Carboxylic Ester Hydrolase

A Sensitive Serum Marker and Indicator of Severity of Acute Pancreatitis

P. Jonas Blind,*1 Marcus Büchler,2 Lars Bläckberg,3 Yvonne Andersson,4 Waldemar Uhl,2 Hans G. Beger,2 and Olle Hernell4

Departments of 1Surgery, 1Physiological Chemistry and Biophysics, and 4Pediatrics, University of Umeå, Umeå, Sweden; and 2Department of Surgery, University of Ulm, Ulm, FRG

Received February 7, 1990; Revised March 15, 1990; Accepted April 15, 1990

Summary

When using clinical criteria, both falsely positive and falsely negative diagnoses of acute pancreatitis (AP) are often made. Based on a clinical study, elevated serum levels of the pancreatic lipolytic enzyme carboxylic ester hydrolase (CEH) was recently suggested to be a highly specific marker of acute pancreatitis.

To determine the sensitivity of the test for AP, a study on patients with the diagnosis set objectively was necessary. In the present study, AP was diagnosed by contrast-enhanced computed tomography in 64 patients, and histopathological examination of tissue removed at laparotomy in 18 of them. By these criteria, 42 patients suffered from acute interstitial pancreatitis (AIP), and 22 patients from necrotizing pancreatitis (NP).

Based on the CEH concentrations in the first serum sample obtained in each patient, the sensitivity of CEH for pancreatitis was 98%. From the second day after admission, CEH levels in patients with NP were significantly higher than in patients with AIP. Furthermore, in patients with NP, CEH values remained at a raised level for the following 10 d, whereas a significant decrease of CEH values was noted in patients with AIP. In contrast, total serum amylase activities were higher in patients suffering of AIP than in patients suffering of NP during the observation period. We conclude, that the sensitivity of the CEH test is very high for AP. CEH concentrations remaining at a high level are suggestive of NP, whereas diminishing CEH levels are suggestive of AIP.

Key Words: Acute pancreatitis; pancreatic enzymes; carboxylic ester hydrolase; amylase.

*Author to whom all correspondence and reprint requests should be addressed.
INTRODUCTION

In patients presenting with acute abdominal pain and hyperamylasemia, the diagnosis of acute pancreatitis (AP) may be erroneously set in as many as one-third, as judged from isoamylase determinations (1,2). On the other hand, AP is reported to be found unexpectedly in one-third of patients undergoing laparotomy required by various clinically diagnosed intraabdominal emergency conditions (3). Apparently, when using clinical criteria and hyperamylasemia, both falsely positive and falsely negative diagnosis of AP is often made. The serum concentration of the pancreatic lipolytic enzyme carboxylic ester hydrolase (CEH), determined by a sandwich-ELISA technique, was recently suggested to be highly specific for AP, since no falsely positive CEH levels were noted in patients admitted because of abdominal emergency conditions, or for elective surgery, without known pancreatic pathology (4). However, in a study without objective confirmation of the diagnosis in all patients, no conclusions can be drawn on the sensitivity of the CEH test for AP, or on the course of serum levels of CEH, or any other marker, in relation to the severity of the disease (4–8). Thus, for further evaluation of serum CEH determinations as a marker for AP, an objective diagnosis, independent of enzyme levels, was a prerequisite. The most reliable means for diagnosis of AP are laparotomy (8,9) and contrast-enhanced computed tomography (CECT) (10,11).

The present study was therefore designed to determine the sensitivity of serum CEH as a marker of AP. Furthermore, the relationship between severity of pancreatitis and the time-course of serum CEH levels was studied. CEH levels were also compared to total amylase activities in serum, since amylase is universally used as marker of AP.

PATIENTS AND METHODS

Patients

The present study was conducted on 20 female and 44 male patients discharged from the Department of General Surgery, University of Ulm, FRG, with the diagnosis AP. Their mean age was 49 yr, ranging from 17–84 yr. All patients were examined by CECT in a General Electric CT T8800 within 48 h after admission. The patients were given 200 mL of a water soluble contrast medium to drink. Scans (5 mm thick slices exposed during 12 s) were made just before and after the patients were given a 200 mL iv bolus of contrast medium (12).

On the basis of CECT, 42 patients were diagnosed as suffering from acute interstitial pancreatitis (AIP), and 22 from necrotizing pancreatitis (NP). In 18 of these 22 patients, the diagnosis NP was further verified by histopathological examination of tissue that was judged necrotic at laparotomy and thus removed. They underwent lesser sac lavage according to previously