

per year—Knight considered that some areas of the United Kingdom, including the temperate west counties, north Wales, and north-west Cheshire may have sufficient warmth and humidity to harbour the yeast in fertile environments.<sup>5</sup> These tend to be soil infested with animal matter—chicken coops, starling roosts, and caves rich in bat guano. Seven years before admission our patient killed a bat that entered his room in a nineteenth century Somerset house, but no febrile illness followed this event. He otherwise denied hobbies or activities that could lead to exposure to potentially infected material. Closer questioning about his wartime exploits, however, revealed several visits to the Elephanta caves outside Bombay in 1945. The implication of bat infection at this source would presume a 30-year interval between acquiring the organism and the development of clinical symptoms. Presumably if this were so, the fungus was during this prolonged interval a symbiotic inhabitant of the mouth, and the onset of diabetes mellitus provided a favourable environment for its proliferation and dissemination. The alternative to this rather convoluted theory is to assume that the patient contracted histoplasmosis as an

opportunistic infection in England after developing his diabetes mellitus.

We are grateful to the sister and the staff of ward M2, Manchester Royal Infirmary, the Department of Oral Medicine, the Dental Hospital, and to Professor P H Adams for permission to report this case.

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## SHORT REPORTS

### Detection of bone metastases in carcinoma of bronchus

At diagnosis lung cancer is at least as frequently a systemic as a regional disease.<sup>1</sup> Bone metastases have been found at necropsy in over one-third of cases.<sup>2</sup> It is reasonable to try to exclude such metastases before treatment. We have compared the value of three techniques for detecting bone metastases—namely, measurement of serum alkaline phosphatase concentrations, plain radiography, and radioisotope scanning.

#### Methods and results

We examined the records of 100 consecutive patients with carcinoma of the bronchus who had undergone investigation for bone metastases. Sixty patients had bone pain and 40 were investigated for assessment of tumour spread before a course of chemotherapy or radiotherapy.

Bone metastases were thought to be present in 44 patients. Of these, 20 had squamous-cell carcinoma, 14 oat-cell carcinoma, and 10 adenocarcinoma. Bone metastases were confirmed histologically in six patients, by subsequent radiographs in 17 patients, and the remaining 21 patients had severe, persistent, localised bone pain before death. The other 56 patients had no evidence of bone metastases at death or after 18 months' follow-up. Of the 44 cases of bone metastases, 40 had been investigated because of bone pain.

In all cases serum alkaline phosphatase was measured, and plain radiography and a bone scan were performed. Radiographs were taken of painful areas, of regions that had been positive at scanning, or for a skeletal survey, and were reported without knowledge of the bone-scan result. The scans were performed on a Scintomat 2 machine (Siemens) with the use of 99-Tc-labelled polyphosphate. The whole spine, pelvis, and upper femora were examined routinely, and other areas as indicated. Scans were reported by other observers without access to radiographs.

The results are summarised in the table. The serum alkaline phosphatase concentration (normal 35 IU/l) was raised in half the patients with bone

metastases. In only 10 cases was it raised by more than 10%. It was raised in 11 patients with no bone metastases; this was due to liver metastases in nine patients, and Paget's disease in two patients.

Plain radiographs detected six of the cases of bone metastases due to squamous-cell carcinoma, four of those due to adenocarcinoma, and seven of those due to oat-cell carcinoma.

Bone scans detected 19 out of 20 metastases due to squamous-cell carcinoma, all 10 cases due to adenocarcinoma, but only eight of the 14 cases due to oat-cell carcinoma. The scan was positive in seven cases in which radiographs were negative and sites were symptom-free. The duration of symptoms in patients with positive scans was raised from two days to seven months, but seven patients had symptoms for one week or less. In six cases the scan was equivocal and x-ray pictures showed degenerative disease. Abnormal findings on two scans were correctly identified as being due to Paget's disease, and this was confirmed by plain radiography.

#### Comment

Estimation of serum alkaline phosphatase was a poor technique for isolating bone metastases. Plain radiography detected less than half the cases of bone metastases. Radiographs cannot usually show bone metastases until they are 1-1.5 cm in diameter, and 50% bone calcification has occurred.<sup>3 4</sup>

Most patients with positive scans had symptoms, but some had pain only for a short period and others had positive scans in sites that were symptom-free. Hence bone scans may be useful in detecting otherwise unobtrusive bone metastases. We suggest that bone scans are used as the major technique for investigating bone metastases due to carcinoma of the bronchus. If the scan shows equivocal areas, radiography should also be used.

<sup>1</sup> Muggia, F M, and Chervu, L R, *Seminars in Oncology*, 1974, **1**, 217.

<sup>2</sup> Deeley, T J, *Monographs on Oncology: The Chest*, p 28. London, Butterworths, 1973.

<sup>3</sup> Brachman, A L, and Sproul, E, *Bulletin of the New York Academy of Medicine*, 1955, **31**, 146.

<sup>4</sup> Edelstyn, G A, Gillespie, P J, and Grebbell, F S, *Clinical Radiology*, 1967, **18**, 158.

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Results of investigations for bone metastases in 100 cases of carcinoma of the bronchus

Technique	True-positive (n = 44)	True-negative (n = 56)	False-positive	False-negative
Serum alkaline phosphatase estimation .. .. .	22	22	11	45
Plain radiography .. .. .	17	56	0	27
Radioisotope bone scanning .. .. .	37	56	0	7