

imens from patients with ankylosing spondylitis.³ Inflammatory changes of the muscles in patients with ankylosing spondylitis have rarely been described. The muscle changes described here, however, together with two previous reports,^{4,5} suggest that inflammatory changes may occur in the skeletal muscles of patients with ankylosing spondylitis.

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Incorrect diagnosis of myotonic dystrophy and its potential consequences revealed by subsequent direct genetic analysis

Myotonic dystrophy (MyD) is a multisystem disorder with prominent features in skeletal and cardiac muscle. It shows genetic anticipation with a tendency for members of successive generations to be affected more severely by the disease and at a younger age.¹ At its most severe it may cause a characteristic foetal and neonatal syndrome, which can be fatal.¹ For genetic reasons and also to identify patients at risk from cardiac complications,² screening of patients at risk for MyD is now recognised as important. Classically, a combination of clinical examination, needle EMG, and slit-lamp examination of the eyes has been used to identify patients who carry the disease² but only about 92% of obligate carriers are detected. The sensitivity could be increased by genetic linkage studies, but clearly this requires that the correct parent be identified as a carrier in cases where both are asymptomatic. The recent introduction of a direct DNA test³ to demonstrate an increase in the number of [CTG] repeats at the 3' end of the myotonin protein kinase gene has now improved diagnostic accuracy and removed the need for linkage analysis. We report here two cases in which an incorrect assignment of carrier status on clinical and EMG criteria was revealed by the direct genetic test.

Case 1

A 60-year-old woman and her 70-year-old husband were seen in 1990 for screening for myotonic dystrophy after the diagnosis had been made in their 31-year-old daughter. Clinical examination showed no evidence of myotonia in the husband and his EMG and slit-lamp examination were negative. On examination of his wife there was no grip

myotonia or percussion myotonia but a consultant neurologist considered that percussion myotonia of the tongue was present. Needle EMG showed occasional myotonic discharges and there were minor non-specific changes on slit-lamp examination. Based on these findings the mother was assumed to be the carrier of the gene for MyD. A clinically unaffected daughter sought genetic advice and was assigned a low risk on the basis of negative EMG and slit-lamp examination and by linkage analysis. When the direct genetic test became available in 1992 the samples were retested and the mother found not to carry the expansion associated with MyD. Her husband carried a minimally expanded allele (EO)⁴ and thus was a carrier of the disease. Fortunately the unaffected daughter, who had been given a low risk based on the incorrect linkage result, was found to carry no expansion and therefore not to carry the disease.

Case 2

A 51-year-old woman was screened for MyD after the diagnosis was made in three of her siblings. No abnormalities were found on neurological examination or needle EMG. She had bilateral posterior subcapsular cataracts and low intraocular pressure. The cataracts were not of the stellate form usually seen in MyD, but as there was also low intraocular pressure (which is associated with MyD) she was assigned carrier status. Linkage analysis for her asymptomatic daughter was complicated by the fact that the biological father was no longer in contact with the family so that no linkage diagnosis could be offered. For this reason the entire family was retested with the direct DNA test and the woman in question was found not to be a carrier of the disease.

In both of these cases, asymptomatic patients were diagnosed as being minimally affected by MyD based on limited clinical features, and in the first case an assessment of genetic risk was made for a third party (the patient's younger daughter) on the basis of incorrect linkage assignments. It was fortunate that the incorrect result did not lead to a missed diagnosis and the birth of a congenitally affected child. There was, however, considerable psychological trauma to the first patient both at the time of her misdiagnosis and when the diagnosis was revised. The importance of making a correct clinical diagnosis before applying linkage analysis is again brought home by these cases.

The direct demonstration of the mutation in MyD, either by restriction enzyme analysis or by the polymerase chain reaction, detects at least 99% of cases of MyD.⁵ Also, cases where myotonia has coexisted with features not considered typical of MyD have been shown to have the MyD mutation and the test has proved useful in detecting cases of congenital MyD in which the mother has not previously been known to have MyD. We feel that there is now a demonstrable need to review critically all minimally affected persons who have been diagnosed on the basis of clinical (including EMG and slit-lamp examination) or linkage analysis criteria. Linkage analysis in this condition should now be considered outmoded. Finally, we advise that whereas clinical examination, EMG, and slit-lamp examination are still relevant in trying to understand the relation between genetic

abnormality and clinical features, the gold standard for diagnosis and screening must be direct DNA analysis.

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MATTERS ARISING

Lactate responses to exercise in chronic fatigue syndrome

We were interested to read the recent account of exercise characteristics in patients with chronic fatigue syndrome by Gibson *et al*,¹ which concluded that there was no abnormality of neuromuscular function in this condition. Patients reached the limits of exercise tolerance at lower heart rates than controls during incremental exercise to exhaustion but their peak work rates and duration of exercise did not differ significantly from the control group, although the total work done (the product of these variables) would appear to have been less; the authors had previously reported that patients with this condition showed a reduction in maximal work rate achieved in such tests.² Despite this, plasma lactate levels at the end of exercise were as high in the patients as the controls.

In an earlier study using incremental exercise on a treadmill, Riley *et al*³ had found higher heart rates and increased lactate levels compared with normal controls at submaximal work rates but similarly noted no differences at peak exercise.

We have found that a proportion of patients with chronic fatigue syndrome exhibit abnormally raised lactate levels following steady state exercise at work rates below the anaerobic threshold, corresponding to roughly half the peak work rates achieved in the incremental test paradigm.⁴ It is thus possible that lactate levels in some patients increase more rapidly than normal at lower work rates.

The cause of this apparent 'left shift' of the anaerobic threshold is unclear. Neither we nor Gibson *et al*² found evidence of