in falsely negative results. In fact, besides being affected by temperature and having easy habituation, the sympathetic skin response is a reflexly evoked response, having efferent autonomic and diverse afferent sensory pathways, and also subject to "central" control. This implies that absent sympathetic skin responses could conceivably follow not only lesions of the efferent autonomic branches, but also involvement of sensory afferences, some of which are often affected in neuropathy, or of central nervous system alone. Central nervous system lesions could also simply change the reflex threshold, modifying the supraspinal facilitation of sympathetic skin response. Moreover, sudomotor activity can be affected by a number of agents, such as anticholinergic and antihypertensive drugs; their effects on sympathetic skin responses, at present unknown, might be relevant.

P MONTAGNA, R LIGUORI, M ZAPPIT
Institute of Neurology
University of Bologna
Via U. Foscolo 7
40123 Bologna Italy

References

Sympathetic skin response

Sir: A simple, reliable and non-invasive test to identify dysfunction in non-myelinated peripheral axons would be a great advance and the investigation of peripheral neuropathy. Shahani et al claim that the measurement of the sympathetic skin response, which they believe to be related to eccrine sweat gland activity, provides such a test. They produce evidence which is interpreted as showing that the sympathetic skin response is absent in axonal neuropathy but preserved in demyelinating neuropathies. Our experience suggests that their conclusions should be treated with caution.

We have measured the sympathetic skin response in patients and normal controls using surface electrodes placed on the palm and dorsum of the hand and on the sole and dorsum of the foot. Recordings were made with a DISA 1500 electromyograph using a band pass of 0-5-2000 Hz. Stimuli were sudden inspiratory gasp, cough, sudden loud noise and electric shock. Sympathetic skin responses were easily recorded from both upper and lower limbs of eight normal subjects in response to all stimuli. Latencies varied slightly from test to test in a single patient but all responses were within the range 1-2-1-5 s when recorded from the hand and 1-8-2-2 s when recorded from the foot. Response amplitude was much more variable, showing a tendency to become smaller with repeated testing. Maximum amplitude ranged between 1-0 and 2-5 mV measured from peak to peak. Four diabetic patients were studied. All had evidence both of autonomic dysfunction, judged by abnormalities of tests based on cardiovascular reflexes, and polyneuropathy, judged by clinical examination and reduced common peroneal motor nerve conduction velocities. In addition, all had symptoms of dysautonomia including the characteristic pattern of sweating abnormality found in diabetics: loss of sweating in the lower limbs and a tendency to hyperhidrosis over the upper trunk and head. A sympathetic skin response of comparable latency and amplitude to that found in normal subjects was elicited from the hands of all patients. Sympathetic skin responses were absent in the feet of two of the patients but were easily elicited from the others.

Symptoms occur late in the natural history of diabetic autonomic neuropathy. All our patients were symptomatic and had abnormalities of cardiovascular reflexes in addition; they should be regarded as having advanced autonomic neuropathy. They also showed clear evidence of polyneuropathy which, in diabetics, is known to be axonal in type. In two out of four patients we were able to elicit sympathetic skin responses indistinguishable from those found in our control subjects. Absence of the sympathetic skin response may well indicate dysfunction of non-myelinated peripheral axons but its presence cannot be taken as evidence that these axons are intact. We think that the lack of sensitivity of this test will limit its value in the investigation of patients with peripheral neuropathy.

P C WACHTEL
Department of Medicine
University of Edinburgh
Edinburgh EH3 9Dy Scotland

References