Table 14-28. Analysis of Leg Pulses (Continued)

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,151		
Background RH	360	1.01 (0.66,1.53)	0.981
Low RH	221	1.01 (0.63,1.64)	0.955
High RH	236	0.91 (0.54,1.53)	0.725
Low plus High RH	457	0.96 (0.66,1.40)	0.832

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
  Comparison: 1987 Dioxin ≤ 10 ppt.
  Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
  Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
  High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	284	30 (10.6)	1.00 (0.87,1.16)	0.956
Medium	281	31 (11.0)		
High	287	31 (10.8)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

	Analysis Results for Log_2 (1987 Dioxin + 1)	
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
817	1.08 (0.88,1.31)	0.467

[a] Relative risk for a twofold increase in 1987 dioxin.

14.2.2.3.9   Peripheral Pulses

All unadjusted and adjusted analyses in Models 1 through 4 were nonsignificant (Table 14–29(a–h): p>0.21 for each analysis).

Table 14-29. Analysis of Peripheral Pulses

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)	p-Value
All	*Ranch Hand*	*859*	*97 (11.3)*	*1.11 (0.84,1.47)*	*0.454*
	Comparison	*1,228*	*126 (10.3)*		
Officer	Ranch Hand	334	37 (11.1)	1.31 (0.82,2.08)	0.258
	Comparison	483	42 (8.7)		
Enlisted Flyer	Ranch Hand	149	25 (16.8)	1.48 (0.79,2.74)	0.218
	Comparison	183	22 (12.0)		
Enlisted Groundcrew	Ranch Hand	376	35 (9.3)	0.83 (0.53,1.28)	0.396
	Comparison	562	62 (11.0)		

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Adjusted Relative Risk (95% C.I.)	p-Value
All	*1.05 (0.77,1.42)*	*0.761*
Officer	1.27 (0.77,2.09)	0.353
Enlisted Flyer	1.48 (0.75,2.92)	0.260
Enlisted Groundcrew	0.75 (0.47,1.21)	0.242

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
Initial Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[b]	p-Value
Low	155	16 (10.3)	0.96 (0.77,1.19)	0.703
Medium	161	22 (13.7)		
High	160	17 (10.6)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

	Analysis Results for Log_2 (Initial Dioxin)	
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
457	1.06 (0.79,1.41)	0.718

[a] Relative risk for a twofold increase in initial dioxin.

Table 14-29. Analysis of Peripheral Pulses (Continued)

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)[ab]	p-Value
Comparison	1,191	125 (10.5)		
Background RH	376	40 (10.6)	0.95 (0.65,1.39)	0.797
Low RH	233	30 (12.9)	1.27 (0.83,1.95)	0.266
High RH	243	25 (10.3)	1.04 (0.66,1.63)	0.880
Low plus High RH	476	55 (11.6)	1.15 (0.82,1.61)	0.431

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,151		
Background RH	360	1.00 (0.66,1.52)	0.997
Low RH	221	1.05 (0.65,1.70)	0.833
High RH	236	0.94 (0.57,1.57)	0.828
Low plus High RH	457	1.00 (0.68,1.45)	0.981

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log_2 (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	284	31 (10.9)	1.00 (0.86,1.15)	0.972
Medium	281	32 (11.4)		
High	287	32 (11.1)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

Table 14-29. Analysis of Peripheral Pulses (Continued)

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

	Analysis Results for Log$_2$ (1987 Dioxin + 1)	
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
817	1.07 (0.88,1.30)	0.485

[a] Relative risk for a twofold increase in 1987 dioxin.

14.2.2.3.10   ICVI Index

The analysis of ICVI index did not show any significant associations with dioxin (Table 14-30(a–h): p>0.11 for each analysis).

Table 14-30. Analysis of ICVI Index

(a) MODEL 1: RANCH HANDS VS. COMPARISONS – UNADJUSTED

Occupational Category	Group	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)	p-Value
All	*Ranch Hand*	*858*	*33 (3.8)*	*1.06 (0.67,1.67)*	*0.819*
	Comparison	*1,232*	*45 (3.7)*		
Officer	Ranch Hand	334	13 (3.9)	1.27 (0.59,2.70)	0.541
	Comparison	484	15 (3.1)		
Enlisted Flyer	Ranch Hand	149	7 (4.7)	0.71 (0.27,1.86)	0.492
	Comparison	186	12 (6.5)		
Enlisted Groundcrew	Ranch Hand	375	13 (3.5)	1.09 (0.53,2.24)	0.825
	Comparison	562	18 (3.2)		

(b) MODEL 1: RANCH HANDS VS. COMPARISONS – ADJUSTED

Occupational Category	Adjusted Relative Risk (95% C.I.)	p-Value
All	*0.99 (0.61,1.60)*	*0.958*
Officer	1.25 (0.57,2.70)	0.577
Enlisted Flyer	0.50 (0.17,1.51)	0.218
Enlisted Groundcrew	1.12 (0.53,2.39)	0.764

(c) MODEL 2: RANCH HANDS – INITIAL DIOXIN – UNADJUSTED

Initial Dioxin Category Summary Statistics			Analysis Results for Log$_2$ (Initial Dioxin)[a]	
Initial Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[b]	p-Value
Low	155	6 (3.9)	0.99 (0.71,1.37)	0.948
Medium	161	10 (6.2)		
High	160	7 (4.4)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Table 14-30. Analysis of ICVI Index (Continued)

(d) MODEL 2: RANCH HANDS – INITIAL DIOXIN – ADJUSTED

n	Analysis Results for $\log_2$ (Initial Dioxin) Adjusted Relative Risk (95% C.I.)[a]	p-Value
461	1.12 (0.73,1.72)	0.604

[a] Relative risk for a twofold increase in initial dioxin.

Note: Results are not adjusted for diabetic class because of the sparse number of Ranch Hands with an abnormal intermittent claudication and vascular insufficiency index.

(e) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – UNADJUSTED

Dioxin Category	n	Number (%) Abnormal	Est. Relative Risk (95% C.I.)[a,b]	p-Value
Comparison	1,195	43 (3.6)		
Background RH	375	9 (2.4)	0.65 (0.31,1.35)	0.249
Low RH	233	9 (3.9)	1.08 (0.52,2.24)	0.839
High RH	243	14 (5.8)	1.66 (0.89,3.09)	0.112
Low plus High RH	476	23 (4.8)	1.34 (0.79,2.27)	0.272

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

(f) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY – ADJUSTED

Dioxin Category	n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
Comparison	1,155		
Background RH	360	0.69 (0.32,1.48)	0.340
Low RH	221	0.98 (0.46,2.11)	0.968
High RH	236	1.41 (0.69,2.89)	0.346
Low plus High RH	457	1.19 (0.67,2.09)	0.555

[a] Relative risk and confidence interval relative to Comparisons.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Table 14-30. Analysis of ICVI Index (Continued)

(g) MODEL 4: RANCH HANDS – 1987 DIOXIN – UNADJUSTED

1987 Dioxin Category Summary Statistics			Analysis Results for Log$_2$ (1987 Dioxin + 1)	
1987 Dioxin	n	Number (%) Abnormal	Estimated Relative Risk (95% C.I.)[a]	p-Value
Low	283	8 (2.8)	1.08 (0.86,1.37)	0.503
Medium	281	9 (3.2)		
High	287	15 (5.2)		

[a] Relative risk for a twofold increase in 1987 dioxin.

Note: Low = ≤7.9 ppt; Medium = >7.9–19.6 ppt; High = >19.6 ppt.

(h) MODEL 4: RANCH HANDS – 1987 DIOXIN – ADJUSTED

	Analysis Results for Log$_2$ (1987 Dioxin + 1)	
n	Adjusted Relative Risk (95% C.I.)[a]	p-Value
817	1.07 (0.79,1.45)	0.666

[a] Relative risk for a twofold increase in 1987 dioxin.

14.2.3 Longitudinal Analysis

Cardiovascular longitudinal analyses were conducted on systolic blood pressure measurements taken at the 1982 and 1997 examinations and six pulse assessments made at the 1985 and 1997 examinations. Discrete and continuous analyses were performed for systolic blood pressure. The six pulse measurements included femoral pulses, popliteal pulses, dorsalis pedis pulses, posterior tibial pulses, leg pulses, and peripheral pulses. The 1985 and 1997 measurements were used for the pulse assessments because the Doppler assessment of pulses was conducted at these two examinations and was not conducted at the 1982 baseline or 1987 follow-up examinations.

Longitudinal analyses were conducted to examine whether changes across time differed with respect to group membership (Model 1), initial dioxin (Model 2), and categorized dioxin (Model 3). Model 4 was not examined in longitudinal analyses because 1987 dioxin, the measure of exposure in these models, changes over time and is not available for all participants for 1982 or 1997.

Participants considered abnormal in 1982 (or 1985 for Doppler pulse measurements) were not included in the longitudinal analysis of discrete dependent variables. The purpose of the longitudinal analysis was to examine the effects of dioxin exposure across time. Participants who were abnormal in 1982 (or 1988) were not considered to be at risk for developing the condition, because the condition already existed at the time of the first collection of data for the AFHS (1982). Only participants who were normal at the 1982 (or 1985) examination were considered to be at risk for developing the condition; therefore, the rate of abnormalities under this restriction approximates an incidence rate between 1982 (or 1985) and 1997. That is, an incidence rate is a measure of the rate at which people without a condition develop the condition during a specified period of time (53). Summary statistics are provided for reference purposes for the 1985, 1987, and 1992 examinations for systolic blood pressure and for the 1992 examination for the pulse measurements.

The longitudinal analysis for systolic blood pressure in its discrete form examined relative risks at the 1997 examination for participants who were classified as normal at the 1982 examination. The longitudinal analysis for the Doppler pulse measurements examined relative risks at the 1997 examination for participants who were classified as normal at the 1985 examination. The adjusted relative risks estimated from each of the three models were used to investigate the change in the dependent variable over time. All three models were adjusted for age; Models 2 and 3 also were adjusted for the percentage of body fat at the time of the blood measurement of dioxin.

The longitudinal analysis for the systolic blood pressure in its continuous form examined the paired difference between the measurements from 1982 and 1997. These paired differences measured the change in systolic blood pressure over time. Each of the three models used in the longitudinal analysis was adjusted for age and systolic blood pressure as measured in 1982 (see Chapter 7, Statistical Methods).

14.2.3.1 Physical Examination Variables

14.2.3.1.1   Systolic Blood Pressure (Continuous)

The Model 1 analysis of change in mean systolic blood pressure revealed a marginally significant difference between overall Ranch Hands and Comparisons (Table 14-31(a): difference of examination mean change=−1.6 mm Hg, p=0.066). The Ranch Hand mean decreased by 6.3 mm Hg between 1982 and 1997, and the Comparison mean decreased by 4.7 mm Hg. Stratifying by occupation showed a marginally significant group difference in the enlisted groundcrew stratum (Table 14-31(a): difference of examination mean change=−2.2 mm Hg, p=0.079). For the enlisted groundcrew, the Ranch Hand mean decreased by 7.4 mm Hg between 1982 and 1997, and the Comparison mean decreased by 5.2 mm Hg.

Table 14-31. Longitudinal Analysis of Systolic Blood Pressure (mm Hg) (Continuous)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS

Occupational Category	Group	Mean[a]/(n) Examination 1982	1985	1987	1992	1997	Exam. Mean Change[b]	Difference of Exam. Mean Change	p-Value[c]
All	*Ranch Hand*	*131.1* *(808)*	*117.8* *(790)*	*125.9* *(782)*	*120.4* *(785)*	*124.8* *(808)*	*−6.3*	*−1.6*	*0.066*
	Comparison	*130.7* *(959)*	*118.9* *(940)*	*126.4* *(935)*	*121.3* *(939)*	*126.0* *(959)*	*−4.7*		
Officer	Ranch Hand	131.8 (305)	118.8 (301)	126.5 (298)	122.6 (300)	126.1 (305)	−5.6	−0.3	0.840
	Comparison	131.3 (372)	118.8 (365)	126.3 (360)	121.8 (367)	126.1 (372)	−5.3		
Enlisted Flyer	Ranch Hand	131.8 (146)	118.4 (143)	127.2 (141)	120.6 (142)	126.7 (146)	−5.1	−3.8	0.135
	Comparison	130.2 (144)	118.9 (143)	125.9 (142)	121.2 (142)	128.9 (144)	−1.3		
Enlisted Groundcrew	Ranch Hand	130.3 (357)	116.8 (346)	124.8 (343)	118.4 (343)	122.9 (357)	−7.4	−2.2	0.079
	Comparison	130.3 (443)	119.0 (432)	126.7 (433)	120.9 (430)	125.1 (443)	−5.2		

[a] Transformed from natural logarithm scale.
[b] Difference between 1997 and 1982 examination means after transformation to original scale.
[c] P-value is based on analysis of natural logarithm of systolic blood pressure; results adjusted for natural logarithm of systolic blood pressure in 1982 and age in 1997.

Note: Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations.

Table 14-31. Longitudinal Analysis of Systolic Blood Pressure (mm Hg) (Continuous) (Continued)

(b) MODEL 2: RANCH HANDS – INITIAL DIOXIN

	Initial Dioxin Category Summary Statistics					Analysis Results for Log_2 (Initial Dioxin)[b]	
	Mean[a]/(n) Examination					Adjusted Slope	
Initial Dioxin	1982	1985	1987	1992	1997	(Std. Error)	p-Value
Low	132.2 (149)	118.4 (146)	127.1 (148)	120.5 (144)	125.9 (149)	0.000 (0.005)	0.977
Medium	132.8 (158)	119.7 (155)	126.4 (155)	122.9 (155)	125.5 (158)		
High	131.2 (153)	119.1 (150)	127.4 (148)	121.1 (150)	124.1 (153)		

[a] Transformed from natural logarithm scale.

[b] Results based on difference between natural logarithm of 1997 systolic blood pressure and natural logarithm of 1982 systolic blood pressure versus log_2 (initial dioxin); results adjusted for percent body fat at the date of the blood measurement of dioxin, natural logarithm of 1982 systolic blood pressure, and age in 1997.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations.

Table 14-31. Longitudinal Analysis of Systolic Blood Pressure (mm Hg) (Continuous) (Continued)

(c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY

Dioxin Category	Mean[a]/(n) Examination					Exam. Mean Change[b]	Difference of Exam. Mean Change	p-Value[c]
	1982	1985	1987	1992	1997			
Comparison	130.6 (932)	118.7 (916)	126.2 (910)	121.1 (913)	126.0 (932)	−4.7		
Background RH	129.8 (342)	116.2 (334)	124.4 (326)	119.0 (331)	124.4 (342)	−5.3	−0.6	0.386
Low RH	132.0 (224)	118.7 (218)	126.8 (221)	120.9 (217)	126.0 (224)	−6.0	−1.3	0.347
High RH	132.1 (236)	119.5 (233)	127.2 (230)	122.0 (232)	124.4 (236)	−7.8	−3.1	0.086
Low plus High RH	132.1 (460)	119.1 (451)	127.0 (451)	121.5 (449)	125.2 (460)	−6.9	−2.2	0.083

[a] Transformed from natural logarithm scale.
[b] Difference between 1997 and 1982 examination means after transformation to original scale.
[c] P-value is based on analysis of natural logarithm of 1997 systolic blood pressure; results adjusted for percent body fat at the date of the blood measurement of dioxin, natural logarithm of 1982 systolic blood pressure, and age in 1997.

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin > 10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin > 10 ppt, Initial Dioxin > 94 ppt.

Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations.

The longitudinal analysis in Model 2 did not reveal a significant association between the change in mean systolic blood pressure and dioxin (Table 14-31(b): p=0.977).

The Model 3 analysis of the change in mean systolic blood pressure levels between 1982 and 1997 revealed two marginally significant contrasts: Ranch Hands in the high dioxin category versus Comparisons (Table 14-31(c): difference of examination mean change=−3.1 mm Hg, p=0.086) and Ranch Hands in the low plus high dioxin category versus Comparisons (Table 14-31(c): difference of examination mean change=−2.2 mm Hg, p=0.083). The change in means between 1982 and 1997 for Ranch Hands in the high dioxin category, Ranch Hands in the low plus high dioxin category, and Comparisons was −7.8 mm Hg, −6.9 mm Hg, and −4.7 mm Hg, respectively.

14.2.3.1.2   Systolic Blood Pressure (Discrete)

The longitudinal analysis in Models 1 through 3 did not reveal a significant association between dioxin and change in systolic blood pressure in its discrete form (Table 14-32(a–c): p>0.45 for each analysis).

Table 14-32. Longitudinal Analysis of Systolic Blood Pressure (Discrete)

(a) MODEL 1: RANCH HANDS VS. COMPARISONS

Occupational Category	Group	Number (%) High/(n) Examination				
		1982	1985	1987	1992	1997
All	*Ranch Hand*	*141 (17.5) (808)*	*42 (5.3) (790)*	*146 (18.7) (782)*	*119 (15.2) (785)*	*169 (20.9) (808)*
	Comparison	*187 (19.5) (959)*	*65 (6.9) (940)*	*205 (21.9) (935)*	*146 (15.5) (939)*	*215 (22.4) (959)*
Officer	Ranch Hand	60 (19.7) (305)	20 (6.6) (301)	59 (19.8) (298)	51 (17.0) (300)	73 (23.9) (305)
	Comparison	75 (20.2) (372)	25 (6.8) (365)	81 (22.5) (360)	65 (17.7) (367)	90 (24.2) (372)
Enlisted Flyer	Ranch Hand	28 (19.2) (146)	5 (3.5) (143)	29 (20.6) (141)	23 (16.2) (142)	35 (24.0) (146)
	Comparison	27 (18.8) (144)	11 (7.7) (143)	31 (21.8) (142)	20 (14.1) (142)	38 (26.4) (144)
Enlisted Groundcrew	Ranch Hand	53 (14.8) (357)	17 (4.9) (346)	58 (16.9) (343)	45 (13.1) (343)	61 (17.1) (357)
	Comparison	85 (19.2) (443)	29 (6.7) (432)	93 (21.5) (433)	61 (14.2) (430)	87 (19.6) (443)

Occupational Category	Group	Normal in 1982			
		n in 1997	Number (%) High in 1997	Adj. Relative Risk (95% C.I.)[a]	p-Value[a]
All	*Ranch Hand*	*667*	*111 (16.6)*	*0.99 (0.75,1.31)*	*0.951*
	Comparison	*772*	*130 (16.8)*		
Officer	Ranch Hand	245	48 (19.6)	1.18 (0.76,1.84)	0.454
	Comparison	297	50 (16.8)		
Enlisted Flyer	Ranch Hand	118	23 (19.5)	0.90 (0.47,1.71)	0.743
	Comparison	117	25 (21.4)		
Enlisted Groundcrew	Ranch Hand	304	40 (13.2)	0.86 (0.55,1.35)	0.513
	Comparison	358	55 (15.4)		

[a] Relative risk, confidence interval, and p-values are in reference to a contrast of 1982 and 1997 results; results adjusted for age in 1997.

Note: Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations. Statistical analyses are based only on participants who had normal systolic blood pressure in 1982 (see Chapter 7, Statistical Methods).

(b) MODEL 2: RANCH HANDS — INITIAL DIOXIN

Initial Dioxin	Number (%) High/(n) Examination				
	1982	1985	1987	1992	1997
Low	32 (21.5) (149)	6 (4.1) (146)	33 (22.3) (148)	24 (16.7) (144)	37 (24.8) (149)
Medium	32 (20.3) (158)	8 (5.2) (155)	28 (18.1) (155)	28 (18.1) (155)	34 (21.5) (158)
High	22 (14.4) (153)	11 (7.3) (150)	30 (20.3) (148)	25 (16.7) (150)	28 (18.3) (153)

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
	Normal in 1982			
Initial Dioxin	n in 1997	Number (%) High in 1997	Adj. Relative Risk (95% C.I.)[b]	p-Value
Low	117	22 (18.8)	0.96 (0.78,1.19)	0.714
Medium	126	23 (18.3)		
High	131	20 (15.3)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin and age in 1997.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations. Statistical analyses are based only on participants who had normal systolic blood pressure in 1982 (see Chapter 7, Statistical Methods).

(c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY

Dioxin Category	Number (%) High/(n) Examination				
	1982	1985	1987	1992	1997
Comparison	180 (19.3) (932)	60 (6.6) (916)	194 (21.3) (910)	140 (15.3) (913)	207 (22.2) (932)
Background RH	54 (15.8) (342)	17 (5.1) (334)	54 (16.6) (326)	42 (12.7) (331)	69 (20.2) (342)
Low RH	43 (19.2) (224)	8 (3.7) (218)	44 (19.9) (221)	35 (16.1) (217)	54 (24.1) (224)
High RH	43 (18.2) (236)	17 (7.3) (233)	47 (20.4) (230)	42 (18.1) (232)	45 (19.1) (236)
Low plus High RH	86 (18.7) (460)	25 (5.5) (451)	91 (20.2) (451)	77 (17.1) (449)	99 (21.5) (460)

Table 14-32. Longitudinal Analysis of Systolic Blood Pressure (Discrete) (Continued)

Dioxin Category	n in 1997	Normal in 1982 Number (%) High in 1997	Adj. Relative Risk (95% C.I.)[a,b]	p-Value[b]
Comparison	752	127 (16.9)		
Background RH	288	45 (15.6)	0.96 (0.66,1.41)	0.840
Low RH	181	34 (18.8)	1.01 (0.65,1.55)	0.978
High RH	193	31 (16.1)	1.01 (0.65,1.57)	0.965
Low plus High RH	374	65 (17.4)	1.01 (0.72,1.41)	0.963

[a] Relative risk and confidence interval relative to Comparisons.
[b] Adjusted for percent body fat at the time of the blood measurement of dioxin and age in 1997

Note: RH = Ranch Hand.
Comparison: 1987 Dioxin ≤ 10 ppt.
Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
Low (Ranch Hand): 1987 Dioxin >10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
High (Ranch Hand): 1987 Dioxin >10 ppt, Initial Dioxin > 94 ppt.

Summary statistics for 1985 are provided for reference purposes for participants who attended the 1982, 1985, and 1997 examinations. Summary statistics for 1987 are provided for reference purposes for participants who attended the 1982, 1987, and 1997 examinations. Summary statistics for 1992 are provided for reference purposes for participants who attended the 1982, 1992, and 1997 examinations. Statistical analyses are based only on participants who had normal systolic blood pressure in 1982 (see Chapter 7, Statistical Methods).

14.2.3.1.3   Femoral Pulses

The Model 1 analysis of the change in percentage of abnormal femoral pulses did not reveal a significant difference between Ranch Hands and Comparisons overall (Table 14-33(a): p=0.118). Stratifying by occupation showed a marginally significant group difference in the enlisted groundcrew stratum (Table 14-33(a): Adj. RR=3.19, p=0.095). For enlisted groundcrew, 1.9 percent of the Ranch Hands and 0.6 percent of the Comparisons had normal femoral pulses in 1985 and abnormal femoral pulses in 1997.

The Model 2 longitudinal analysis revealed no significant association between dioxin and the percentage of participants with normal femoral pulses in 1985 and abnormal femoral pulses in 1997 (Table 14-33(b): p=0.972).

Table 14-33. Longitudinal Analysis of Femoral Pulses

(a) MODEL 1: RANCH HANDS VS. COMPARISONS

| Occupational Category | Group | Number (%) Abnormal/(n) Examination | | |
		1985	1992	1997
All	*Ranch Hand*	*0 (0.0)*	*6 (0.7)*	*19 (2.3)*
		(823)	*(802)*	*(823)*
	Comparison	*0 (0.0)*	*6 (0.6)*	*14 (1.3)*
		(1,047)	*(1,020)*	*(1,047)*
Officer	Ranch Hand	0 (0.0)	4 (1.3)	7 (2.2)
		(318)	(313)	(318)
	Comparison	0 (0.0)	2 (0.5)	8 (1.9)
		(412)	(405)	(412)
Enlisted Flyer	Ranch Hand	0 (0.0)	0 (0.0)	5 (3.4)
		(145)	(143)	(145)
	Comparison	0 (0.0)	2 (1.3)	3 (1.9)
		(158)	(156)	(158)
Enlisted Groundcrew	Ranch Hand	0 (0.0)	2 (0.6)	7 (1.9)
		(360)	(346)	(360)
	Comparison	0 (0.0)	2 (0.4)	3 (0.6)
		(477)	(459)	(477)

| Occupational Category | Group | Normal in 1985 | | Adj. Relative Risk (95% C.I.)[a] | p-Value[a] |
		n in 1997	Number (%) Abnormal in 1997		
All	*Ranch Hand*	*823*	*19 (2.3)*	*1.74 (0.86,3.49)*	*0.118*
	Comparison	*1,047*	*14 (1.3)*		
Officer	Ranch Hand	318	7 (2.2)	1.12 (0.40,3.13)	0.824
	Comparison	412	8 (1.9)		
Enlisted Flyer	Ranch Hand	145	5 (3.4)	1.82 (0.43,7.77)	0.419
	Comparison	158	3 (1.9)		
Enlisted Groundcrew	Ranch Hand	360	7 (1.9)	3.19 (0.82,12.42)	0.095
	Comparison	477	3 (0.6)		

[a] Relative risk, confidence interval, and p-values are in reference to a contrast of 1985 and 1997 results; results adjusted for age in 1997.

Note: Summary statistics for 1992 are provided for reference purposes for participants who attended the 1985 and 1997 examinations. Statistical analyses are based only on participants who had normal femoral pulses in 1985 (see Chapter 7, Statistical Methods).

Table 14-33. Longitudinal Analysis of Femoral Pulses (Continued)

(b) MODEL 2: RANCH HANDS — INITIAL DIOXIN

	Number (%) Abnormal/(n) Examination		
Initial Dioxin	1985	1992	1997
Low	0 (0.0) (149)	3 (2.1) (144)	3 (2.0) (149)
Medium	0 (0.0) (158)	1 (0.6) (155)	5 (3.2) (158)
High	0 (0.0) (155)	0 (0.0) (151)	4 (2.6) (155)

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
	Normal in 1985			
Initial Dioxin	n in 1997	Number (%) Abnormal in 1997	Adj. Relative Risk (95% C.I.)[b]	p-Value
Low	149	3 (2.0)	1.01 (0.63,1.61)	0.972
Medium	158	5 (3.2)		
High	155	4 (2.6)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin and age in 1997.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Summary statistics for 1992 are provided for reference purposes for participants who attended the 1985 and 1997 examinations. Statistical analyses are based only on participants who had normal femoral pulses in 1985 (see Chapter 7, Statistical Methods).

(c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY

	Number (%) Abnormal/(n) Examination		
Dioxin Category	1985	1992	1997
Comparison	0 (0.0) (1,019)	6 (0.6) (994)	14 (1.4) (1,019)
Background RH	0 (0.0) (355)	2 (0.6) (346)	7 (2.0) (355)
Low RH	0 (0.0) (224)	4 (1.8) (217)	6 (2.7) (224)
High RH	0 (0.0) (238)	0 (0.0) (233)	6 (2.5) (238)
Low plus High RH	0 (0.0) (462)	4 (0.9) (450)	12 (2.6) (462)

Table 14-33. Longitudinal Analysis of Femoral Pulses (Continued)

Dioxin Category	n in 1997	Number (%) Abnormal in 1997	Adj. Relative Risk (95% C.I.)[a,b]	p-Value[b]
		Normal in 1985		
Comparison	1,019	14 (1.4)		
Background RH	355	7 (2.0)	1.28 (0.51,3.21)	0.602
Low RH	224	6 (2.7)	1.88 (0.71,4.98)	0.202
High RH	238	6 (2.5)	2.34 (0.87,6.25)	0.091
Low plus High RH	462	12 (2.6)	2.10 (0.96,4.62)	0.063

[a] Relative risk and confidence interval relative to Comparisons.

[b] Adjusted for percent body fat at the time of the blood measurement of dioxin and age in 1997.

Note: RH = Ranch Hand.
  Comparison: 1987 Dioxin ≤ 10 ppt.
  Background (Ranch Hand): 1987 Dioxin ≤ 10 ppt.
  Low (Ranch Hand): 1987 Dioxin >10 ppt, 10 ppt < Initial Dioxin ≤ 94 ppt.
  High (Ranch Hand): 1987 Dioxin >10 ppt, Initial Dioxin > 94 ppt.

  Summary statistics for 1992 are provided for reference purposes for participants who attended the 1985 and 1997 examinations. Statistical analyses are based only on participants who had normal femoral pulses in 1985 (see Chapter 7, Statistical Methods).

Model 3 analysis of the change in femoral pulses from normal in 1985 to abnormal in 1997 revealed two marginally significant contrasts: Ranch Hands in the high dioxin category versus Comparisons (Table 14-33(c): Adj. RR=2.34, p=0.091) and Ranch Hands in the low plus high dioxin category versus Comparisons (Table 14-33(c): Adj. RR=2.10, p=0.063). Of the Comparisons, 1.4 percent had normal femoral pulses in 1985 and abnormal femoral pulses in 1997. Of the Ranch Hands, 2.5 percent in the high dioxin category and 2.6 percent in the low plus high dioxin category had normal femoral pulses in 1985 and abnormal femoral pulses in 1997.

14.2.3.1.4 Popliteal Pulses

Analyses of Models 1 through 3 showed no significant associations between dioxin and the change in popliteal pulses between 1985 and 1997 (Table 14-34(a–c): p>0.19 for each analysis).

Table 14-34. Longitudinal Analysis of Popliteal Pulses

Occupational Category	Group	Number (%) Abnormal/(n) Examination		
		1985	1992	1997
All	*Ranch Hand*	*2 (0.2)*	*10 (1.2)*	*23 (2.8)*
		(823)	*(802)*	*(823)*
	Comparison	*1 (0.1)*	*7 (0.7)*	*24 (2.3)*
		(1,046)	*(1,019)*	*(1,046)*
Officer	Ranch Hand	1 (0.3)	6 (1.9)	7 (2.2)
		(318)	(313)	(318)
	Comparison	0 (0.0)	4 (1.0)	11 (2.7)
		(411)	(404)	(411)
Enlisted Flyer	Ranch Hand	0 (0.0)	2 (1.4)	5 (3.4)
		(145)	(143)	(145)
	Comparison	1 (0.6)	2 (1.3)	3 (1.9)
		(158)	(156)	(158)
Enlisted Groundcrew	Ranch Hand	1 (0.3)	2 (0.6)	11 (3.1)
		(360)	(346)	(360)
	Comparison	0 (0.0)	1 (0.2)	10 (2.1)
		(477)	(459)	(477)

Occupational Category	Group	Normal in 1985			
		n in 1997	Number (%) Abnormal in 1997	Adj. Relative Risk (95% C.I.)[a]	p-Value[a]
All	*Ranch Hand*	*821*	*22 (2.7)*	*1.22 (0.67,2.21)*	*0.518*
	Comparison	*1,045*	*23 (2.2)*		
Officer	Ranch Hand	317	7 (2.2)	0.81 (0.31,2.13)	0.672
	Comparison	411	11 (2.7)		
Enlisted Flyer	Ranch Hand	145	5 (3.4)	2.67 (0.51,14.07)	0.246
	Comparison	157	2 (1.3)		
Enlisted Groundcrew	Ranch Hand	359	10 (2.8)	1.39 (0.57,3.40)	0.473
	Comparison	477	10 (2.1)		

[a] Relative risk, confidence interval, and p-values are in reference to a contrast of 1985 and 1997 results; results adjusted for age in 1997.

Note: Summary statistics for 1992 are provided for reference purposes for participants who attended the 1985 and 1997 examinations. Statistical analyses are based only on participants who had normal popliteal pulses in 1985 (see Chapter 7, Statistical Methods).

Table 14-34. Longitudinal Analysis of Popliteal Pulses (Continued)

(b) MODEL 2: RANCH HANDS — INITIAL DIOXIN

Initial Dioxin	Number (%) Abnormal/(n) Examination		
	1985	1992	1997
Low	0 (0.0)	3 (2.1)	4 (2.7)
	(149)	(144)	(149)
Medium	0 (0.0)	2 (1.3)	6 (3.8)
	(158)	(155)	(158)
High	0 (0.0)	2 (1.3)	4 (2.6)
	(155)	(151)	(155)

Initial Dioxin Category Summary Statistics			Analysis Results for Log_2 (Initial Dioxin)[a]	
	Normal in 1985			
Initial Dioxin	n in 1997	Number (%) Abnormal in 1997	Adj. Relative Risk (95% C.I.)[b]	p-Value
Low	149	4 (2.7)	0.95 (0.61,1.49)	0.838
Medium	158	6 (3.8)		
High	155	4 (2.6)		

[a] Adjusted for percent body fat at the time of the blood measurement of dioxin and age in 1997.
[b] Relative risk for a twofold increase in initial dioxin.

Note: Low = 27–63 ppt; Medium = >63–152 ppt; High = >152 ppt.

Summary statistics for 1992 are provided for reference purposes for participants who attended the 1985 and 1997 examinations. Statistical analyses are based only on participants who had normal popliteal pulses in 1985 (see Chapter 7, Statistical Methods).

(c) MODEL 3: RANCH HANDS AND COMPARISONS BY DIOXIN CATEGORY

Dioxin Category	Number (%) Abnormal/(n) Examination		
	1985	1992	1997
Comparison	1 (0.1)	7 (0.7)	24 (2.4)
	(1,018)	(993)	(1,018)
Background RH	2 (0.6)	3 (0.9)	9 (2.5)
	(355)	(346)	(355)
Low RH	0 (0.0)	4 (1.8)	7 (3.1)
	(224)	(217)	(224)
High RH	0 (0.0)	3 (1.3)	7 (2.9)
	(238)	(233)	(238)
Low plus High RH	0 (0.0)	7 (1.6)	14 (3.0)
	(462)	(450)	(462)