Increased Clara Cell Protein in Serum of Firefighters

To the Editor:

Smoke inhalation is a well-known cause of airway injury in firefighting personnel. At present, early diagnosis of smoke-inhalation injury relies essentially on tests of pulmonary function. Data reported here suggest that a much more sensitive detection can be achieved by measuring serum Clara cell protein (CC16). The latter is the major secretory product of lung Clara cells, nonciliated cells located predominantly in terminal bronchioli. The protein was determined by latex immunoassay [1] in the serum of six voluntary firefighters in a chemical plant (ages 27 to 49 years) who had inhaled smoke from the combustion of polypropylene for ~20 min. Five of them had complaints of airways irritation. Clinical examination, however, was normal for all subjects, and no significant decrease in lung function was found. The mean vital capacity and the mean forced expiratory volume in 1 s were respectively 99.7% and 94.7% of predicted values. The concentration of CC16 in serum of firefighters 1 h after the fire (mean 54.4 μg/L, SD 34.9) was significantly greater than that of six age-matched controls examined simultaneously [19.5 (11.7) μg/L, P = 0.04]. Ten days later, the CC16 concentrations in the firefighters had returned to values similar to those in controls: 15.9 (2.76) vs 17.7 (12.5) μg/L. Considering the latter as baseline, the average increase of serum CC16 in the firefighters had been 328% (range 100–564%). This peak of serum CC16 most likely results from a transient increase in transit of the protein across the bronchoalveolar/blood barrier, caused by irritating compounds of the smoke. Determination of serum CC16 thus appears to be a new sensitive test for detecting injury to the respiratory airways after acute exposure to firesmoke.

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Alfred Bernard*
Guy Van Houtte
Industrial Toxicol. and Occupational Med. Unit
30.54 Clas Chapelle-aux-Champs
B-1200 Brussels, Belgium

Cardiac Troponins in Severe Rhabdomyolysis

To the Editor:

An editorial in Clinical Chemistry last year discussed the roles of various markers of myocardial damage [1]. The cardioselectivity of cardiac troponin T (TnT) was stated to be uncertain in patients with chronic renal disease, chronic muscle disease, and noncardiac trauma. In the article being discussed, Bhayana et al. had examined one patient with rhabdomyolysis [2]. We have studied the specificity of cardiac TnT and cardiac troponin I (Tnl) in the serum of 20 patients (16 men and 4 women) with severe rhabdomyolysis. The study was done in accordance with the Helsinki Declaration.

The etiology of rhabdomyolysis was intoxication with alcohol or drugs (usually benzodiazepines, neuroleptics, and antidepressives), or both, in 13 patients; infection in 2; and 1 each with brain infarction with inability to move, traumatic compression of lower limbs, and malignant neuroleptic syndrome. Patients with chest contusion or obvious myocardial damage were excluded. Four of the 20 required hemodialysis because of renal failure. Overall, the mean peak serum creatine kinase (S-CK) value was 91 300 U/L (range 7300–201 250 U/L; reference value <270 U/L). Serial blood samples (an average of 4 samples per patient) were collected between day 1 and 12 after diagnosis. TnT was measured by the one-step immunoenzymometric assay (IEMA) of Boehringer Mannheim (Mannheim, Germany) and Tnl by the IEMA from ERIA Diagnostics (Marnes la Coquette, France).

Tnl concentrations were above the discriminator value for myocardial infarction (0.2 μg/L) given by the manufacturer of the kit in 81% of the samples. The peak Tnl value (average 5.21 μg/L, 26 times the upper reference value) was increased in 19 of the 20 patients (Fig. 1) and correlated with the peak S-CK value (r = 0.75, P <0.0001). Three of these patients had minor ischemic changes detected by electrocardiography (ECG) on admission to the hospital.

In contrast, 11% of the samples measured for TnT were above the detection limit for myocardial damage (0.1 μg/L). The peak TnT value (average 0.17 μg/L, 1.7 times the upper reference value) was increased in 6 of the 20 patients (Fig. 1) with no correlation to peak S-CK (r = 0.07). The absolute peak value of S-CK-MB mass was increased in all 6, but

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Fig. 1. Peak values of cardiac TnT and Tnl in 20 patients (○ women, ● men) with severe rhabdomyolysis.

The shaded area depicts the reference range. The peak values of S-CK-MB mass (<7 μg/L) with corresponding S-CK (<270 U/L) and CK-MB mass index (100 x CK-MB mass (μg/L)/total CK (U/L); reference <1.5) and the peak creatinine concentrations (<115 μmol/L) of the six patients with increased Tnl values were respectively: 1 (age 56), 13, 15 810, 0.08, and 160; 2 (age 60), 8, 15 220, 0.05, and 238; 3 (age 41), 159, 156 800, 0.10, and 574; 4 (age 25), 20, 31 450, 0.06, and 1173; 5 (age 22), 20, 130 350, 0.02, and 651; 6 (age 73), 9, 2966, 0.30, and 92. Patients 3 and 5 underwent hemodialysis because of renal failure. Only patients 2, 3, and 6 showed ischemic changes on ECG (T-wave inversion, elevated ST and T-wave inversion, and T-wave inversion, respectively).

* Author for correspondence.