

MODELS FOR CANCER INCIDENCE

Örjan Hallberg, Hallberg Independent Research

A REGRESSION MODEL BASED ON AGE-COHORTS WILL REQUIRE LOTS OF PARAMETERS HAVING NO PHYSICAL MEANING

- ✍ Formula: $\log C_{ac} = N_{ac} + a_a + t_a + \text{error}_{ac}$
- ✍ Each age group (a) and each time period (c) require one parameter.
- ✍ On top of that the whole set of lines will be adjusted by another two parameters
- ✍ As an example, for 9 age groups during 6 time periods there will be required $15 + 2 = 17$ parameters

THIS IS AN EXAMPLE REQUIRING 17

COEFFICIENTS (FOSS AJE ET AL. MODELLING UVEAL MELANOMA, BR J OPHTHALMOL 1999;83:588-594)

Modelling uveal melanoma

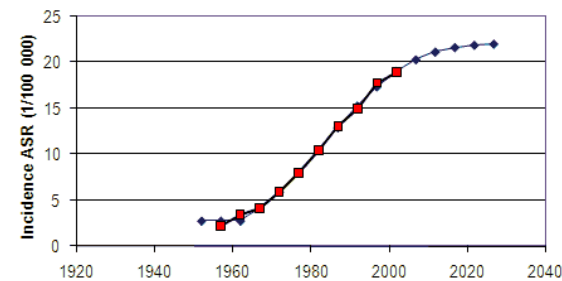
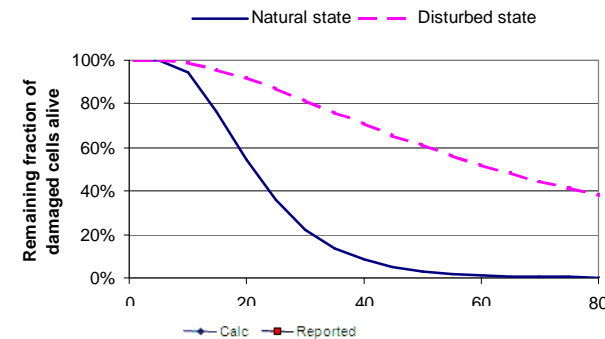
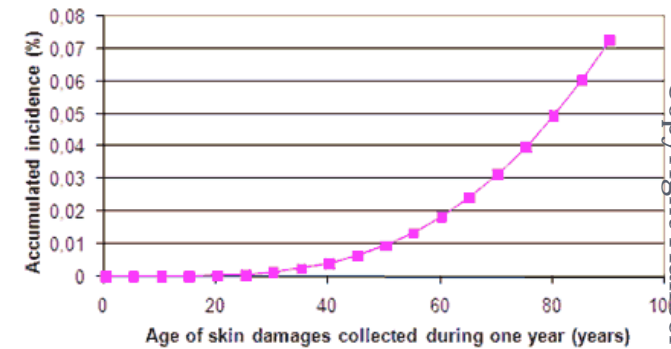
Table 1 Poisson model for England and Wales

<i>Variable</i>	<i>Coefficient</i>	<i>Standard error</i>	<i>p Value</i>
Sex			
Female	-0.236	0.030	0.000
Age			
45-49	0.570	0.108	0.000
50-54	0.998	0.101	0.000
55-59	1.480	0.096	0.000
60-64	1.838	0.94	0.000
65-69	2.098	0.093	0.000
70-74	2.231	0.094	0.000
75-79	2.249	0.097	0.000
80-84	2.330	0.102	0.000
85+	2.536	0.108	0.000
Time period			
1960-64	0.091	0.061	0.133
1965-69	0.128	0.059	0.030
1970-74	0.250	0.057	0.000
1975-79	0.164	0.057	0.005
1980-84	0.124	0.058	0.033
1985-89	0.079	0.058	0.175
Constant	-13.59	0.096	0.000

A PHYSICAL MODEL CAN MANAGE WELL BY VARYING ONLY TWO PARAMETERS.

(HALLBERG Ö. A REDUCED REPAIR EFFICIENCY CAN EXPLAIN INCREASING MELANOMA RATES. EUROPEAN JOURNAL OF CANCER PREVENTION. 2008;17:147-152.)

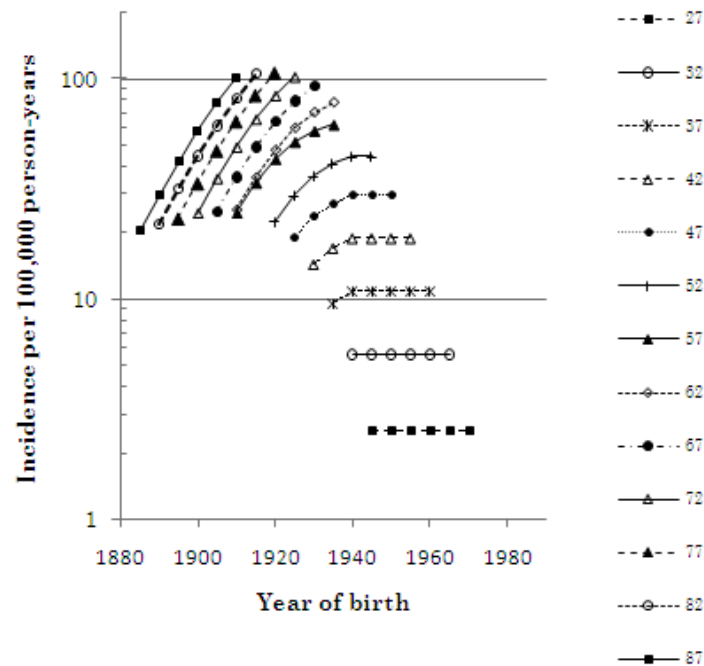
- ✎ One probability function describing cancer risk over time if no skin damages are being repaired at all (F)
- ✎ Another function describing how fast skin damages are being repaired before (S_n) and after (S_d) an environmental change.
- ✎ The dispersions of the two functions F and S_d are varied to fit age-standardized rates with reported data.



Copyright Hallberg Independent Research 2008

ALSO AGE-SPECIFIC INCIDENCE FITS WELL WITHOUT FURTHER PARAMETER VARIATION

Calculated incidence



Reported incidence

