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ANTITHROMBIN III AND PLASMINOGEN LEVELS IN MODERATE AND SEVERE TRAUMA. F.A. Dombrose[†], A.E. Seyfer[§] and J. Callahan[†]. Department of Pathology[†], Thrombosis and Hemostasis Center, University of North Carolina, Chapel Hill, N.C. 27514 and Plastic Surgery Service[§], Walter Reed Army Medical Center, Washington, D.C., 20012, USA

Functional and immunologic levels of antithrombin III (ATIII) and plasminogen were assessed in three groups of nine patients each: elective surgery, moderate and severe trauma. Patients otherwise healthy were classified as follows: I, elective extremity surgery, no blood transfusions, normal coagulation screening tests (14-50y); II, isolated, moderately severe trauma (e.g., replantation or revascularization of one or more digits), no transfusions (14-56y); and III, isolated, severe trauma to extremities, with replantation and revascularization of a severed arm or leg, receiving 1-4 units of whole CPD blood (20-59y). Preoperative, intraoperative (2 hr into surgery) and 24 hr postoperative values were measured. Group III only had intraoperative sampling, with the exception of two patients who had preoperative values prior to any transfusions. A detailed statistical comparision was made (at the 95% confidence level) of the differences in ATIII activity, ATIII antigen level, the ratio of ATIII activity-to-antigen and plasminogen activity among categories within and between groups. The data suggest that elective surgery and moderate trauma had virtually the same effect on ATIII and plasminogen. Activity and antigen values decreased intraoperatively but on the average not enough to be out of the acceptable range. During the convalescent period most ATIII values returned to their preoperative level while most plasminogen values continued to decline somewhat (although still in the acceptable range). By contrast, both ATIII and plasminogen values in the severe trauma group were markedly depressed compared to preoperative levels in either group I or II. Four of the patients in this group suffered postoperative thrombosis and loss of an extremity even though the limb was initially viable. The transient lowering of both ATIII and available plasminogen is undoubtedly most critical when surgical stress is superimposed on existing trauma.

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A KINETIC APPROACH TO THE DEFINITION OF PATHOPHYSIOLOGY OF LOW ANTITHROMBIN III (AT) LEVELS IN PATIENTS. E.B. Reeve, B.D. Leonard, R.D. Bies, D.R. Ambruso and W.E. Hathaway. Department of Medicine and Pediatrics, University of Colorado School of Medicine, Denver, Colorado, United States.

Patients with 50 percent of normal levels of AT are at serious risk of deep venous thrombosis. Possible causes of 50 percent levels are (1) a halving of synthetic rate, or (2) a doubling of fractional catabolic rate. In health fractional catabolic rate is 50 percent of the plasma AT per day. Doubling of fractional catabolic rate might be due to (a) the presence of a structurally defective AT molecule or (b) might be directly related to a great excess of AT consumption by complex formation with released clotting proteases. These possible causes of low AT levels can be distinguished by turnover studies with ^{131}I-labelled AT from the patient and from a healthy donor.

We have developed simple, rapid methods of preparing highly purified AT from 30 to 60 ml of citrated blood and of labelling it with ^{131}I without denaturation at about 0.5 iodine atom per AT molecule. A turnover study requires intravenous injection of 4-6 μC of ^{131}I.

Studies in a female patient with hereditary AT deficiency (40-50 percent AT level) compared to normal subjects indicates our approach. Fractional breakdown rate of her own ^{131}I-AT was 50 percent per day indicating no obvious structural abnormality. Fractional breakdown rate of ^{131}I-labelled donor AT was also 50 percent per day further indicating no difference in the behavior of her own and of normal AT and no excess consumption by clotting proteases. The patient's ability to compensate for increased AT-III consumption during an episode of thrombosis was impaired. Thus the patient suffered from a synthetic defect resulting in the ability to synthesize only 50 percent of her AT requirements per day.

AT turnover studies provide an approach to the definition of the etiology of depressed AT levels in various disease states.