Letters to the Editor

To the Editor

Autonomic Dysfunction in Recovered Severe Acute Respiratory Syndrome Patients

The worldwide outbreak of the severe acute respiratory syndrome (SARS) has been associated with a novel coronavirus.[1] With global eradication of transmission of SARS, research efforts have focused on vaccine development and prevention of future outbreaks. However, little attention has been paid to the morbidity of recovered SARS patients, and effects of the disease on the nervous system. A common complaint is prolonged fatigue and malaise. Based on previous experiences of similar complaints after viral infections, we hypothesized that the symptomatology may be related to peripheral and autonomic nervous system dysfunction.

With ethics committee approval, we studied 14 probable SARS patients (two men, age range 20 to 48 years) who were previously healthy six months after onset of illness, with their consent. They were infected by a SARS patient during a local hospital outbreak but subsequently recovered and returned to work. The diagnoses were based on contact history, clinical features, chest radiological changes and antibody testing. Each patient had a detailed history taken and underwent physical examination, including a complete neurological examination. They underwent nerve conduction (median sensory and motor, ulnar sensory and motor, posterior tibial motor, superficial peroneal sensory, peroneal motor, sural, 'F' waves) and autonomic studies (sympathetic skin responses in four limbs, heart rate measurement over one minute during normal, deep breathing and 30:15 s heart rate ratio to standing up). To ensure validity, each heart rate study was repeated six times and was considered abnormal if more than three showed results exceeding that of controls. For a more robust criterion, only absence of sympathetic skin response in a particular limb was regarded as pathological. Studies were performed using a Medtronic Keypoint (Medtronic, Skovlunde, Denmark) machine with automated analysis.

Each patient then completed a questionnaire based on four questions relating to fatigue symptoms. These comprised subjective severity of fatigue, its relation to time of day, additional rest needed and whether fatigue affected daily activities. Each question was scored from 1 to 7, defined as depicting no change from before illness to maximum severity of symptoms. Hence, the fatigue score ranged from 4 to 28.

The results were compared with those from 30 age-matched (range: 18 to 50 years) normal controls who underwent similar study protocols.

All 14 patients experienced fatigue and malaise. The controls and patients had mean fatigue scores (standard deviation (SD)) of 2.2 (1.5) and 4.7 (0.9) respectively, with statistically significant differences (unpaired t-test, $p<0.005$). None had evidence of postural hypotension (> 20 mm Hg postural drop in blood pressure) or abnormal neurological examination.

Nerve conduction studies were unremarkable, consistent with absence of large fiber system affectation. The stand-up test was significantly abnormal for patients (mean: 1.14, SD: 0.15) compared with controls (mean: 1.28, SD: 0.16) (Mann-Whitney U test, $p<0.05$). Comparison with normal controls of each age group showed four patients had abnormal individual stand-up test ratios, of which three experienced persistent dizziness. Two others with headache and sleep disturbances had normal and deep breathing test abnormalities, respectively. One patient had absent bilateral lower limb sympathetic skin responses.

The findings in this study, which show the presence of dysautonomia in recovered SARS patients, are of interest in several areas. While younger patients suffer less mortality, significant morbidity, particularly chronic fatigue, may be present months after recovery from acute illness.[2] This was supported by statistically significant differences in fatigue scores of patients and controls. The autonomic dysfunction (parasympathetic and sympathetic) documented in 50% of recovered SARS patients in our study appeared to be of higher incidence than postviral idiopathic autonomic neuropathy.[3] While the relationship between our findings and the chronic fatigue syndrome,[4] which share common features, is unclear, abnormal stand-up test results may partially account for subclinical orthostatic hemodynamic disturbances, which contribute to fatigue symptoms and dizziness. More sensitive additional autonomic testing may be useful in this respect. To this end, our study leads to better understanding of clinical problems faced by convalescing SARS, and will be of value in devising future therapeutic regimens.

This study is dedicated to the patients who overcame SARS and continue to live life courageously.

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1. Ksiazek TG, Erdman D, Goldsmith CS, et al. A novel coronavirus associated with severe acute respiratory syndrome. N Engl J Med 2003; 348: 1953-1966.
2. Choi KW, Chau TN, Tsang O, et al. Outcomes and prognostic factors in 267 patients with severe acute respiratory syndrome in Hong Kong. Ann Intern Med 2003; 139: 715-723.
3. Rowe PC, Bou-Holaigah I, Kan JS, et al. Is neurally mediated hypotension an unrecognised cause of chronic fatigue? Lancet 1995; 345: 623-624.
4. Freeman R, Komaroff AL. Does the chronic fatigue syndrome involve the autonomic nervous system? Am J Med 1997; 102: 357-364.

To the Editor

An American-Canadian Neurologist Returns to Canada. Harvey B. Sarnat. *Can. J. Neurol. Sci. 2004; 31: 436-437.*

Like Dr. Sarnat, we have also recently returned to Canada after twelve years of practice in neurology and neurosurgery in the Midwest of the USA. Before then we had practiced in Canada for fifteen years as an academic neurologist (SJP) and a neurosurgeon in a nonuniversity hospital (GBP). One of us has recently returned to a nonacademic practice in British Columbia. Dr. Sarnat's

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