> **Likelihood profile for parameter alpha used in computation of statistical uncertainty for ERR/Sv in NIH-IREP lung cancer model; re: Table IV.D.3, page 50, Report of the NCI-CDC Working Group to Revise the 1985 NIH Radioepidemiological Tables**
> **(Personal communication from Dr. Charles Land, NCI)**

From: Land, Charles (NIH/NCI) [landc@exchange.nih.gov]
Sent: Tuesday, February 03, 2004 3:02 PM
To: Henshaw, Russell
Subject: RE: Request for Pierce analysis

Russ, the attachment is the amfit analysis Don Pierce sent me, giving the likelihood profile in Table IV.D.3 for parameter alpha. I copied the log file onto a Word document to retain the format. In the model, the variables in Linear term 1 and loglinear term 1 pertain to the modeled baseline risk; loglinear term 2 has the linear dose-response coefficient, in log scale (parameter 20) and fixed parameter values corresponding to the Model 2 conventions for plus minus 1/2 for sex, f(e) for exposure age, and g(a) for attained age.

If it isn't crystal clear, give me a call.

Charles

ATTACHMENT

USE C:\workrerf\smoking\final\smoklung.BSF

BSF File created by AMFIT   on October 24, 2000 12:31:00 pm
Program information: 16   25
Description: This BSF file generated by EPICURE

INPUT @

Input from C:\workrerf\smoking\final\smoklung.BSF

        39022 records read   39022 records used
                                       0 records rejected

37 variables defined At least 500 additional variables can be created.

cases lung @
pyr apyr @
fitopt iter 70 @
CATEGORY agex AS ax7cat < / 10 (10) 60 > @
ax7cat has 7 levels from 1 to 7
strata city sex ax7cat agecat @

The current model has 560 strata

sele stopper==1 and smokcat>1 @

23460 records to be used

```
tran fem=sex==2 ; e30sq=e30^2 ; e30cub=e30^3; sexvar=2*sex-3 @
tran lage50a=min(log(age/50),0); lage60a=min(log(age/60),0);
lage70a=min(log(age/70),0)@
tran e30a15_30 = min(max(-15,e30),0) @
line 1 smokcat2 @
para 3=0 4:4.5 5:8.8 6:14 @
logl 1 acat fem sex*e30 sex*e30sq sex*e30cub @
para 7:-0.22 8:-1.6 9=0 10:-0.26 11:-0.52  13:-0.05 14:0.03 @
line 2 lun_ad10=1 @


logl 2 %con:0.5 sexvar e30a15_30 lage50a @
!fit @ null @
!prof 20 @
para 21 = 0.4215 @
para 22 = -.05255 @
para 23 = -1.626 @
fit @
```

	Iter	Step	Deviance
	0	0	2937.541
	1	0	2926.434
	2	0	2923.116
	3	0	2921.197
	4	0	2919.809
	5	0	2918.958
	6	0	2918.472
	7	0	2918.132
	8	0	2917.876
	9	0	2917.679
	10	0	2917.522
	11	0	2917.396
	12	0	2917.292
	13	0	2917.206
	14	0	2917.135
	15	0	2917.074
	16	0	2917.022
	17	0	2916.978
	18	0	2916.941
	19	0	2916.909
	20	0	2916.881
	21	0	2916.857
	22	0	2916.836
	23	0	2916.819
	24	0	2916.804
	25	0	2916.791
	26	0	2916.780
	27	0	2916.770
	28	0	2916.762
	29	0	2916.755
	30	0	2916.750
	31	0	2916.745
	32	0	2916.741

```
        33    0    2916.737
        34    0    2916.734
        35    0    2916.732
        36    0    2916.729
        37    0    2916.728
        38    0    2916.726
        39    0    2916.725
        40    0    2916.724
        41    0    2916.723
        42    0    2916.722
        43    0    2916.722
        44    0    2916.721
        45    0    2916.721
        46    0    2916.721
        47    0    2916.720
        48    0    2916.720
        49    0    2916.720
```

Piece-wise exponential regression
Product additive excess model { T0 * (1 + T1 + T2 + ...) }
Stratification on CITY SEX ax7cat AGECAT with 229 strata

Using stopper==1 and smokcat>1

    LUNG is used for cases
    APYR is used for person years

                        Parameter Summary Table

# Name	Estimate	Std.Err.	Test Stat.	P value
Linear term 1				
2 SMOKCAT2_1..............	0.000	Aliased		
3 SMOKCAT2_2..............	0.000	Fixed	0.06149	> 0.5
4 SMOKCAT2_3..............	4.057	2.106	1.927	0.054
5 SMOKCAT2_4..............	7.928	3.867	2.05	0.0404
6 SMOKCAT2_5..............	12.71	6.285	2.022	0.0432
Log-linear term 1				
7 ACAT_1...................	-1.093	1.986	-0.5503	> 0.5
8 ACAT_2...................	-1.726	1.007	-1.713	0.0867
9 ACAT_3...................	0.000	Aliased		
10 ACAT_4...................	-0.2290	0.4361	-0.525	> 0.5
11 ACAT_5...................	-0.4688	0.5245	-0.8938	0.371
12 fem.....................	0.1031	0.4885	0.211	> 0.5
13 SEX_1 * E30.............	-0.04044	0.02992	-1.352	0.176
14 SEX_2 * E30.............	0.02250	0.0361	0.6234	> 0.5
15 SEX_1 * e30sq...........	0.001027	0.001117	0.9195	0.358
16 SEX_2 * e30sq...........	-0.005169	0.003657	-1.413	0.158
17 SEX_1 * e30cub..........	7.255e-05	4.748e-05	1.528	0.126
18 SEX_2 * e30cub..........	0.0001941	0.000127	1.528	0.127
Linear term 2				
19 LUN_AD10................	1.000	Aliased		
Log-linear term 2				

```
20 %CON.....................        -0.1505      0.2981    -0.5048      > 0.5
21 SEXVAR..................         0.4215       Fixed      0.07885     > 0.5
22 e30a15_30...............        -0.05255      Fixed      0.5795      > 0.5
23 lage50a.................         -1.626       Fixed     -0.612       > 0.5
```

```
            Records used        23460

              Deviance       2916.72
            Pearson Chi2     73679.46      Degrees of freedom    23216
```

prof 20 @

  Upper bound trial values

```
            Deviance   One-Sided
    Beta     Change     P-Value

         _____

  -0.09089  -0.03796     0.423 *
   0.1635   -1.169       0.140 *
   0.04680  -0.4398      0.254 *
   0.1410   -0.9970      0.159 *
   0.1824   -1.323       0.125 *
   0.3156   -2.733       0.0491 *
   0.3952   -3.865       0.0247 *
   0.4645   -5.039       0.0124 *
   0.5455   -6.649       0.00496 *
   0.6001   -7.887       0.00249 *
```

  Lower bound trial values

```
            Deviance   One-Sided
    Beta     Change     P-Value

         _____

  -0.2101   -0.03436     0.426 *
  -0.4975   -1.042       0.154 *
  -0.3783   -0.4735      0.246 *
  -0.4899   -1.001       0.159 *
  -0.5449   -1.316       0.126 *
  -0.7364   -2.644       0.0520 *
  -0.8767   -3.783       0.0259 *
  -1.013    -4.974       0.0129 *
  -1.189    -6.575       0.00517 *
  -1.327    -7.841       0.00255 *
```

  Sorted list of profile likelihood points

```
            Deviance   One-Sided
    Beta     Change     P-Value

         _____

  -1.327    -7.841      0.00255
  -1.189    -6.575      0.00517
  -1.013    -4.974      0.0129
  -0.8767   -3.783      0.0259
```

```
-0.7364    -2.644     0.0520
-0.5449    -1.316     0.126
-0.4899    -1.001     0.159
-0.4975    -1.042     0.154
-0.3783    -0.4735    0.246
-0.2101   -0.03436    0.426
-0.1505     0.000     0.00
-0.09089  -0.03796    0.423
 0.04680   -0.4398    0.254
 0.1410    -0.9970    0.159
 0.1635    -1.169     0.140
 0.1824    -1.323     0.125
 0.3156    -2.733     0.0491
 0.3952    -3.865     0.0247
 0.4645    -5.039     0.0124
 0.5455    -6.649     0.00496
 0.6001    -7.887     0.00249
```

Interpolated profile likelihood bounds
 for parameter 20 (%CON)

| | MLE | -0.1505 | exp(MLE) | 0.8603 |

| 2-sided | Bounds | | exp(Bounds) | |
Level	Lower	Upper	Lower	Upper
25.0%	-0.2547	-0.05451	0.7751	0.9470
50.0%	-0.3735	0.04999	0.6883	1.051
68.3%	-0.4899	0.1414	0.6127	1.152
75.0%	-0.5461	0.1825	0.5792	1.200
90.0%	-0.7445	0.3134	0.4750	1.368
95.0%	-0.8836	0.3937	0.4133	1.483
97.5%	-1.019	0.4637	0.3611	1.590
99.0%	-1.196	0.5448	0.3025	1.724
99.5%	-1.331	0.5998	0.2642	1.822

```
0.9975  1.822
0.995   1.724
0.9875  1.590
0.975   1.482
0.95    1.368
0.875   1.200
0.8413  1.152
0.75    1.051
0.625   0.9469
0.5     0.8603
0.375   0.7751
0.25    0.6883
0.1587  0.6127
0.125   0.5792
0.05    0.4750
0.025   0.4133
0.0125  0.3610
0.005   0.3024
0.0025  0.2642
```