5						5												
focal hemorrhage			3															3			
acute focal bronchopneumonia		4				3					4										
numerous aggregates of pigment laden alveolar macrophages																					

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; - = not available; *Died or sacrificed in extremis

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FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

Tissue Lesion	Group, Sex, Monkey Number	Control				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/da		
		M	M	F	F	M	M	F	F	M	M	F	F	M	M	F	F	M	M	F
		7362	7365	7336	7386	7364	7366	7384	7385	7363	7458	7328	7383	7455	7367*	7382*	7387*	7456*	7361*	7335*
Heart			1			1				1	1		1	1		1			1	
focal interstitial lymphoid infiltrates		3		3	3		2	3	3						3			2		2
focus of lymphoid infiltrate in endocardium												3								
focal subendocardial hemorrhage																		3		
atrophy of epicardial fat																	4			4
Aorta		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Spleen		1	1	1	1	1	1	1	1	1	1									
atrophy of lymphoid follicles														4	4	4	4	4	4	4
diffuse congestion												3	3	3	3	4	3	4	4	3
focal amyloidosis in lymphoid follicles																				3
increased amount of hemosiderin pigment																	3			
Lymph node		1		1	1	1	1	1	1	1	1	1	1	1	1					
atrophy of lymphoid follicles																	4	4	4	4
increased amount of hemosiderin pigment			3															3		
neutrophil infiltrate in sinuses																3			3	5
diffuse congestion																3				
lymphoid hyperplasia			3																	
Esophagus		1			1		1									1		1		1
foci of inflammatory cell infiltrates in lamina propria			3	2		2		3	2		3	2	2	3	2		2		2	
foci of interstitial lymphoid infiltrates in muscularis			2					2			2	2	2							
Gongylonema sp. in mucosal epithelium										x										
Stomach																				
foci of inflammatory cell infiltrate in lamina propria		3	4	3	3	3	3	4	4	4	3	4	3	3			3	3	2	4
diffuse congestion												2			3	3				3
foci of inflammatory cell infiltrates in submucosa						4				4		4	3							
foci of inflammatory cell infiltrates in muscularis								3			3									
foci of inflammatory cell infiltrates in serosa																				
parasitic granuloma in omentum											x									
focal mucosal hemorrhage												2		2						2
focal coagulation necrosis in mucosa																				3

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; 5 - marked; 6 - extreme; - = not available; *Died or sacrificed in extremis

137-090

HLAB003905

EID123456

P000031560

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

Tissue Lesion	Group, Sex	Control M	Control M	Control F	Control F	3 mg/kg/day M	3 mg/kg/day M	3 mg/kg/day F	3 mg/kg/day F	10 mg/kg/day M	10 mg/kg/day M	10 mg/kg/day F	10 mg/kg/day F	30 mg/kg/day M	30 mg/kg/day M	30 mg/kg/day F	30 mg/kg/day F	100 mg/kg/day M	100 mg/kg/day M	100 mg/kg/day F	100 mg/kg/day F
	Monkey Number	7362	7365	7336	7386	7364	7366	7384	7385	7363	7458	7328	7383	7455	7367*	7382*	7387*	7456*	7361*	7335*	7381*
Small intestine		1	1	1	1	1	1	1	1	1	1	1	1	1							
diffuse villous atrophy																		5	5		
focal hemorrhage															3				3	3	
diffuse congestion															3	3	3			3	3
focal aggregate of brown pigment-laden foamy macrophages in mesentery																					x
inflammatory cell infiltrates in serosa																		4			
atrophy of lymph nodule															4			4		4	
Cecum		1	1	-	1	1	1	1	1		1	1	1					1			1
transmural inflammatory cell infiltrates																			4		
diffuse congestion															3	3	3		3	3	
focal mucosal hemorrhage															2				2	4	
inflammatory cell infiltrates in serosa										2											
parasitic granuloma in muscularis														x							
atrophy of lymph nodule																	4			4	
Colon		1	1	1	1	1	1	1	1	1	1	1	1	1							1
diffuse congestion															3	3	3		3	3	
parasitic granuloma in submucosa																		x			
transmural inflammatory cell infiltrates																		4			
focal mucosal hemorrhage															3						
atrophy of lymph nodule																	4			4	
Rectum		1	1	1	1	1	1	1	1	1	1	1	1	1				-	1		1
diffuse congestion															3	3	3			3	
inflammatory cell infiltrates in muscularis																				3	
atrophy of lymphoid nodule																	4			4	
Pancreas		1	1				1			1		1	1					a	1	1	a
focal periductal lymphoid infiltrates				3	2	3		3			3			2							
focal interstitial lymphoid infiltrates								3	2												
diffuse congestion															3	3	3				
Thymus		1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-

Code: x - condition present; 4 - moderate; a - autolyzed; 5 - marked; 1 - not remarkable; 6 - extreme; 2 - very slight; - - not available; 3 - slight; *Died or sacrificed in extremis

137-090

HLAB003906

EID123457

P000031561

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

Tissue Lesion	Group, Sex, Monkey Number	Control				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
		M	M	F	F	M	M	F	F	M	M	F	F	M	M	F	F	M	M	F	F
		7362	7365	7336	7386	7364	7366	7384	7385	7363	7458	7328	7383	7455	7367*	7382*	7387*	7456*	7361*	7335*	7381*
Liver																			1		
portal inflammatory cell infiltrates		3	3	3	3			3	2	3	3	2	2		2			2			
parenchymal inflammatory cell infiltrates		2	2	2	3	3	3	3	3	3	3	2								3	2
diffuse congestion															4	3	3	3		3	3
acidophilic degeneration of individual to small groups of hepatocytes									3								3				
diffuse hepatocellular hypertrophy with cytoplasmic vacuolation														3		3					
neutrophil infiltrates in sinusoids														3							
Gallbladder														1	a	a	a	a	a	1	a
foci of inflammatory cell infiltrates in lamina propria		3	3	4	3	3	2	2	3	2	3	3	3								
Kidney																					
focal interstitial lymphoid infiltrates		2	2		2	3	3	4	2	2	3	2	3	2		2	2		2	2	
multinucleated lining epithelium in papillary ducts			x	x				x					x								
cyst in medulla			x																		
chronic interstitial nephritis				3											4	3	3	3	3	3	3
diffuse congestion																		x			
microlith in renal tubules																					
small foci of dystrophic mineralization				2										2			2		2	2	
Urinary bladder												1	1	1	1		1		1		
foci of inflammatory cell infiltrates in lamina propria		3	2	3	2	2	3	2	3	3	3										
diffuse congestion																3		3		3	3
Testes																					
prepuberal development		x	x			x	x			x	x			x	x			x	x		
chronic focal vasculitis			4																		
focal perivascular lymphoid infiltrate											2										
Ovaries					1			1	1			1	1				1			1	1
small foci of dystrophic mineralization				2												2					
diffuse congestion																					

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; 5 - marked; 6 - extreme; - = not available; *Died or sacrificed in extremis

137-090

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

Tissue Lesion	Group, Sex, Monkey Number	Control				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
		M 7362	M 7365	F 7336	F 7386	M 7364	M 7366	F 7384	F 7385	M 7363	M 7458	F 7328	F 7383	M 7455	M 7367*	F 7382*	F 7387*	M 7456*	M 7361*	F 7335*	F 7381*
Prostate																					
focal interstitial lymphoid infiltrates		3	3			2	3			2	3			2							
focal lymphoid infiltrate in corpus cavernosum			3				2			2				3							
Uterus												1	1				1				
diffuse congestion				2	2			2								3				3	3
blood in uterine glands				2	2			3								2				2	
small foci of hemorrhage in endometrium				2	2				3												
brown pigment-laden macrophages in endometrium				3	2			4	2											3	
inflammatory cell infiltrates in endometrium																					
proteinaceous fluid and inflammatory cells in uterine lumen																					
Vagina																					
foci of lymphoid infiltrates in lamina propria and mucosal epithelium				3	4			3	3			4	4			2	3			2	5
foci of lymphoid infiltrates in muscularis					2				2				3								3
Sarcocystis sp.								x													
focal lymphoid infiltrate in tunica adventitia								3													
diffuse congestion																3					
focal neutrophil infiltrate in mucosa												3									
Skeletal muscle		1		1	1	1	1			1		1						1			
Sarcocystis sp.			x					x	x						x					x	
focal interstitial inflammatory cell infiltrates			3					4	2		3		2								
interstitial fibrosis																	4				3
focal/multifocal atrophy of muscle															4		4				4
increased sarcolemmal nuclei														4		3			4		
Skin																					
brown/black pigment in dermis		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
dermal inflammatory cell infiltrates			2				3	3													
diffuse acanthosis		3		3																	
diffuse congestion																		3			
hyperkeratosis						3	3		3		3	3			3	3	3			3	3
few large areas of hemorrhage in subcutis								3										5			

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; 5 - marked; 6 - extreme; - = not available; *Died or sacrificed in extremis

137-090

FC-143: Ninety Day Subacute Rhesus Monkey Toxicity Study.

TABLE 18. Cont. Microscopic Observations.

	Control				3 mg/kg/day				10 mg/kg/day				30 mg/kg/day				100 mg/kg/day			
	M	M	F	F	M	M	F	F	M	M	F	F	M	M	F	F	M	M	F	F
Tissue / Lesion	7362	7365	7336	7386	7364	7366	7384	7385	7363	7458	7328	7383	7455	7367*	7382*	7387*	7456*	7361*	7335*	7381*
Mammary gland								1												
brown pigment in dermis	x	x		x	x				x	x	x		x	x		x	x	x	x	x
hyperkeratosis	3		3	3	3	3	3			3		3	3	3	3					
dermal inflammatory cell infiltrates			3	3	2		3		3		3	3	2							
inflammatory exudate in acinar lumen/ducts		2		2												2				
inflammatory cell infiltrates in intralobular connective tissue		3							2											
diffuse congestion																	3			
intraepidermal microabscess													x							
Femur	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	1	1
Bone marrow (Rib junction)	1	1	1	1	1	1	1	1	1	1	1	1								
hypocellular marrow													3	4	4	3	4	4	4	4
congestion														3	3	4	3	3	4	3
Miscellaneous																				
acute focal cheilitis, lip																4				

Code: x - condition present; a - autolyzed; 1 - not remarkable; 2 - very slight; 3 - slight; 4 - moderate; 5 - marked; 6 - extreme; - = not available; *Died or sacrificed in extremis

237-090

HLAB003909

EID123460

P000031564

ANALYSIS OF $C_7F_{15}CO_2^-$ IN SERUM AND LIVER OF RATS FROM I.R.D.C. STUDY

DOSE	SURVIVAL		PPM $C_7F_{15}CO_2^-$ IN BLOOD		PPM $C_7F_{15}CO_2^-$ IN LIVER	
PPM	M	F	M	F	M	F
0	5/5	5/5	0	0	-	-
10	5/5	5/5	21	-	-	-
30	5/5	5/5	34	0.15	8	0.1
100	5/5	4/5	36	-	-	-
300	5/5*	4/5	38	0.25	22	0.3
1000	5/5**	5/5	49	0.65	-	-

*7-1/2% WEIGHT DECREASE

**22 % WEIGHT DECREASE - LIVER CHANGES FOR MALE

PERSONAL & CONFIDENTIAL

Sept. 6, 1979.

To: G. H. Patterson

From: Erik Kissa

FLUORINE IN BLOOD SAMPLES FROM WASHINGTON WORKS, PARKERSBURG, W.V.

The following blood samples submitted by Dr. Y.L. Power have been analyzed for total nonvolatile fluorine (3M method) and inorganic fluorine:

Name	PR No.	Fluorine ppm	
		Total Nonvolatile	Inorganic
	3520	2.42	0.09
	858	0.62	0.08
	3133	0.38	0.08
e	3793	1.56	0.06
eld	3690	0.30	0.06
	3904	0.31	0.07
n	560	0.50	0.24
	4452	0.61	0.11
	3352	0.44	0.27
	1482	0.70	0.11
	598	0.60	0.08
	911	0.79	0.09
r	1592	0.70	0.11
am	3720	2.32	0.25
	W.S.	0.60	0.15

Name	PR No.	Fluorine ppm		
		Total Nonvolatile	Inorganic	
X[illegible]son	W.S.	0.57	0.14	0.43
	4278	0.85	0.13	0.72
	3120	4.05	0.14	3.91
	1447	0.37	0.20	0.17
	864	0.67	0.15	[illegible]
	767	2.19	0.20	1.99
	4299	1.84	0.06	1.78
	4331	1.86	0.06	1.80

These results were obtained by analyzing dried blood for fluorine (3M method). Volatile fluorocompounds, if present in blood, are not detected by this method. The samples will be analyzed also by our method which determines total fluorine (volatile and nonvolatile) in liquid blood.

EID080213

ABNORMAL HIGH TEST RESULTS SMA-12-1977

No. of Tests	BSD 129	BUTA. 128	C&P 82	DEL. 101	E. R. 24	FIL. 145	LUC. 86	MECH. 515	POWER 61	RES. 86	TECH. 354	TFE 190	ZYTEL 131
Albumen	7	3	1	3	1	3	1	16	0	1	13	3	2
Uric Acid	2	6	3	3	0	3	2	15	2	2	12	8	4
SGOT	11	11	7	12	4	23	14	85	5	14	45	30	18
Alk. Phos.	16	5	0	4	0	7	7	21	6	5	16	15	2
Bilirubin	8	5	0	3	0	3	2	12	2	5	12	2	5
Glucose	4	2	1	2	1	2	1	12	2	0	9	3	2
Tl. Protein	9	1	0	1	0	0	0	5	0	0	2	0	1
BUN	1	2	3	4	1	4	3	14	0	1	11	7	4
Inorgan. Phos. *	4	4	2	8	0	4	0	27	5	3	12	1	3
LDH	1	0	2	1	0	0	0	4	3	1	3	4	0
Cholest.	1	2	0	1	0	3	2	6	2	1	7	2	3
Calcium	1	0	0	1	0	2	0	3	0	0	3	0	3

P00031568

* also includes abnormally low results

YLP:jsh

AJP0013 98