their faeces, when the preceding specimen had been negative (-/+ sequence). Six (31.6%) of these occasions were associated with a deterioration in clinical state compared with a similar deterioration associated with only 17 (9.8%) of the remaining 174 faecal culture sequences (+/+, +/-, -/-). Using the chi-square method, the authors found a p value less than 0.02.

The chi-square method, however, should only be applied to independent variables.² Bacteriological sequences from the same patient are not. Chi-square should in this case be calculated on one faecal sample or sequence per patient. Indeed, pooling related data artificially reinforces the strength of an observation. Moreover, if there are seasonal variations in klebsiella prevalence—which we do not know—the comparison has to be done at the same month for all patients and controls.

The same chi-square error is found in the first klebsiella paper,³ where 433 faecal samples from 163 patients are pooled and subdivided according to clinical activity. So it appears that, even if the klebsiella idea is an interesting one, the evidence thus far of a relationship between klebsiella and activity of ankylosing spondylitis largely rests on unsound statistics.

May we suggest that the editorial board should pay more attention to the validity of statistical procedures used in submitted papers?

Arthritis Unit,
Military Hospital,
rue Bruyn,
B 1120 Brussels, Belgium

Service de Statistique et Informatique,
Faculté des Sciences Agronomiques de l'Etat,
B 5800 Gembloux, Belgium

R. J. FRANÇOIS
C. DEBOUCHE

References

- 1 Eastmond C J, Calguneri M, Shinebaum R, Cooke E M, Wright V. A sequential study of the relationship between faecal *Klebsiella aerogenes* and the common clinical manifestations of ankylosing spondylitis. *Ann Rheum Dis* 1982; **41**: 15–20.
- 2 Dixon W J, Massey F J. *Introduction to statistical analysis*. New York: McGraw-Hill, 1957: 221–5.
- 3 Ebringer R W, Cawdell D R, Cowling P, Ebringer A. Sequential studies in ankylosing spondylitis. Association of *Klebsiella pneumoniae* with active disease. *Ann Rheum Dis* 1978; **37**: 146–51.

SIR, We read with interest the letter from Drs François and Debouche criticising the use of the chi-square statistics for testing the statistical significance of the association between a particular klebsiella faecal culture sequence (-/+) compared with alternative sequences (-/-, +/-, +/+) and an increase in clinical activity of ankylosing spondylitis in patients. The chi-square statistic is a method of testing the hypothesis that 2 characteristics are independent. If the proportions in the sample tested are significantly different from the expected then the hypothesis that the 2 characteristics are independent is rejected.¹

In our study² the frequency of the faecal culture sequence -/+ was independent of whether the subjects

were patients with ankylosing spondylitis or controls. Nineteen of 193 patients had this sequence compared with 26 of 154 controls giving $\chi^2_c = 1.36$ (1 DF); $p < 0.05$. Patients and controls were contacted on the same consecutive dates, thus excluding any effect of possible seasonal variation in faecal klebsiella carriage.

We believe our results do show an association between the appearance of *Klebsiella aerogenes* in the faeces and an increase in the clinical activity of ankylosing spondylitis, though this does not prove cause and effect or indicate the mechanism of such an effect.

Rheumatism Research Unit,
University Department of Medicine,
General Infirmary at Leeds and
Department of Microbiology,
Medical School,
University of Leeds

C. J. EASTMOND
M. CALGUNERI
R. SHINEBAUM
E. M. COOKE
V. WRIGHT

References

- 1 Dixon W J, Massey F J. *Introduction to statistical analysis*. New York: McGraw-Hill, 1957: 221–5.
- 2 Eastmond C J, Calguneri M, Shinebaum R, Cooke E M, Wright V. A sequential study of the relationship between faecal *Klebsiella aerogenes* and the common clinical manifestations of ankylosing spondylitis. *Ann Rheum Dis* 1982; **41**: 15–20.

Bacteroides causing osteomyelitis in rheumatoid arthritis

SIR, We read with interest the recent case reports of pyogenic arthritis due to bacteroides species complicating rheumatoid arthritis (RA).¹ We recently reported the history of a man with RA who presented with acute haematogenous osteomyelitis of the clavicle due to *Bacteroides fragilis*.² There was no evidence of previous bony pathology at a later post-mortem examination, although we had initially suspected a metastasis from a carcinoma of the bronchus. Like Dodd *et al.*'s case¹ our patient was not pyrexial and had not had steroid therapy. He was treated with clindamycin and metronidazole. After daily aspiration of the abscess the pus discharged spontaneously and he made a full recovery. The metronidazole was continued for 8 weeks, again with no evidence of a neuropathy. We did not identify the source of his infection, but he was known to have diverticulosis.

Anaerobic osteomyelitis is not common. Raff and Melo³ reviewed 193 cases in the literature of which 29 were due to haematogenous spread of the organism. They reported an increased incidence in patients with predisposing factors such as diabetes mellitus, but no patient had RA. Patients with RA may be more susceptible to infection, but it was not clear why our patient developed this unusual presentation of osteomyelitis.

Identification of an anaerobic organism may be delayed because of its slow rate of growth in vitro. The benefits of gas liquid chromatographic (GLC) analysis of septic synovial fluid have been reported,⁴ and if anaerobic infection is

suspected the organism may be identified more rapidly by analysis of the usually foul smelling pus by GLC.

Ashington Hospital, West View,
Ashington, Northumberland

P. R. CROOK

PHLS and Microbiology Laboratory,
Hartshill Road,
Stoke-on-Trent

J. GRAY

References

- 1 Dodd M J, Griffiths I D, Freeman R. Pyogenic arthritis due to bacteroides complicating rheumatoid arthritis. *Ann Rheum Dis* 1982; **41**: 248-9.
- 2 Crook P R, Gray J. Acute osteomyelitis of the clavicle due to *Bacteroides fragilis*. *North Staffordshire Medical Institute Journal* 1981; **13**: 66-7.
- 3 Raff M J, Melo J C. Anaerobic osteomyelitis. *Medicine (Baltimore)* 1978; **57**: 83-103.
- 4 Brook I, Reza M J, Bricknell K S, Bluestone R, Finegold S M. Abnormalities in synovial fluid of patients with septic arthritis detected by gas-liquid chromatography. *Ann Rheum Dis* 1980; **39**: 168-72.

Calciferol levels in RA and OA

SIR, We were interested to read the report of Bird *et al.* demonstrating no significant difference in 1, 25-dihydroxycholecalciferol levels ($1, 25(\text{OH})_2\text{D}_3$) in a group of patients with rheumatoid arthritis (RA) compared with a similar group with osteoarthritis (OA).¹

We have demonstrated a general increase in bone turnover as measured by whole body retention (WBR)² of ^{99m}Tc methylene diphosphonate in rheumatoid patients compared with matched controls.³ Serum levels of vitamin D metabolites including $1, 25(\text{OH})_2\text{D}_3$ were normal in 8 patients whose WBR was elevated. This lends additional support to the concept of a generalised as well as a periarticular abnormality of bone turnover in RA which occurs as part of the inflammatory disease process.

Rheumatic Diseases Centre,
University of Manchester,
Salford M6 8HD

R. N. THOMPSON
C. N. A. RAJAPAKSE
D. M. GRENNAN
B. MAWER

References

- 1 Bird H A, Wright B, Hennes U, Theiss E. Comparison of serum $1, 25$ -dihydroxycholecalciferol concentrations in rheumatoid arthritis and osteoarthritis. *Ann Rheum Dis* 1982; **41**: 257-8.
- 2 Fogelman I, Bessent R G, Turner J G, Critin D L, Boyle I T, Greig W R. The use of whole-body-retention of ^{99m}Tc diphosphonate in the diagnosis of metabolic bone disease. *J Nucl Med Allied Sci* 1977; **19**: 170-275.
- 3 Rajapakse C, Thompson R n, Grennan D M, *et al.* Increased bone metabolism in rheumatoid arthritis as measured by the whole body retention of ^{99m}Tc methylene diphosphonate. *Ann Rheum Dis* in press.

Streptococci and reactive arthritis

SIR, We were interested to read the case report of Hubbard and Hughes.¹ There are some similarities between their patient and the one we described in 1980.² A 43-year-old salesman developed, 3 weeks after a throat infection due to beta-haemolytic streptococci, predominant lower limbs arthritis, low back pain, and severe talalgia.

In the presence of subcutaneous nodules, pericardial effusion, and a previous history of rheumatic fever at the age of 19 an acute attack of rheumatic fever was diagnosed. The ASO titre was 1600 U/ml. In addition to these classical signs of rheumatic fever the patient sustained not only sacroiliac pain for 2 weeks but also a painful swelling of the right big toe and severe bilateral talalgia lasting more than 1 year, which evolved to calcaneal erosions. There were no yersinia agglutinins, and HLA B27 was positive.

It is interesting to note that both rheumatic fever and a reactive arthritis (considered as an incomplete form of Reiter's syndrome in our report) followed a streptococcal throat infection in this patient. The association of both conditions could be fortuitous. However, these data suggest, as in the case reported by our colleagues, that streptococci might be considered as one of the infectious agents capable of precipitating a reactive arthritis in an HLA B27-positive individual.

Centre Hospitalier,
Universitaire Vaudois,
1011 Lausanne,
Switzerland

J. C. GERSTER
M. PAYOT
G. RAPPOPORT

References

- 1 Hubbard W N, Hughes G R V. Streptococci and reactive arthritis. *Ann Rheum Dis* 1982; **41**: 435.
- 2 Gerster J C, Payot M, Rappoport G. Probably fortuitous association of rheumatic fever and Reiter's syndrome. *Z Rheumatol* 1980; **39**: 343-7.

Histocompatibility antigens in patients with ectopic ossification due to fibrodysplasia ossificans progressiva

SIR, Sharpshiro *et al.*¹ have suggested that HLA B27 might have the effect of increasing liability to new bone formation. The basis for this was a claimed association between B27 and ankylosing hyperostosis, but, although the evidence is that there is no such association, we have taken the opportunity to study the HLA antigen frequencies in 23 patients from the UK with fibrodysplasia ossificans