Why do old men have big ears?

In July 1993, 19 members of the south east Thames faculty of the Royal College of General Practitioners gathered at Bore Place, in Kent, to consider how best to encourage ordinary general practitioners to carry out research. Some members favoured highly structured research projects; others were fired by serendipity and the observations of everyday practice. Someone said, 'Why do old men have big ears? Some members thought that this was obviously true—indeed some old men have very big ears—but others doubted it, and so we set out to answer the question "As you get older do your ears get bigger?"

Materials and results

Four ordinary general practitioners agreed to ask patients attending for routine surgery consultations for permission to measure the size of their ears, with an explanation of the idea behind the project. The aim was to ask consecutive patients aged 30 or over, of either sex, and of any racial group. Inevitably it was some times not appropriate -- for example, after a bereavement or important diagnosis -- to make what could have seemed so frivolous a request and sometimes (such as when surgery was running late) patients were not recruited. The length of the left ear was measured from the top to the lowest part with a transparent ruler; the result (in millimetres), together with the patient's age, was recorded. No patients refused to participate, and all the researchers were surprised by how interested (if amused) patients were by the project. The data were then entered on to a computer and analysed with Epi-Info; the relation between length of ear and the patient's age was examined by calculating a regression equation.

In all, 206 patients were studied (mean age 53.75 (range 30-93; median age 53) years). The mean ear length was 67.5 mm (range 52-84 mm), and the linear regression equation was: ear length = -55.99 + (0.22 x patient's age) (95% confidence interval for B coefficient 0.17 to 0.27). The figure shows a scatter plot of the relation between length of ear and age.
It seems therefore that as we get older our ears get bigger (on average by 0.22 mm a year).

Comment

A literature search on Medline by the library at the Royal College of General Practitioners that looked for combinations of "ears, external," "size and growth," "males," and "aging" produced no references.   A chance observation -- that older people have bigger ears -- was at first controversial but has been shown to be true. For the researchers the experience of involving patients in business beyond their presenting symptoms proved to be a positive one, and it was rewarding to find a clear result. Why ears should get bigger when the rest of the body stops growing is not answered by this research. Nor did we consider whether this change in a particular part of the anatomy is a marker of something less easily measurable elsewhere or throughout the body.

Scatter plot of length of ear against age
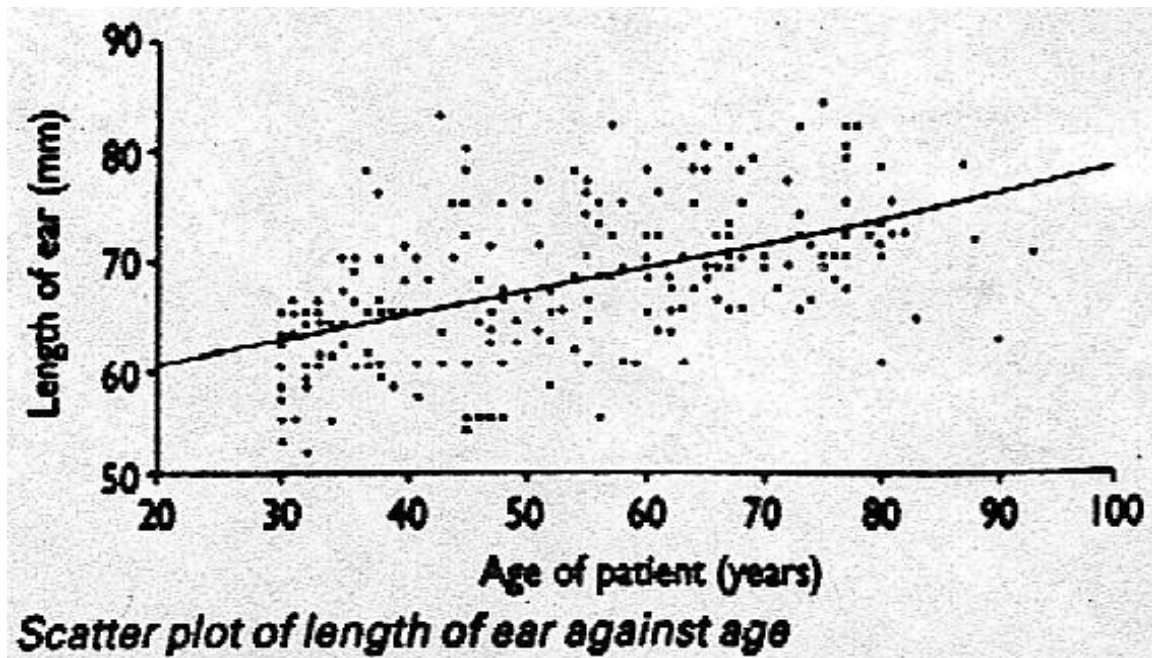
[scanned from journal]

Questions

a) Unlike Epi-Info, many statistical packages do not return the 95% CI for B; instead, they report b and SE(b). How does one go from b and SE(b) to the CI for B?

b) Considering the 95% CI for B, the coefficient b is statistically significantly different from B=0 (p < 0.05 two sided). But -- just from the CI-- can we calculate the actual p-value? If so, how?

c) Substitute the lower and upper limits of the 95% CI for coefficient B into the equation 55.9 + B•60. Compare this range with the observed ear lengths for patients of age approximately 60 years. How do you explain the discrepancy between the calculated and observed ranges?

d) Does the report give enough numerical details to allow you to mathematically project what the observed range should be? If yes, do so. If not, explain.

e) [tough!] From the summaries given, and from assumed values when essential summary values are not reported, reconstruct the output that would be produced by the PROC GLM or PROC REG regression procedure in SAS (see examples in textbook). Carefully document your calculations and reasoning, indicating which items were taken directly from the report, and which you had to estimate 'by eye'.