TABLE 13-9. (Continued)

Analysis of Hematocrit (Percent) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	783	45.208	All Categories		0.428
Unknown	345	45.132	Unknown vs. Background	-0.075 (-0.460,0.309)	0.700
Low	195	45.336	Low vs. Background	0.128 (-0.347,0.604)	0.597
High	187	45.559	High vs. Background	0.351 (-0.132,0.835)	0.155
Total	1,510		(R^2=0.002)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	783	44.965**	All Categories		0.573**	DXCAT*AGE (p=0.025)
Unknown	345	44.792**	Unknown vs. Background	-0.173 (-0.539,0.193)**	0.355**	RACE (p=0.051)
Low	195	45.001**	Low vs. Background	0.035 (-0.417,0.488)**	0.878**	CSMOK
High	187	45.153**	High vs. Background	0.188 (-0.277,0.654)**	0.428**	(p<0.001)
Total	1,510		(R^2=0.106)			

**Categorized current dioxin-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, confidence interval, and p-value derived from a model fitted after deletion of this interaction.

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.
DXCAT: Categorized current dioxin.

In the adjusted analysis, there was a significant interaction between categorized current dioxin and age (Table 13-9 [j]: p=0.025). To explore this interaction, age was divided into two categories: those participants born in or after 1942, and those born prior to 1942. The overall contrast in the younger age stratum showed a marginally significant difference in hematocrit percentage means among the four current dioxin categories (Appendix Table L-1: p=0.091). The means for the background, unknown, low, and high current dioxin categories were 45.044, 44.882, 44.516, and 45.536 percent. In the older age stratum, the test of the overall contrast was not significant (p=0.268).

After the categorized current dioxin-by-age interaction was removed from the adjusted model, the overall contrast was nonsignificant (Table 13-9 [j]: p=0.573).

Hematocrit (Discrete)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

There was no significant association exhibited between abnormally low hematocrit and initial dioxin in the unadjusted analysis under either the minimal or maximal assumption (Table 13-10 [a] and [b]: p=0.943 and p=0.611). After the model was adjusted for covariates, the association remained nonsignificant for both cohorts (Table 13-10 [c] and [d]: p=0.910 and p=0.556).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

Under both the minimal and maximal assumptions, the interaction between current dioxin and time since tour was not significant for the unadjusted analysis of hematocrit in its discrete form (Table 13-10 [e] and [f]: p=0.330 and p=0.277, respectively). For the adjusted analysis, the interaction remained nonsignificant under both assumptions (Table 13-10 [g] and [h]: p=0.358 and p=0.300, respectively).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The overall contrast in the unadjusted analysis showed no significant association between an abnormally low hematocrit percentage and the four current dioxin categories (Table 13-10 [i]: p=0.634). After adjusting the model for covariates, the association remained nonsignificant (Table 13-10 [j]: p=0.774).

Mean Corpuscular Volume (Continuous)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

MCV was not significantly associated with initial dioxin either under the minimal or under the maximal assumption in the unadjusted analysis (Table 13-11 [a] and [b]: p=0.730 and p=0.737, respectively).

In the adjusted analysis of the minimal cohort, there was a significant interaction between initial dioxin and lifetime cigarette smoking history (Table 13-11 [c]: p=0.045). To examine this interaction, lifetime cigarette smoking history was divided into three strata: Ranch Hands who never smoked, Ranch Hands whose pack-years did not exceed 10, and Ranch Hands with more than 10 pack-years. The association between MCV and initial

TABLE 13-10.

Analysis of Hematocrit (Discrete)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Percent Abnormal Low	Est. Relative Risk (95% C.I.)[a]	p-Value
a) Minimal (n=520)	Low	130	1.5	0.98 (0.56,1.70)	0.943
	Medium	259	1.9		
	High	131	1.5		
b) Maximal (n=741)	Low	185	0.5	1.11 (0.74,1.68)	0.611
	Medium	370	2.2		
	High	186	1.1		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
c) Minimal (n=520)	1.03 (0.59,1.82)	0.910	RACE (p=0.108)
d) Maximal (n=741)	1.14 (0.75,1.73)	0.556	RACE (p=0.122) CSMOK (p=0.113)

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

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-10. (Continued)

Analysis of Hematocrit
(Discrete)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Percent Abnormal Low/(n) Current Dioxin Low	Medium	High	Est. Relative Risk (95% C.I.)[a]	p-Value
e) Minimal (n=520)						0.330[b]
	≤18.6	1.4 (72)	0.0 (128)	0.0 (54)	0.15 (0.00,17.41)	0.431[c]
	>18.6	1.7 (58)	3.8 (131)	2.6 (77)	0.87 (0.48,1.58)	0.643[c]
f) Maximal (n=741)						0.277[b]
	≤18.6	0.9 (106)	0.5 (191)	0.0 (83)	0.46 (0.08,2.63)	0.383[c]
	>18.6	0.0 (79)	3.9 (178)	1.9 (104)	1.09 (0.70,1.69)	0.715[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
g) Minimal (n=520)			0.358[b]	AGE (p=0.129)
	≤18.6	0.14 (0.00,13.94)	0.402[c]	CSMOK (p=0.149)
	>18.6	0.72 (0.36,1.42)	0.343[c]	
h) Maximal (n=741)			0.300[b]	RACE (p=0.145)
	≤18.6	0.47 (0.08,2.76)	0.403[c]	CSMOK (p=0.124)
	>18.6	1.09 (0.69,1.72)	0.720[c]	

[a]Relative risk for a twofold increase in dioxin.
[b]Test of significance for homogeneity of relative risks (current dioxin continuous, time categorized).
[c]Test of significance for relative risk equal to 1 (current dioxin continuous, time categorized).
Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-10. (Continued)

Analysis of Hematocrit
(Discrete)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Percent Abnormal Low	Contrast	Est. Relative Risk (95% C.I.)	p-Value
Background	783	2.0	All Categories		0.634
Unknown	345	1.5	Unknown vs. Background	0.70 (0.26,1.94)	0.498
Low	195	2.6	Low vs. Background	1.26 (0.46,3.49)	0.654
High	187	1.1	High vs. Background	0.52 (0.12,2.27)	0.384
Total	1,510				

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Contrast	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks
Background	783	All Categories		0.774	AGE (p=0.100) RACE (p=0.013)
Unknown	345	Unknown vs. Background	0.75 (0.27,2.06)	0.571	
Low	195	Low vs. Background	1.27 (0.46,3.53)	0.649	
High	187	High vs. Background	0.62 (0.14,2.76)	0.531	
Total	1,510				

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

TABLE 13-11.

Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Mean	Slope (Std. Error)[a]	p-Value
a) Minimal (n=520) (R^2<0.001)	Low	130	91.465	0.0621 (0.1799)	0.730
	Medium	259	91.308		
	High	131	91.702		
b) Maximal (n=741) (R^2<0.001)	Low	185	91.712	-0.0424 (0.1261)	0.737
	Medium	370	91.446		
	High	186	91.559		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Initial Dioxin	n	Adj. Mean	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
c) Minimal (n=520) (R^2=0.105)	Low	130	89.966**	0.1630 (0.1789)**	0.363**	INIT*PACKYR (p=0.045) CSMOK (p<0.001) AGE*RACE (p=0.020)
	Medium	259	89.901**			
	High	131	90.518**			
d) Maximal (n=741) (R^2=0.087)	Low	185	89.854	0.0303 (0.1240)	0.807	CSMOK (p<0.001) AGE*RACE (p=0.028)
	Medium	370	89.601			
	High	186	90.012			

[a]Slope and standard error based on mean corpuscular volume versus log_2 dioxin.

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, adjusted slope, standard error, and p-value derived from a model fitted after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-11. (Continued)

Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
e) Minimal						0.527[b]
(n=520)	≤18.6	91.050	91.099	91.550	0.1380 (0.2930)	0.638[c]
(R^2=0.004)		(72)	(128)	(54)		
	>18.6	92.197	91.661	91.391	-0.1019 (0.2397)	0.671[c]
		(58)	(131)	(77)		
f) Maximal						0.564[b]
(n=741)	≤18.6	91.491	91.119	91.249	-0.0098 (0.1956)	0.960[c]
(R^2=0.005)		(106)	(191)	(83)		
	>18.6	92.429	91.855	91.386	-0.1606 (0.1730)	0.354[c]
		(79)	(178)	(104)		

Ranch Hands - Log2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Mean/(n) Current Dioxin Low	Medium	High	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
g) Minimal						0.538[b]	CSMOK (p<0.001)
(n=520)	≤18.6	89.665	89.681	90.490	0.2740 (0.2911)	0.347[c]	AGE*RACE
(R^2=0.099)		(72)	(128)	(54)			(p=0.017)
	>18.6	90.299	90.250	90.148	0.0509 (0.2364)	0.830[c]	
		(58)	(131)	(77)			
h) Maximal						0.781[b]	CSMOK (p<0.001)
(n=741)	≤18.6	89.739	89.339	89.685	0.0495 (0.1921)	0.797[c]	AGE*RACE
(R^2=0.089)		(106)	(191)	(83)			(p=0.025)
	>18.6	90.209	89.937	89.770	-0.0204 (0.1702)	0.905[c]	
		(79)	(178)	(104)			

[a]Slope and standard error based on mean corpuscular volume versus log_2 dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope different from 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-11. (Continued)

Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	783	91.276	All Categories		0.277
Unknown	345	91.871	Unknown vs. Background	0.594 (-0.017,1.206)	0.057
Low	195	91.559	Low vs. Background	0.283 (-0.474,1.040)	0.463
High	187	91.325	High vs. Background	0.049 (-0.721,0.819)	0.901
Total	1,510		(R^2=0.003)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	783	89.621	All Categories		0.653	RACE (p<0.001)
Unknown	345	89.966	Unknown vs. Background	0.345 (-0.233,0.923)	0.242	AGE*CSMOK (p=0.015)
Low	195	89.814	Low vs. Background	0.194 (-0.519,0.907)	0.595	AGE*PACKYR (p=0.018)
High	187	89.898	High vs. Background	0.277 (-0.457,1.011)	0.460	CSMOK*PACKYR (p=0.003)
Total	1,510		(R^2=0.120)			

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

dioxin was nonsignificant in all three strata (Appendix Table L-1: 0 pack-years: p=0.795; >0-10 pack-years: p=0.412; >10 pack-years: p=0.268). However, the association was negative for those who never smoked (slope=-0.0831) and was positive for those who smoked (>0-10 pack-years: slope=0.2841; >10 pack-years: slope=0.2888). When this interaction was removed from the adjusted minimal analysis, the association between MCV and initial dioxin remained nonsignificant (Table 13-11 [c]: p=0.363). The association also remained nonsignificant for the adjusted maximal analysis (Table 13-11 [d]: p=0.807).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

In the unadjusted analysis of MCV, the current dioxin-by-time since tour interaction was not significant for both the minimal and the maximal cohorts (Table 13-11 [e] and [f]: p=0.527 and p=0.564). After adjusting for current cigarette smoking and an age-by-race interaction, the current dioxin-by-time since tour interaction remained nonsignificant for both cohorts (Table 13-11 [g] and [h]: p=0.538 and p=0.781, respectively).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The test for the overall contrast of the four current dioxin categories was not significant in the unadjusted analysis of MCV (Table 13-11 [i]: p=0.277). However, the mean MCV for the unknown category was marginally higher than the mean MCV for the background category (p=0.057). The MCV means for the background, unknown, low, and high categories were 91.276, 91.871, 91.559, and 91.325 cubic micra.

In the adjusted analysis of MCV, the overall contrast remained nonsignificant (Table 13-11 [j]: p=0.653). The difference between the unknown and background categories became nonsignificant with the inclusion of race, and the age-by-current cigarette smoking, age-by-lifetime cigarette smoking history, and current cigarette smoking-by-lifetime cigarette smoking history interactions in the model (p=0.242).

Mean Corpuscular Volume (Discrete)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

There was no significant association between abnormally high MCV and initial dioxin in the unadjusted analyses of the minimal and maximal cohorts (Table 13-12 [a] and [b]: p=0.999 and p=0.179, respectively).

In the adjusted analysis of the minimal cohort, there was a significant interaction between initial dioxin and lifetime cigarette smoking history (Table 13-12 [c]: p=0.019). To examine this interaction lifetime cigarette smoking history was divided into three strata: Ranch Hands who never smoked, Ranch Hands whose pack-years did not exceed 10, and Ranch Hands with more than 10 pack-years. The association between MCV and initial dioxin was not significant for all three strata (Appendix Table L-1: 0 pack-years: p=0.416; >0-10 pack-years: p=0.712; >10 pack-years: p=0.568). However, the risk of an abnormally high MCV increased as the amount of cigarettes smoked in one's lifetime increased. In particular, the risk was less than 1 for those who never smoked (Adj. RR=0.61), and for those whose pack-years did not exceed 10 (Adj. RR=0.92). The risk was greater than 1 for those with more than 10 pack-years (Adj. RR=1.09). After this interaction was removed

TABLE 13-12.

Analysis of Mean Corpuscular Volume (Discrete)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Percent Abnormal High	Est. Relative Risk (95% C.I.)[a]	p-Value
a) Minimal (n=520)	Low	130	11.5	1.00 (0.80,1.24)	0.999
	Medium	259	12.7		
	High	131	12.2		
b) Maximal (n=741)	Low	185	7.0	1.12 (0.95,1.32)	0.179
	Medium	370	12.7		
	High	186	10.8		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
c) Minimal (n=520)	1.00 (0.80,1.26)**	0.970**	INIT*PACKYR (p=0.019) CSMOK (p<0.001)
d) Maximal (n=741)	1.17 (0.98,1.39)**	0.087**	INIT*PACKYR (p=0.014) AGE (p=0.052) CSMOK*PACKYR (p=0.033)

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

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted relative risk, confidence interval, and p-value derived from a model fitted after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-12. (Continued)

Analysis of Mean Corpuscular Volume (Discrete)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Percent Abnormal High/(n) Current Dioxin Low	Medium	High	Est. Relative Risk (95% C.I.)[a]	p-Value
e) Minimal						0.999[b]
(n=520)	≤18.6	9.7 (72)	13.3 (128)	11.1 (54)	0.99 (0.69,1.42)	0.960[c]
	>18.6	13.8 (58)	13.0 (131)	11.7 (77)	0.99 (0.75,1.32)	0.965[c]
f) Maximal						0.808[b]
(n=741)	≤18.6	6.6 (106)	13.1 (191)	8.4 (83)	1.15 (0.89,1.49)	0.288[c]
	>18.6	7.6 (79)	13.5 (178)	10.6 (104)	1.10 (0.89,1.37)	0.384[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
g) Minimal			0.978[b]	AGE (p=0.137)
(n=520)	≤18.6	1.06 (0.71,1.58)	0.772[c]	CSMOK*PACKYR (p=0.039)
	>18.6	1.06 (0.78,1.42)	0.724[c]	
h) Maximal			0.972[b]	AGE (p=0.032)
(n=741)	≤18.6	1.20 (0.91,1.59)	0.195[c]	CSMOK*PACKYR (p=0.046)
	>18.6	1.19 (0.95,1.50)	0.127[c]	

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

[b]Test of significance for homogeneity of relative risks (current dioxin continuous, time categorized).

[c]Test of significance for relative risk equal to 1 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-12. (Continued)

Analysis of Mean Corpuscular Volume (Discrete)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Percent Abnormal High	Contrast	Est. Relative Risk (95% C.I.)	p-Value
Background	783	9.8	All Categories		0.070
Unknown	345	8.7	Unknown vs. Background	0.87 (0.56,1.36)	0.548
Low	195	15.9	Low vs. Background	1.73 (1.10,2.72)	0.017
High	187	9.6	High vs. Background	0.98 (0.57,1.68)	0.931
Total	1,510				

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Contrast	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks
Background	783	All Categories		0.034	RACE (p=0.102)
Unknown	345	Unknown vs. Background	0.77 (0.49,1.22)	0.267	AGE*PACKYR (p=0.023)
Low	195	Low vs. Background	1.77 (1.11,2.82)	0.017	CSMOK*PACKYR (p=0.009)
High	187	High vs. Background	1.12 (0.63,1.97)	0.702	
Total	1,510				

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

from the model, the association between MCV and initial dioxin remained nonsignificant (Table 13-12 [c]: p=0.970).

In the adjusted analysis of the maximal cohort, there was also a significant interaction between initial dioxin and lifetime cigarette smoking history (Table 13-12 [d]: p=0.014). In the strata containing Ranch Hands with less than 10 pack-years (0 pack-years and >0-10 pack-years) the risk of an abnormally high MCV was less than 1, but was nonsignificant for both strata (Appendix Table L-1: Adj. RR=0.92, p=0.837 for 0 pack-years; Adj. RR=0.95, p=0.735 for >0-10 pack-years).

For Ranch Hands with more than 10 pack-years, the risk was significantly greater than 1 (Adj. RR=1.30, p=0.020). The percentages of abnormally high MCV in this stratum were 5.5, 16.7, and 17.6 percent for the low, medium, and high levels of initial dioxin. When this interaction was removed from the adjusted model, the risk of an abnormally high MCV became marginally significant (Table 13-12 [d]: Adj. RR=1.17, p=0.087). The covariates that were retained in the model were age and the interaction between current cigarette smoking and lifetime cigarette smoking history.

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

The current dioxin-by-time since tour interaction was not significant in the unadjusted analysis of abnormally high MCV under either the minimal or the maximal assumption (Table 13-12 [e] and [f]: p=0.999 and p=0.808). After adjusting for covariates, this interaction remained nonsignificant under both assumptions (Table 13-12 [g] and [h]: p=0.978 and p=0.972, respectively).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The test on the unadjusted overall contrast showed a marginally significant difference in the percentage of abnormally high MCV among the four current dioxin categories (Table 13-12 [i]: p=0.070). The percentages for the background, unknown, low, and high current dioxin categories were 9.8, 8.7, 15.9, and 9.6 percent. The risk of an abnormally high MCV was significantly greater than 1 for the low versus background contrast (Est. RR=1.73, 95% C.I.: [1.10,2.72], p=0.017). The risk was less than 1, but nonsignificant, for the unknown versus background and the high versus background contrasts (unknown versus background: p=0.548; high versus background: p=0.931).

After the model for MCV was adjusted for covariates, the overall contrast became significant (Table 13-12 [j]: p=0.034). The risk for the low versus background contrast remained significantly greater than 1 (Adj. RR=1.77, 95% C.I.: [1.11,2.82], p=0.017) and the risks for the other two contrasts remained nonsignificant (unknown versus background: p=0.267; high versus background: p=0.702). Race, the interaction between age and lifetime cigarette smoking history, and the interaction between current cigarette smoking and lifetime cigarette smoking history were the covariates that were retained in the model.

Mean Corpuscular Hemoglobin (Continuous)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The unadjusted analysis of the minimal cohort showed no significant association between MCH and initial dioxin (Table 13-13 [a]: p=0.643). The association was also nonsignificant for the analysis of the maximal cohort (Table 13-13 [b]: p=0.674).

When the model for the minimal analysis was adjusted for covariates, there was a significant interaction between initial dioxin and lifetime cigarette smoking history (Table 13-13 [c]: p=0.015). Lifetime cigarette smoking history was divided into three strata to examine this interaction (0 pack-years, >0-10 pack-years, and >10 pack-years). Within each of these strata the association between MCH and initial dioxin was not significant (Appendix Table L-1: 0 pack-years: p=0.634; >0-10 pack-years: p=0.640; >10 pack-years: p=0.185). However, the association was negative for Ranch Hands who never smoked (0 pack-years: slope=-0.0552), and was positive for those with a smoking history (>0-10 pack-years: slope=0.0585; >10 pack-years: slope=0.1251). After this interaction was removed from the model, the association between MCH and initial dioxin remained nonsignificant (Table 13-13 [c]: p=0.449).

The association between MCH and initial dioxin for the adjusted analysis of the maximal cohort remained nonsignificant (Table 13-13 [d]: p=0.941).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

The current dioxin-by-time since tour interaction was not significant in either the unadjusted analysis of the minimal cohort or the unadjusted analysis of the maximal cohort for MCH (Table 13-13 [e] and [f]: p=0.497 and p=0.386, respectively). After the models were adjusted for covariates, the current dioxin-by-time interaction remained nonsignificant in both analyses of MCH (Table 13-13 [g] and [h]: minimal, p=0.531; maximal, p=0.567).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

A marginally significant difference in the mean MCH among the four current dioxin categories was exhibited by the overall contrast (Table 13-13 [i]: p=0.072). The means corresponding to the background, unknown, low, and high categories were 31.633, 31.923, 31.814, and 31.678 micromicrograms. The means for the three Ranch Hand categories were all higher than the mean for the Comparisons in the background category. The unknown category had a significantly higher mean MCH than the background category (unknown versus background: p=0.012), and the means for the low and high categories were also larger than the background category, but the differences were not significant (low versus background: p=0.203; high versus background: p=0.760).

When age, race, and current cigarette smoking were included in the model, the overall contrast became nonsignificant (Table 13-13 [j]: p=0.325). The adjusted mean MCH for the unknown category remained larger than the adjusted mean for the background category, but the difference was only marginally significant (unknown versus background: p=0.090). The adjusted means for the low and high categories also remained larger than the background category, but not significantly (low versus background: p=0.253; high versus background: p=0.496).

TABLE 13-13.

Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Mean	Slope (Std. Error)[a]	p-Value
a) Minimal (n=520) (R^2<0.001)	Low	130	31.736	0.0301 (0.0650)	0.643
	Medium	259	31.668		
	High	131	31.866		
b) Maximal (n=741) (R^2<0.001)	Low	185	31.864	-0.0193 (0.0458)	0.674
	Medium	370	31.737		
	High	186	31.779		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Initial Dioxin	n	Adj. Mean	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
c) Minimal (n=520) (R^2=0.105)	Low	130	31.062**	0.0491 (0.0648)**	0.449**	INIT*PACKYR (p=0.015)
	Medium	259	31.012**			CSMOK (p<0.001)
	High	131	31.249**			AGE*RACE (p=0.015)
d) Maximal (n=741) (R^2=0.087)	Low	185	31.021	-0.0034 (0.0451)	0.941	CSMOK (p<0.001)
	Medium	370	30.930			AGE*RACE (p=0.047)
	High	186	31.024			

[a]Slope and standard error based on mean corpuscular hemoglobin versus log_2 dioxin.

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, adjusted slope, standard error, and p-value derived from a model fitted after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-13. (Continued)

Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
e) Minimal (n=520) (R^2=0.002)	≤18.6	31.611 (72)	31.637 (128)	31.893 (54)	0.0710 (0.1060)	0.497[b] 0.503[c]
	>18.6	31.902 (58)	31.782 (131)	31.697 (77)	-0.0220 (0.0867)	0.800[c]
f) Maximal (n=741) (R^2=0.004)	≤18.6	31.780 (106)	31.653 (191)	31.707 (83)	0.0134 (0.0711)	0.386[b] 0.851[c]
	>18.6	32.122 (79)	31.869 (178)	31.654 (104)	-0.0690 (0.0629)	0.273[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Mean/(n) Current Dioxin Low	Medium	High	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
g) Minimal (n=520) (R^2=0.094)	≤18.6	30.979 (72)	30.967 (128)	31.305 (54)	0.0968 (0.1055)	0.531[b] 0.359[c]	CSMOK (p<0.001) AGE*RACE (p=0.013)
	>18.6	31.098 (58)	31.144 (131)	31.080 (77)	0.0145 (0.0857)	0.865[c]	
h) Maximal (n=741) (R^2=0.088)	≤18.6	30.978 (106)	30.853 (191)	30.928 (83)	0.0196 (0.0698)	0.567[b] 0.779[c]	CSMOK (p<0.001) AGE*RACE (p=0.043)
	>18.6	31.180 (79)	31.049 (178)	30.893 (104)	-0.0326 (0.0619)	0.599[c]	

[a]Slope and standard error based on mean corpuscular hemoglobin versus log_2 dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope different from 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-13. (Continued)

Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	783	31.633	All Categories		0.072
Unknown	345	31.923	Unknown vs. Background	0.289 (0.065,0.513)	0.012
Low	195	31.814	Low vs. Background	0.180 (-0.097,0.458)	0.203
High	187	31.678	High vs. Background	0.044 (-0.238,0.326)	0.760
Total	1,510		(R^2=0.005)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	783	30.871	All Categories		0.325	AGE (p<0.001)
						RACE (p<0.001)
Unknown	345	31.055	Unknown vs. Background	0.184 (-0.028,0.397)	0.090	CSMOK (p<0.001)
Low	195	31.024	Low vs. Background	0.153 (-0.109,0.416)	0.253	
High	187	30.965	High vs. Background	0.094 (-0.176,0.364)	0.496	
Total	1,510		(R^2=0.111)			

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

Mean Corpuscular Hemoglobin (Discrete)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The association between MCH and initial dioxin was not significant for either the minimal or the maximal unadjusted analysis (Table 13-14 [a] and [b]: p=0.404 and p=0.287, respectively).

The association in the adjusted minimal analysis remained nonsignificant (Table 13-14 [c]: p=0.376). After adjusting the model in the maximal analysis for covariates, there was a significant interaction between initial dioxin and lifetime cigarette smoking history (Table 13-14 [d]: p=0.016). This interaction was examined by dividing lifetime cigarette smoking history into three strata (0 pack-years, >0-10 pack-years, and >10 pack-years). The association between MCH and initial dioxin was not significant within any of the three strata (Appendix Table L-1: 0 pack-years: p=0.970; >0-10 pack-years: p=0.879; >10 pack-years: p=0.138). However, the risk of abnormally high MCH was less than 1 for the strata containing Ranch Hands with fewer than 10 pack-years (0 pack-years: Adj. RR=0.99; >0-10 pack-years: Adj. RR=0.97), and was greater than 1 for those with more than 10 pack-years (Adj. RR=1.21). When this interaction was removed from the adjusted model, the association between MCH and initial dioxin remained nonsignificant (Table 13-14 [d]: p=0.261).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

The interaction between current dioxin and time since tour was not significant in both the unadjusted minimal analysis and in the unadjusted maximal analysis of discretized MCH. (Table 13-14 [e] and [f]: p=0.127 and p=0.301, respectively). After adjusting the models for covariates, the interaction remained nonsignificant in both analyses of MCH in its discrete form (Table 13-14 [g] and [h]: p=0.139 and p=0.382).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The overall contrast showed no significant difference in the percentage of abnormally high MCH levels among the four current dioxin categories (Table 13-14 [i]: p=0.719). After the model was adjusted for covariates, the contrast remained nonsignificant (Table 13-14 [j]: p=0.628).

Mean Corpuscular Hemoglobin Concentration (Continuous)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The association between MCHC and initial dioxin was not significant in the unadjusted analysis of the minimal cohort or the maximal cohort (Table 13-15 [a] and [b]: p=0.695 and p=0.670).

There was a significant interaction between initial dioxin and age in the adjusted analysis of the minimal cohort (Table 13-15 [c]: p=0.025). To explore this interaction, the association between MCHC and initial dioxin was examined separately for Ranch Hands born in or after 1942 and for Ranch Hands born prior to 1942. The association was nonsignificant for both strata, but was negative for the younger Ranch Hands and positive for

TABLE 13-14.

Analysis of Mean Corpuscular Hemoglobin (Discrete)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Percent Abnormal High	Est. Relative Risk (95% C.I.)[a]	p-Value
a) Minimal (n=520)	Low	130	6.2	1.11 (0.87,1.43)	0.404
	Medium	259	8.5		
	High	131	9.2		
b) Maximal (n=741)	Low	185	6.0	1.11 (0.92,1.34)	0.287
	Medium	370	8.4		
	High	186	8.1		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
c) Minimal (n=520)	1.13 (0.87,1.46)	0.376	CSMOK (p<0.001)
d) Maximal (n=741)	1.12 (0.92,1.36)**	0.261**	INIT*PACKYR (p=0.016) CSMOK (p<0.001)

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

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted relative risk, confidence interval, and p-value derived from a model after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-14. (Continued)

Analysis of Mean Corpuscular Hemoglobin (Discrete)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Percent Abnormal High/(n) Current Dioxin Low	Medium	High	Est. Relative Risk (95% C.I.)[a]	p-Value
e) Minimal (n=520)	≤18.6	2.8 (72)	7.8 (128)	9.3 (54)	1.41 (0.92,2.15)	0.127[b] 0.112[c]
	>18.6	13.8 (58)	8.4 (131)	7.8 (77)	0.92 (0.66,1.29)	0.645[c]
f) Maximal (n=741)	≤18.6	5.7 (106)	6.3 (191)	8.4 (83)	1.24 (0.91,1.68)	0.301[b] 0.176[c]
	>18.6	7.6 (79)	10.7 (178)	6.7 (104)	1.00 (0.78,1.29)	0.992[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
g) Minimal (n=520)			0.139[b]	CSMOK (p<0.001)
	≤18.6	1.43 (0.92,2.23)	0.109[c]	
	>18.6	0.94 (0.67,1.32)	0.725[c]	
h) Maximal (n=741)			0.382[b]	AGE (p=0.129)
	≤18.6	1.29 (0.93,1.79)	0.124[c]	CSMOK (p<0.001)
	>18.6	1.08 (0.83,1.40)	0.585[c]	

[a]Relative risk for a twofold increase in dioxin.
[b]Test of significance for homogeneity of relative risks (current dioxin continuous, time categorized).
[c]Test of significance for relative risk equal to 1 (current dioxin continuous, time categorized).
Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-14. (Continued)

Analysis of Mean Corpuscular Hemoglobin (Discrete)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Percent Abnormal High	Contrast	Est. Relative Risk (95% C.I.)	p-Value
Background	783	6.8	All Categories		0.719
Unknown	345	7.3	Unknown vs. Background	1.08 (0.66,1.76)	0.771
Low	195	9.2	Low vs. Background	1.40 (0.80,2.45)	0.238
High	187	7.5	High vs. Background	1.11 (0.60,2.06)	0.728
Total	1,510				

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Contrast	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks
Background	783	All Categories		0.628	AGE (p<0.001) RACE (p=0.150)
Unknown	345	Unknown vs. Background	0.97 (0.59,1.62)	0.918	CSMOK*PACKYR (p=0.038)
Low	195	Low vs. Background	1.38 (0.78,2.45)	0.267	
High	187	High vs. Background	1.28 (0.68,2.40)	0.451	
Total	1,510				

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

TABLE 13-15.

Analysis of Mean Corpuscular Hemoglobin Concentration (gm/dl) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Mean	Slope (Std. Error)[a]	p-Value
a) Minimal (n=520) (R^2<0.001)	Low	130	34.681	0.0077 (0.0197)	0.695
	Medium	259	34.656		
	High	131	34.720		
b) Maximal (n=741) (R^2<0.001)	Low	185	34.719	-0.0062 (0.0146)	0.670
	Medium	370	34.683		
	High	186	34.680		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Initial Dioxin	n	Adj. Mean	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
c) Minimal (n=520) (R^2=0.060)	Low	130	34.516**	-0.0117 (0.0199)**	0.559**	INIT*AGE (p=0.025) RACE (p<0.001) PACKYR (p=0.036)
	Medium	259	34.471**			
	High	131	34.491**			
d) Maximal (n=741) (R^2=0.058)	Low	185	34.415	-0.0149 (0.0146)	0.306	AGE (p=0.015) RACE*PACKYR (p=0.050)
	Medium	370	34.417			
	High	186	34.356			

[a]Slope and standard error based on mean corpuscular hemoglobin concentration versus log_2 dioxin.

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, adjusted slope, standard error, and p-value derived from a model fitted after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-15. (Continued)

Analysis of Mean Corpuscular Hemoglobin Concentration (gm/dl) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
e) Minimal (n=520) (R^2=0.009)	≤18.6	34.700 (72)	34.705 (128)	34.806 (54)	0.0200 (0.0320)	0.915[b] 0.532[c]
	>18.6	34.578 (58)	34.647 (131)	34.653 (77)	0.0156 (0.0261)	0.552[c]
f) Maximal (n=741) (R^2=0.004)	≤18.6	34.711 (106)	34.720 (191)	34.714 (83)	0.0158 (0.0227)	0.316[b] 0.487[c]
	>18.6	34.732 (79)	34.666 (178)	34.612 (104)	-0.0146 (0.0201)	0.467[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Mean/(n) Current Dioxin Low	Medium	High	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
g) Minimal (n=520) (R^2=0.054)	≤18.6	34.537 (72)	34.506 (128)	34.555 (54)	-0.0055 (0.0324)	0.985[b] 0.866[c]	AGE (p=0.143) RACE (p<0.001) PACKYR (p=0.042)
	>18.6	34.426 (58)	34.479 (131)	34.447 (77)	-0.0047 (0.0264)	0.859[c]	
h) Maximal (n=741) (R^2=0.055)	≤18.6	34.469 (106)	34.495 (191)	34.434 (83)	0.0024 (0.0227)	0.322[b] 0.917[c]	AGE (p=0.021) RACE (p<0.001) PACKYR (p=0.034)
	>18.6	34.514 (79)	34.478 (178)	34.371 (104)	-0.0270 (0.0201)	0.179[c]	

[a]Slope and standard error based on mean corpuscular hemoglobin concentration versus log_2 dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope different from 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-15. (Continued)

Analysis of Mean Corpuscular Hemoglobin Concentration (gm/dl) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	783	34.629	All Categories		0.022
Unknown	345	34.723	Unknown vs. Background	0.094 (0.026,0.162)	0.007
Low	195	34.722	Low vs. Background	0.093 (0.009,0.178)	0.031
High	187	34.657	High vs. Background	0.029 (-0.058,0.115)	0.515
Total	1,510		(R^2=0.006)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	783	34.401	All Categories		0.029	RACE*CSMOK (p=0.029)
Unknown	345	34.484	Unknown vs. Background	0.083 (0.016,0.150)	0.016	CSMOK*PACKYR (p=0.034)
Low	195	34.497	Low vs. Background	0.095 (0.013,0.178)	0.024	
High	187	34.416	High vs. Background	0.015 (-0.069,0.099)	0.727	
Total	1,510		(R^2=0.059)			

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

the older Ranch Hands (Appendix Table L-1: born≥1942: slope=-0.0394, p=0.158; born <1942: slope=0.0248, p=0.390). Without this interaction in the adjusted model, the association between MCHC and initial dioxin remained nonsignificant (Table 13-15 [c]: p=0.559).

After the model in the maximal analysis was adjusted for significant covariates, the association between MCHC and initial dioxin remained nonsignificant (Table 13-15 [d]: p=0.306).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

There was no significant interaction between current dioxin and time since tour in either the minimal or maximal analysis of MCHC (Table 13-15 [e] and [f]: p=0.915 and p=0.316, respectively). After the adjustment for covariate information was made, the interaction remained nonsignificant in both analyses (Table 13-15 [g] and [h]: p=0.985 and p=0.322, respectively).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The contrast of all four current dioxin categories showed a significant difference in the MCHC means (Table 13-15 [i]: p=0.022). In particular, the means for the unknown category and the low category were significantly greater than the mean for the background category (unknown versus background: p=0.007; low versus background: p=0.031). The mean for the high category was also greater than the mean for the background category, but the difference was not significant (high versus background: p=0.515). The means for the background, unknown, low, and high categories were 34.629, 34.723, 34.722, and 34.657 gm/dl.

In the adjusted analysis of MCHC, the overall contrast remained significant (Table 13-15 [j]: p=0.029). The unknown versus background and the low versus background contrasts also remained significant (unknown versus background: p=0.016; low versus background: p=0.024), and the high versus background contrast remained nonsignificant (high versus background: p=0.727).

Platelet Count (Continuous)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

In the unadjusted analysis of the minimal cohort, the association between platelet count and initial dioxin was not significant (Table 13-16 [a]: p=0.211). There was, however, a significant positive association in the analysis of the maximal cohort (Table 13-16 [b]: p=0.030). For this cohort, the mean platelet counts for the low, medium, and high levels of initial dioxin were 256.31, 264.41, and 268.39 thousand/mm^3.

The association between platelet count and initial dioxin remained nonsignificant for the minimal cohort after the model was adjusted for significant covariates (Table 13-16 [c]: p=0.603). For the maximal cohort, the association became nonsignificant after the adjustment was made (Table 13-16 [d]: p=0.181). The covariates that were retained in the maximal analysis were the age-by-race and the age-by-lifetime cigarette smoking history interactions.

TABLE 13-16.

Analysis of Platelet Count (thousand/mm^3) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Mean	Slope (Std. Error)[a]	p-Value
a) Minimal (n=519) (R^2=0.003)	Low	129	254.24	2.638 (2.105)	0.211
	Medium	259	270.00		
	High	131	268.73		
b) Maximal (n=740) (R^2=0.006)	Low	185	256.31	3.252 (1.494)	0.030
	Medium	369	264.41		
	High	186	268.39		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Initial Dioxin	n	Adj. Mean	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
c) Minimal (n=519) (R^2=0.056)	Low	129	268.47	1.111 (2.133)	0.603	AGE*PACKYR (p=0.018) RACE*PACKYR (p=0.038)
	Medium	259	280.91			
	High	131	278.29			
d) Maximal (n=740) (R^2=0.045)	Low	185	261.90	2.020 (1.509)	0.181	AGE*RACE (p=0.044) AGE*PACKYR (p=0.016)
	Medium	369	269.32			
	High	186	270.23			

[a]Slope and standard error based on platelet count versus log_2 dioxin.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-16. (Continued)

Analysis of Platelet Count (thousand/mm^3) (Continuous)

Ranch Hands - Log$_2$ (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
e) Minimal						0.491[b]
(n=519)	≤18.6	251.86 (71)	267.44 (128)	267.17 (54)	4.167 (3.434)	0.226[c]
(R^2=0.005)	>18.6	269.40 (58)	267.63 (131)	268.88 (77)	1.114 (2.802)	0.691[c]
f) Maximal						0.834[b]
(n=740)	≤18.6	255.30 (106)	262.17 (190)	267.45 (83)	3.552 (2.321)	0.127[c]
(R^2=0.007)	>18.6	255.34 (79)	266.06 (178)	272.13 (104)	2.904 (2.052)	0.158[c]

Ranch Hands - Log$_2$ (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Mean/(n) Current Dioxin Low	Medium	High	Adj. Slope (Std. Error)[a]	p-Value	Covariate Remarks
g) Minimal						0.693[b]	AGE*PACKYR (p=0.025)
(n=519)	≤18.6	266.45 (71)	277.92 (128)	274.25 (54)	1.217 (3.476)	0.726[c]	RACE*PACKYR (p=0.002)
(R^2=0.059)	>18.6	284.64 (58)	278.45 (131)	279.75 (77)	-0.500 (2.830)	0.860[c]	
h) Maximal						0.971[b]	AGE*RACE (p=0.046)
(n=740)	≤18.6	261.37 (106)	267.10 (190)	267.10 (83)	1.658 (2.341)	0.381[c]	AGE*PACKYR (p=0.019)
(R^2=0.045)	>18.6	261.62 (79)	270.56 (178)	274.38 (104)	1.768 (2.073)	0.394[c]	

[a]Slope and standard error based on platelet count versus log$_2$ dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope different from 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-16. (Continued)

Analysis of Platelet Count (thousand/mm^3) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	783	259.01	All Categories		0.083
Unknown	345	261.81	Unknown vs. Background	2.80 (-4.32,9.93)	0.440
Low	195	265.22	Low vs. Background	6.21 (-2.61,15.03)	0.168
High	187	270.05	High vs. Background	11.05 (2.08,20.02)	0.016
Total	1,510		(R^2=0.004)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	783	259.40**	All Categories		0.217**	DXCAT*AGE (p=0.031)
Unknown	345	262.07**	Unknown vs. Background	2.67 (-4.41,9.74)**	0.461**	CSMOK (p=0.067)
Low	195	265.00**	Low vs. Background	5.60 (-3.16,14.35)**	0.210**	PACKYR
High	187	268.16**	High vs. Background	8.76 (-0.24,17.76)**	0.057**	(p=0.004)
Total	1,510		(R^2=0.028)			

**Categorized current dioxin-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, confidence interval, and p-value derived from a model fitted after deletion of this interaction.

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

Under the minimal and maximal assumptions, the interaction between current dioxin and time since tour was not significant in the unadjusted analysis of platelet count (Table 13-16 [e] and [f]: p=0.491 and p=0.834, respectively). In the adjusted analysis, the interaction remained nonsignificant under both assumptions (Table 13-16 [g] and [h]: p=0.693 and p=0.971).

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The contrast of all four current dioxin categories showed a marginally significant association between platelet count and current dioxin (Table 13-16 [i]: p=0.083). The mean platelet counts for the three Ranch Hand categories were greater than the mean platelet count for Comparisons in the background category. The means were 259.01 thousand/mm^3 for the background category and 261.81, 265.22, and 270.05 thousand/mm^3 for the unknown, low, and high categories. The differences in means between the unknown and background categories and between the low and background categories were not significant (unknown versus background: p=0.440; low versus background: p=0.168). But, the mean for the high category was significantly greater than the mean for the background category (high versus background: p=0.016).

In the adjusted model, there was a significant interaction between categorized current dioxin and age (Table 13-16 [j]: p=0.031). To examine this interaction, age was stratified into two categories: one containing those participants born in or after 1942, the other containing those born before 1942. Within the stratum containing the younger participants, there was a significant difference in mean platelet count among the four current dioxin categories (Appendix Table L-1: p=0.010). The adjusted means in this stratum were 263.06, 257.98, 271.16, and 279.94 thousand/mm^3 for the background, unknown, low, and high categories. When contrasting the background category with the other three, the only significant difference in means was between the high and background categories (high versus background: p=0.005). The other two contrasts were nonsignificant (unknown versus background: p=0.398; low versus background: p=0.242). Within the stratum containing the older participants, there was no significant difference in mean platelet count among the four current dioxin categories (p=0.435). The adjusted means tended to increase over the current dioxin categories in the younger age stratum and tended to decrease in the older age stratum.

Without the categorized current dioxin-by-age interaction in the adjusted model, the overall contrast became nonsignificant (Table 13-16 [j]: p=0.217). Also, the difference between the mean platelet count for the high category and the mean for the background category became only marginally significant (p=0.057). The covariates that were retained in the model were age, current cigarette smoking, and lifetime cigarette smoking history.

Platelet Count (Discrete)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

There was no significant association between platelet count and initial dioxin for either the minimal or the maximal cohort in the unadjusted analysis (Table 13-17 [a] and [b]: p=0.398 and p=0.133, respectively). No covariates were retained in the adjusted model, therefore the results remained unchanged.

TABLE 13-17.

Analysis of Platelet Count (Discrete)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Percent Abnormal High	Est. Relative Risk (95% C.I.)[a]	p-Value
a) Minimal (n=519)	Low	129	1.6	1.20 (0.80,1.80)	0.398
	Medium	259	3.5		
	High	131	2.3		
b) Maximal (n=740)	Low	185	0.5	1.28 (0.94,1.76)	0.133
	Medium	369	2.7		
	High	186	3.2		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
c) Minimal (n=519)	1.20 (0.80,1.80)	0.398	- -
d) Maximal (n=740)	1.28 (0.94,1.76)	0.133	- -

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

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-17. (Continued)

Analysis of Platelet Count (Discrete)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Percent Abnormal High/(n) Current Dioxin Low	Medium	High	Est. Relative Risk (95% C.I.)[a]	p-Value
e) Minimal						0.551[b]
(n=519)	≤18.6	0.0 (71)	3.9 (128)	0.0 (54)	0.90 (0.38,2.17)	0.820[c]
	>18.6	3.5 (58)	3.1 (131)	3.9 (77)	1.22 (0.75,1.97)	0.428[c]
f) Maximal						0.930[b]
(n=740)	≤18.6	0.0 (106)	2.6 (190)	1.2 (83)	1.19 (0.65,2.19)	0.573[c]
	>18.6	2.5 (79)	2.3 (178)	4.8 (104)	1.23 (0.84,1.80)	0.291[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
g) Minimal			0.551[b]	- -
(n=519)	≤18.6	0.90 (0.38,2.17)	0.820[c]	
	>18.6	1.22 (0.75,1.97)	0.428[c]	
h) Maximal			0.930[b]	- -
(n=740)	≤18.6	1.19 (0.65,2.19)	0.573[c]	
	>18.6	1.23 (0.84,1.80)	0.292[c]	

[a]Relative risk for a twofold increase in dioxin.
[b]Test of significance for homogeneity of relative risks (current dioxin continuous, time categorized).
[c]Test of significance for relative risk equal to 1 (current dioxin continuous, time categorized).
Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-17. (Continued)

Analysis of Platelet Count
(Discrete)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Percent Abnormal High	Contrast	Est. Relative Risk (95% C.I.)	p-Value
Background	783	1.2	All Categories		0.181
Unknown	345	2.3	Unknown vs. Background	2.04 (0.78,5.34)	0.145
Low	195	2.6	Low vs. Background	2.26 (0.75,6.83)	0.147
High	187	3.2	High vs. Background	2.85 (1.00,8.11)	0.050
Total	1,510				

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Contrast	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks
Background	783	All Categories		0.181	- -
Unknown	345	Unknown vs. Background	2.04 (0.78,5.34)	0.145	
Low	195	Low vs. Background	2.26 (0.75,6.83)	0.147	
High	187	High vs. Background	2.85 (1.00,8.11)	0.050	
Total	1,510				

Note: Background (Comparisons): Current Dioxin $\leq$10 ppt.
Unknown (Ranch Hands): Current Dioxin $\leq$10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin $\leq$33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

In the unadjusted analysis of platelet count in its discrete form, the interaction between current dioxin and time since tour was not significant for either the minimal or maximal cohort (Table 13-17 [e] and [f]: p=0.551 and p=0.930). There were no covariates retained in the adjusted model, thus the results remained unchanged.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The overall unadjusted contrast showed no significant differences in the percentage of abnormally high platelet counts across the four current dioxin categories (Table 13-17 [i]: p=0.181). However, the risk of an abnormally high platelet count was significantly greater than 1 when the high category was contrasted with the background category (Est. RR=2.85, 95% C.I.: [1.00,8.11], p=0.050).

The results in the adjusted model remained unchanged because there were no significant covariates retained in the model.

Prothrombin Time (Continuous)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

In the unadjusted analysis of prothrombin time in its continuous form, there was no significant association with initial dioxin under either assumption (Table 13-18 [a] and [b]: minimal assumption, p=0.417; maximal assumption, p=0.444).

In the adjusted model, a significant interaction between initial dioxin and lifetime cigarette smoking history was present under the minimal assumption (Table 13-18 [c]: p=0.011). To examine this interaction, lifetime cigarette smoking was divided into three strata (0 pack-years, >0-10 pack-years, and >10 pack-years). For Ranch Hands who had never smoked, the association between initial dioxin and prothrombin time was positive, but nonsignificant (Table L-1: p=0.190). For Ranch Hands who had less than 10 pack-years, the association between initial dioxin and prothrombin time was significantly positive (p=0.001). The adjusted mean prothrombin times, in this stratum, were 12.367, 12.320, and 12.334 seconds for the low, medium, and high initial dioxin categories. For Ranch Hands who had more than 10 pack-years, the association between initial dioxin and prothrombin time was negative but nonsignificant (p=0.435). Without this interaction in the model, there was a significant positive association between initial dioxin and prothrombin time (Table 13-18 [c]: p=0.041). The adjusted means increased over the low, medium, and high levels of initial dioxin (12.330, 12.347, and 12.416 seconds).

After adjusting the model under the maximal assumption for significant covariate information, the association between initial dioxin and prothrombin time remained nonsignificant (Table 13-18 [d]: p=0.287).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

In the unadjusted minimal and maximal analyses of prothrombin time, the interaction between current dioxin and time since tour was not significant (Table 13-18 [e] and [f]: p=0.701 and p=0.653, respectively).

TABLE 13-18.

Analysis of Prothrombin Time (Seconds) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Mean[a]	Slope (Std. Error)[b]	p-Value
a) Minimal (n=519) (R^2=0.001)	Low	130	12.266	0.0013 (0.0015)	0.417
	Medium	258	12.230		
	High	131	12.290		
b) Maximal (n=740) (R^2<0.001)	Low	185	12.241	0.0009 (0.0011)	0.444
	Medium	370	12.231		
	High	185	12.267		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Initial Dioxin	n	Adj. Mean[a]	Adj. Slope (Std. Error)[b]	p-Value	Covariate Remarks
c) Minimal (n=513) (R^2=0.108)	Low	130	12.330**	0.0032 (0.0016)**	0.041**	INIT*PACKYR (p=0.011)
	Medium	254	12.347**			RACE (p=0.005)
	High	129	12.416**			AGE*CSMOK (p=0.037)
						CSMOK*DRKYR (p=0.025)
						PACKYR*DRKYR (p=0.003)
d) Maximal (n=731) (R^2=0.071)	Low	183	12.343	0.0012 (0.0012)	0.287	RACE (p=0.020)
	Medium	367	12.320			AGE*CSMOK (p=0.003)
	High	181	12.368			AGE*PACKYR (p<0.001)
						CSMOK*DRKYR (p=0.025)

[a]Transformed from natural logarithm scale.

[b]Slope and standard error based on natural logarithm prothrombin time versus log_2 dioxin.

**Log_2 (initial dioxin)-by-covariate interaction ($0.01<p\leq0.05$); adjusted mean, adjusted slope, standard error, and p-value derived from a model fitted after deletion of this interaction.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-18. (Continued)

Analysis of Prothrombin Time (Seconds) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Mean[a]/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[b]	p-Value
e) Minimal						0.701[c]
(n=519)	≤18.6	12.260	12.186	12.206	0.0016 (0.0025)	0.536[d]
(R^2=0.006)		(72)	(128)	(54)		
	>18.6	12.265	12.291	12.292	0.0003 (0.0021)	0.880[d]
		(58)	(130)	(77)		
f) Maximal						0.653[c]
(n=740)	≤18.6	12.244	12.181	12.267	0.0002 (0.0018)	0.895[d]
(R^2=0.003)		(106)	(191)	(83)		
	>18.6	12.198	12.277	12.312	0.0013 (0.0016)	0.408[d]
		(79)	(178)	(103)		

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Mean[a]/(n) Current Dioxin Low	Medium	High	Adj. Slope (Std. Error)[b]	p-Value	Covariate Remarks
g) Minimal						0.713[c]	RACE (p=0.015)
(n=513)	≤18.6	12.330	12.299	12.342	0.0036 (0.0025)	0.153[d]	AGE*CSMOK
(R^2=0.103)		(72)	(127)	(53)			(p=0.003)
	>18.6	12.299	12.387	12.404	0.0024 (0.0021)	0.246[d]	AGE*PACKYR
		(58)	(127)	(76)			(p<0.001)
							CSMOK*DRKYR
							(p=0.021)
h) Maximal						****	CURR*TIME*CSMOK
(n=731)	≤18.6	****	****	****	****	****	(p=0.006)
(R^2=0.085)		(105)	(190)	(81)			RACE (p=0.019)
	>18.6	****	****	****	****	****	AGE*CSMOK (p=0.007)
		(78)	(176)	(101)			AGE*PACKYR
							(p<0.001)
							CSMOK*DRKYR
							(p=0.024)

[a]Transformed from natural logarithm scale.

[b]Slope and standard error based on natural logarithm prothrombin time versus log_2 dioxin.

[c]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[d]Test of significance for slope equal to 0 (current dioxin continuous, time categorized).

****Log_2 (current dioxin)-by-time-by-covariate interaction ($p \leq 0.01$); adjusted mean, adjusted slope, standard error, and p-value not presented.

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-18. (Continued)

Analysis of Prothrombin Time (Seconds) (Continuous)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Mean	Contrast	Difference of Means (95% C.I.)	p-Value
Background	785	12.256	All Categories		0.305
Unknown	345	12.219	Unknown vs. Background	-0.037 --	0.278
Low	195	12.207	Low vs. Background	-0.049 --	0.247
High	186	12.292	High vs. Background	0.036 --	0.409
Total	1,511		(R^2=0.002)		

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Adj. Mean	Contrast	Difference of Adj. Means (95% C.I.)	p-Value	Covariate Remarks
Background	785	****	All Categories		****	DXCAT*AGE (p=0.004)
Unknown	345	****	Unknown vs. Background	****	****	RACE (p<0.001)
Low	195	****	Low vs. Background	****	****	CSMOK (p<0.001)
High	186	****	High vs. Background	****	****	
Total	1,511		(R^2=0.050)			

[a]Transformed from natural logarithm scale.

[e]Difference of means after transformation to original scale; confidence interval on difference of means not given because analysis was performed on natural logarithm scale.

[f]P-value is based on difference of means on natural logarithm scale.

****Categorized current dioxin-by-covariate interaction ($p \leq 0.01$); adjusted mean, confidence interval, and p-value not presented.

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

The current dioxin-by-time interaction remained nonsignificant in the adjusted minimal analysis (Table 13-18 [g]: p=0.713). Under the maximal assumption, a significant interaction was present among current dioxin, time, and current cigarette smoking (Table 13-18 [h]: p=0.006). Current cigarette smoking was then stratified into four categories (never smoked, formerly smoked, smoked less then 20 cigarettes/day, and smoked more than 20 cigarettes/day) to investigate this interaction. The interaction between current dioxin and time was nonsignificant in all four strata (Table L-1: 0-never: p=0.657; 0-former: p=0.131; >0-20 cigarettes/day: p=0.396; >20 cigarettes/day: p=0.107). However, for former smokers, there was a marginally significant positive association between current dioxin and prothrombin time when time exceeded 18.6 years (p=0.068). There was also a marginally significant positive association between current dioxin and prothrombin time when time did not exceed 18.6 years for Ranch Hands who smoked less than 20 cigarettes per day (p=0.082). For nonsmokers (0-never and 0-former), the association between current dioxin and prothrombin time was negative in the later tour stratum (time≤18.6 years) and positive in the earlier tour stratum (time>18.6 years). In contrast, for the other two current smoking categories (>0-20 cigarettes/day and >20 cigarettes/day), the association was stronger in the later tour stratum than in the earlier tour stratum.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

In the unadjusted analysis of prothrombin time, the overall comparison of the four current dioxin categories was nonsignificant (Table 13-18 [i]: p=0.305).

In the adjusted analysis of prothrombin time, there was a significant interaction between categorized current dioxin and age (Table 13-18 [j]: p=0.004). For the younger participants (born≥1942), the adjusted mean prothrombin times differed significantly (Appendix Table L-1: p=0.045). The adjusted means for the background, unknown, low, and high current dioxin categories were 12.402, 12.487, 12.272, and 12.395 seconds. The adjusted mean prothrombin time in the low current dioxin category was significantly less than the adjusted mean in the background category (p=0.046). For the older participants (born<1942), there was a marginally significant difference among the current dioxin categories (p=0.082). Within this stratum, the adjusted mean prothrombin times were 12.323, 12.263, 12.356, and 12.434 seconds for the background, unknown, low, and high current dioxin categories. There was also a marginally significant difference between the adjusted mean in the unknown category and the adjusted mean in the background category (p=0.100).

Prothrombin Time (Discrete)

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The unadjusted analysis of prothrombin time in its discrete form showed no significant association with initial dioxin under either the minimal or the maximal assumption (Table 13-19 [a] and [b]: p=0.722 and p=0.924). The association between initial dioxin and prothrombin time remained nonsignificant after the models were adjusted for covariate information (Table 13-19 [c] and [d]: minimal assumption, p=0.245; maximal assumption, p=0.789).

TABLE 13-19.

Analysis of Prothrombin Time (Discrete)

Ranch Hands - Log_2 (Initial Dioxin) - Unadjusted

Assumption	Initial Dioxin	n	Percent Abnormal High	Est. Relative Risk (95% C.I.)[a]	p-Value
a) Minimal (n=519)	Low	130	2.3	1.08 (0.71,1.65)	0.722
	Medium	258	3.5		
	High	131	1.5		
b) Maximal (n=740)	Low	185	3.2	0.98 (0.72,1.35)	0.924
	Medium	370	2.4		
	High	185	3.2		

Ranch Hands - Log_2 (Initial Dioxin) - Adjusted

Assumption	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
c) Minimal (n=519)	1.31 (0.85,2.02)	0.245	RACE (p=0.093) AGE*CSMOK (p=0.045)
d) Maximal (n=740)	1.05 (0.75,1.47)	0.789	RACE (p=0.083) AGE*PACKYR (p=0.005)

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

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.

TABLE 13-19. (Continued)

Analysis of Prothrombin Time
(Discrete)

Ranch Hands - Log_2 (Current Dioxin) and Time - Unadjusted

Assumption	Time (Yrs.)	Percent Abnormal High/(n) Current Dioxin Low	Medium	High	Est. Relative Risk (95% C.I.)[a]	p-Value
e) Minimal						0.300[b]
(n=519)	≤18.6	1.4 (72)	2.3 (128)	1.9 (54)	1.48 (0.71,3.10)	0.299[c]
	>18.6	3.5 (58)	4.6 (130)	1.3 (77)	0.91 (0.52,1.57)	0.724[c]
f) Maximal						0.889[b]
(n=740)	≤18.6	3.8 (106)	0.5 (191)	4.8 (83)	1.01 (0.60,1.73)	0.957[c]
	>18.6	3.8 (79)	2.8 (178)	3.9 (103)	0.97 (0.64,1.46)	0.873[c]

Ranch Hands - Log_2 (Current Dioxin) and Time - Adjusted

Assumption	Time (Yrs.)	Adj. Relative Risk (95% C.I.)[a]	p-Value	Covariate Remarks
g) Minimal			0.089[b]	RACE (p=0.086)
(n=519)	≤18.6	2.79 (1.13,6.88)	0.026[c]	AGE*CSMOK (p=0.026)
	>18.6	1.14 (0.65,2.01)	0.652[c]	AGE*PACKYR (p=0.039)
h) Maximal			****	CURR*TIME*RACE
(n=740)	≤18.6	****	****	(p=0.006)
	>18.6	****	****	AGE*PACKYR (p=0.005)

[a]Relative risk for a twofold increase in dioxin.
[b]Test of significance for homogeneity of relative risks (current dioxin continuous, time categorized).
[c]Test of significance for relative risk equal to 1 (current dioxin continuous, time categorized).
****Log_2 (current dioxin)-by-time-by-covariate interaction ($p \leq 0.01$); adjusted relative risk, confidence interval, and p-value not presented.
Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.

TABLE 13-19. (Continued)

Analysis of Prothrombin Time (Discrete)

i) Ranch Hands and Comparisons by Current Dioxin Category - Unadjusted

Current Dioxin Category	n	Percent Abnormal High	Contrast	Est. Relative Risk (95% C.I.)	p-Value
Background	785	4.7	All Categories		0.153
Unknown	345	3.5	Unknown vs. Background	0.73 (0.38,1.41)	0.350
Low	195	1.5	Low vs. Background	0.32 (0.10,1.04)	0.057
High	186	4.3	High vs. Background	0.91 (0.42,1.99)	0.810
Total	1,511				

j) Ranch Hands and Comparisons by Current Dioxin Category - Adjusted

Current Dioxin Category	n	Contrast	Adj. Relative Risk (95% C.I.)	p-Value	Covariate Remarks
Background	785	All Categories		****	DXCAT*AGE (p=0.005)
Unknown	345	Unknown vs. Background	****	****	DXCAT*CSMOK (p=0.028)
Low	195	Low vs. Background	****	****	RACE (p=0.003)
High	186	High vs. Background	****	****	
Total	1,511				

****Categorized current dioxin-by-covariate interaction ($p \leq 0.01$); adjusted relative risk, confidence interval, and p-value not presented.

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

In the unadjusted analysis of prothrombin time, the interaction between current dioxin and time since tour was not significant under the minimal and maximal assumptions (Table 13-19 [e] and [f]: p=0.300 and p=0.889).

After adjusting the model in the minimal analysis for race, age-by-current cigarette smoking, and age-by-lifetime cigarette smoking history, the interaction between current dioxin and time was marginally significant (Table 13-19 [g]: p=0.089). For time less than or equal to 18.6 years, there was a significant positive risk of an abnormally high prothrombin time (Adj. RR=2.79, p=0.026). The percentages of abnormalities in this stratum were 1.4, 2.3, and 1.9 percent for low, medium, and high levels of current dioxin. For time greater than 18.6 years, the risk was not significant (p=0.652).

In the adjusted maximal analysis, there was a significant interaction among current dioxin, time, and race (Table 13-19 [h]: p=0.006). The current dioxin-by-time interaction was not evaluated for Black Ranch Hands because there was only one abnormality for time less than or equal to 18.6 years. The abnormality was in the low current dioxin category. For time greater than 18.6 years, the risk of an abnormally high prothrombin time was not significant (Appendix Table L-1: p=0.516). However, there were only two abnormalities within this stratum; one in the medium current dioxin category and one in the high current dioxin category. In the non-Black stratum, the current dioxin-by-time interaction was not significant (p=0.445). This current dioxin-by-time-by-race interaction could have been caused by, or affected by, the sparse number of abnormalities in the Black stratum.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

In the unadjusted analysis of prothrombin time, the overall contrast of the current dioxin categories was not significant (Table 13-19 [i]: p=0.153). However, for the low versus background contrast, the risk of an abnormally high prothrombin time was marginally less than 1 (Est. RR=0.32, 95% C.I.: [0.10,1.04], p=0.057).

In the adjusted analysis of prothrombin time, there was a significant interaction between categorized current dioxin and age (Table 13-19 [j]: p=0.005) and between categorized current dioxin and current cigarette smoking (p=0.028). To investigate these interactions, age was divided into two strata (born in or after 1942 and born before 1942); current cigarette smoking was divided into three strata (never smoked, formerly smoked, and currently smoked). Among the six combinations of these strata, the overall contrast of the current dioxin categories was significant only for the younger participants who had never smoked (Appendix Table L-1: p=0.041) and was marginally significant for the older participants who currently smoked (p=0.093). For the younger participants who had never smoked, the percentages of abnormal prothrombin times were 5.2, 13.9, 0.0, and 2.9 percent for the background, unknown, low, and high current dioxin categories. Also in this stratum, the risk of an abnormally high prothrombin time was marginally greater than 1 under the unknown versus background contrast (Adj. RR=3.38, 95% C.I.: [0.90,12.73], p=0.072). For the older participants who currently smoked, there were only five abnormalities in the background current dioxin category, one abnormality in the high category, and no abnormalities in the unknown and low categories.

Longitudinal Analysis

Laboratory Examination Variables

Longitudinal analyses were conducted for three hematology variables: MCV, MCH, and platelet count. For a specific longitudinal analysis (e.g., minimal assumption, initial dioxin analysis on MCV), the left side of each subpanel of a table provides the means and sample sizes for participants with MCV values at each examination. Based on the difference between 1987 MCV and 1982 MCV, the right side of each subpanel presents slopes, standard errors, and associated p-values (for models using initial dioxin or models using current dioxin and time since tour), or differences of examination mean changes, 95 percent confidence intervals, and associated p-values (for models using categorized current dioxin). The reported statistics are presented subject to the constraint that participants were compliant at both the 1982 and 1987 examinations.

Mean Corpuscular Volume (Continuous)

For the hematologic assessment, differences in MCV levels (cubic micra) between the 1982 Baseline examination and the 1987 examination were analyzed for associations with initial dioxin, current dioxin and time since tour, and categorized current dioxin. All analyses were conducted without adjustment for covariate information (Table 13-20).

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The longitudinal analysis of the change in MCV levels from the 1982 Baseline examination to the 1987 examination displayed a nonsignificant positive association with initial dioxin under both the minimal and the maximal assumptions (Table 13-20 [a] and [b]: p=0.116 and p=0.545).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

Under both the minimal and the maximal assumptions, the longitudinal analysis of the difference between the 1982 and 1987 MCV levels exhibited a nonsignificant interaction between current dioxin and time since tour (Table 13-20 [c] and [d]: p=0.327 and p=0.424, respectively). However, for Ranch Hands in the minimal cohort with less than or equal to 18.6 years since tour, the longitudinal analysis detected a marginally significant positive association between current dioxin and the change in MCV levels from 1982 to 1987 (Table 13-20 [c]: p=0.082). The differences in the 1982 and 1987 MCV levels for this stratum were 1.583, 3.075, and 3.631 cubic micra for the low, medium, and high current dioxin categories.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

In the longitudinal analysis of the difference in MCV values between the 1982 Baseline examination and the 1987 examination, the overall contrast of the four current dioxin categories was not significant (Table 13-20 [e]: p=0.453).

Mean Corpuscular Hemoglobin (Continuous)

Longitudinal analyses were conducted to examine the change in the MCH levels (micromicrogram) of the study participants between the 1982 Baseline and 1987 examinations in relation to initial dioxin, current dioxin and time since tour, and current dioxin

TABLE 13-20.

Longitudinal Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin)

Assumption	Initial Dioxin	Mean/(n) Examination 1982	1985	1987	Slope (Std. Error)[a]	p-Value
a) Minimal (R^2=0.005)	Low	89.694 (124)	92.536 (121)	91.480 (124)	0.2688 (0.1707)	0.116
	Medium	88.413 (254)	92.275 (249)	91.322 (254)		
	High	88.629 (124)	92.827 (122)	91.782 (124)		
b) Maximal (R^2<0.001)	Low	88.735 (170)	92.767 (167)	91.748 (170)	0.0725 (0.1196)	0.545
	Medium	89.008 (358)	92.460 (350)	91.493 (358)		
	High	88.489 (178)	92.710 (175)	91.589 (178)		

[a]Slope and standard error based on difference between 1987 mean corpuscular volume and 1982 mean corpuscular volume versus log_2 dioxin.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

TABLE 13-20. (Continued)

Longitudinal Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time

Assumption	Time (Yrs.)	Examination	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
c) Minimal (R^2=0.007)	≤18.6	1982	89.478 (69)	88.048 (125)	87.961 (51)	0.4851 (0.2781)	0.327[b] 0.082[c]
		1985	92.170 (67)	91.966 (122)	92.810 (50)		
		1987	91.061 (69)	91.123 (125)	91.592 (51)		
	>18.6	1982	90.127 (55)	88.876 (129)	88.781 (73)	0.1327 (0.2275)	0.560[c]
		1985	93.370 (54)	92.598 (127)	92.506 (72)		
		1987	92.235 (55)	91.667 (129)	91.475 (73)		
d) Maximal (R^2=0.002)	≤18.6	1982	88.489 (94)	88.541 (185)	88.127 (79)	0.1895 (0.1870)	0.424[b] 0.311[c]
		1985	92.467 (91)	92.084 (180)	92.428 (78)		
		1987	91.478 (94)	91.168 (185)	91.215 (79)		
	>18.6	1982	89.224 (76)	89.419 (172)	88.800 (100)	-0.0091 (0.1628)	0.956[c]
		1985	93.507 (75)	92.957 (170)	92.477 (98)		
		1987	92.557 (76)	91.887 (172)	91.447 (100)		

[a]Slope and standard error based on difference between 1987 mean corpuscular volume and 1982 mean corpuscular volume versus log_2 dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope equal to 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

TABLE 13-20. (Continued)

Longitudinal Analysis of Mean Corpuscular Volume (cubic micra) (Continuous)

e) Ranch Hands and Comparisons by Current Dioxin Category

Current Dioxin Category	Mean/(n) Examination 1982	1985	1987	Contrast	Difference of Examination Mean Change (95% C.I.)	p-Value
Background	88.604 (681)	92.303 (676)	91.230 (681)	All Categories		0.453
Unknown	88.971 (315)	92.761 (310)	91.830 (315)	Unknown vs. Background	0.232 (-0.328,0.792)	0.417
Low	88.445 (191)	92.428 (188)	91.604 (191)	Low vs. Background	0.533 (-0.140,1.206)	0.121
High	88.503 (179)	92.455 (176)	91.345 (179)	High vs. Background	0.216 (-0.474,0.906)	0.540
	(R^2=0.002)					

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

categorized within group. The results of the longitudinal analyses (unadjusted for covariate information) are presented in Table 13-21.

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The longitudinal analysis did not detect a significant association between initial dioxin and the change in MCH (as measured by the difference between the 1987 examination value and the 1982 examination value) under either the minimal or the maximal assumption (Table 13-21 [a] and [b]: p=0.107 and p=0.982).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

Under both the minimal and the maximal assumptions, the longitudinal analysis of the change in MCH between the 1982 Baseline examination and the 1987 examination exhibited a nonsignificant current dioxin-by-time since tour interaction (Table 13-21 [c] and [d]: p=0.829 and p=0.623, respectively). Thus, the difference between the 1982 and 1987 MCH levels did not differ significantly for the two time strata under either assumption.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The change in MCH levels between the 1982 Baseline examination and the 1987 examination did not differ significantly among the four current dioxin categories (Table 13-21 [e]: p=0.609).

Platelet Count (Continuous)

Longitudinal differences in platelet count (thousand/mm^3) between the 1982 Baseline examination and the 1987 examination were analyzed to examine associations with initial dioxin in Ranch Hands, current dioxin and time since tour in Ranch Hands, and categorized current dioxin in Ranch Hands and Comparisons. Table 13-22 presents the results of these analyses.

Model 1: Ranch Hands - Log_2 (Initial Dioxin)

The longitudinal analysis of the change in platelet count between 1982 and 1987 detected a negative association with initial dioxin for both the minimal and the maximal cohorts. However, the association was nonsignificant under both assumptions (Table 13-22 [a] and [b]: p=0.553 and p=0.768, respectively).

Model 2: Ranch Hands - Log_2 (Current Dioxin) and Time

In the longitudinal analysis of the change in platelet count between the 1982 Baseline examination and the 1987 examination with current dioxin and time since tour, the interaction between current dioxin and time since tour was nonsignificant under both the minimal and the maximal assumptions (Table 13-22 [c] and [d]: p=0.257 and p=0.789). Thus, the association between current dioxin and the change in platelet count, 1987 relative to 1982, did not differ for the two time strata under either the minimal or the maximal assumption.

Model 3: Ranch Hands and Comparisons by Current Dioxin Category

The simultaneous contrast of the four current dioxin categories was not significant in the longitudinal analysis of the change in mean platelet count between the 1982 Baseline and 1987 examinations (Table 13-22 [e]: p=0.181). However, the individual contrast of the

TABLE 13-21.

Longitudinal Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin)

Assumption	Initial Dioxin	Mean/(n) Examination 1982	1985	1987	Slope (Std. Error)[a]	p-Value
a) Minimal (R^2=0.005)	Low	30.998 (124)	31.483 (121)	31.734 (124)	0.0738 (0.0456)	0.107
	Medium	30.711 (254)	31.446 (249)	31.665 (254)		
	High	30.833 (124)	31.691 (122)	31.907 (124)		
b) Maximal (R^2<0.001)	Low	30.776 (170)	31.652 (167)	31.859 (170)	-0.0007 (0.0333)	0.982
	Medium	30.835 (358)	31.490 (350)	31.745 (358)		
	High	30.787 (178)	31.631 (175)	31.793 (178)		

[a]Slope and standard error based on difference between 1987 mean corpuscular hemoglobin and 1982 mean corpuscular hemoglobin versus log_2 dioxin.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

TABLE 13-21. (Continued)

Longitudinal Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

Ranch Hands - Log_2 (Current Dioxin) and Time

Assumption	Time (Yrs.)	Examination	Mean/(n) Current Dioxin Low	Medium	High	Slope (Std. Error)[a]	p-Value
c) Minimal (R^2=0.004)	≤18.6	1982	30.915 (69)	30.629 (125)	30.845 (51)	0.0572 (0.0745)	0.829[b] 0.443[c]
		1985	31.460 (67)	31.379 (122)	31.726 (50)		
		1987	31.609 (69)	31.634 (125)	31.914 (51)		
	>18.6	1982	31.140 (55)	30.824 (129)	30.738 (73)	0.0780 (0.0609)	0.201[c]
		1985	31.657 (54)	31.503 (127)	31.569 (72)		
		1987	31.902 (55)	31.779 (129)	31.744 (73)		
d) Maximal (R^2<0.001)	≤18.6	1982	30.600 (94)	30.712 (185)	30.825 (79)	-0.0214 (0.0521)	0.623[b] 0.682[c]
		1985	31.559 (91)	31.425 (180)	31.582 (78)		
		1987	31.748 (94)	31.667 (185)	31.689 (79)		
	>18.6	1982	31.042 (76)	30.960 (172)	30.732 (100)	0.0126 (0.0454)	0.781[c]
		1985	31.861 (75)	31.619 (170)	31.493 (98)		
		1987	32.150 (76)	31.871 (172)	31.686 (100)		

[a]Slope and standard error based on difference between 1987 mean corpuscular hemoglobin and 1982 mean corpuscular hemoglobin versus log_2 dioxin.

[b]Test of significance for homogeneity of slopes (current dioxin continuous, time categorized).

[c]Test of significance for slope equal to 0 (current dioxin continuous, time categorized).

Note: Minimal--Low: >10-14.65 ppt; Medium: >14.65-45.75 ppt; High: >45.75 ppt.
Maximal--Low: >5-9.01 ppt; Medium: >9.01-33.3 ppt; High: >33.3 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

TABLE 13-21. (Continued)

Longitudinal Analysis of Mean Corpuscular Hemoglobin (micromicrogram) (Continuous)

e) Ranch Hands and Comparisons by Current Dioxin Category

Current Dioxin Category	Mean/(n) Examination 1982	1985	1987	Contrast	Difference of Examination Mean Change (95% C.I.)	p-Value
Background	30.612 (681)	31.414 (676)	31.614 (681)	All Categories		0.609
Unknown	30.858 (315)	31.640 (310)	31.896 (315)	Unknown vs. Background	0.036 (-0.131,0.204)	0.671
Low	30.744 (191)	31.513 (188)	31.824 (191)	Low vs. Background	0.078 (-0.123,0.280)	0.447
High	30.773 (179)	31.532 (176)	31.687 (179)	High vs. Background	-0.088 (-0.295,0.119)	0.406
	(R^2=0.001)					

Note: Background (Comparisons): Current Dioxin ≤10 ppt.
Unknown (Ranch Hands): Current Dioxin ≤10 ppt.
Low (Ranch Hands): 15 ppt < Current Dioxin ≤33.3 ppt.
High (Ranch Hands): Current Dioxin >33.3 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.

TABLE 13-22.

Longitudinal Analysis of Platelet Count (thousand/cubic mm) (Continuous)

Ranch Hands - Log_2 (Initial Dioxin)

Assumption	Initial Dioxin	Mean/(n) Examination 1982	1985	1987	Slope (Std. Error)[a]	p-Value
a) Minimal (R^2<0.001)	Low	266.00 (123)	263.85 (120)	253.59 (123)	-0.971 (1.634)	0.553
	Medium	281.34 (254)	273.18 (249)	270.02 (254)		
	High	282.09 (124)	274.16 (122)	268.32 (124)		
b) Maximal (R^2<0.001)	Low	273.15 (170)	265.02 (167)	256.06 (170)	-0.359 (1.215)	0.768
	Medium	273.26 (357)	269.14 (348)	264.02 (357)		
	High	281.45 (178)	272.40 (175)	268.08 (178)		

[a]Slope and standard error based on difference between 1987 platelet count and 1982 platelet count versus log_2 dioxin.

Note: Minimal--Low: 52-93 ppt; Medium: >93-292 ppt; High: >292 ppt.
Maximal--Low: 25-56.9 ppt; Medium: >56.9-218 ppt; High: >218 ppt.
Summary statistics for 1985 are provided for reference purposes for participants who attended the Baseline, 1985, and 1987 examinations. P-values given are in reference to a contrast of 1982 and 1987 results.