PLATELET ALTERATIONS IN PORCINE STRESS SYNDROME

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ABSTRACT

Platelets in blood collected from pigs identified as normal (21) or stress susceptible (25) on the basis of their response to halothane challenge, were subjected to electron microscopic examination in order to test whether the ultrastructural features of stress susceptible pigs exhibit any deviation from those of normal. The most striking feature of the platelets from stress susceptible pigs was the extent of dilatation of the open canalicular system (OCS). The difference in platelet morphology between normal and stress susceptible pigs was consistent regardless of the anticoagulants used for blood collection indicating that the platelet alteration may be an inherent component of the porcine stress syndrome.

INTRODUCTION
Porcine stress syndrome (PSS) is an inherited condition generally affecting breeds characterized by heavy musculature. Susceptible animals are adversely affected by stress induced by isolation, trucking, weaning, fighting, coitus or crowding and exhibit muscle rigidity, a rapid rise in body temperature, tachycardia, open mouth breathing and blotchy cyanosis (Gronert, 1980). After slaughter in an abattoir, the carcass of a stress susceptible pig often deteriorates to what is generally referred to as pale, soft, exudative (PSE) pork. Development of a reliable test system for the detection of stress susceptibility in pigs is vital to the swine industry which now suffers a severe economic loss due to stress-related sudden death and post-mortem deterioration of meat.

The response of young pigs to halothane challenge is currently being used as the most reliable indicator of stress susceptibility (Webb, 1980). However, variability in the response to this test and the frequent mortality during halothane challenge necessitate the development of a less invasive and more reliable method of stress detection. Among the non-invasive systems tested for the efficacy of stress detection are the blood group antigens (Andresen and Jensen, 1977), erythrocyte membrane property (Harrison and...
Verburg, 1973) and the platelet function (Keith et al., 1983). Abnormalities in platelet morphology have been detected in some stress susceptible pigs (Basrur et al., 1983). However, some of the anticoagulants routinely used for blood collection are also known to affect the size, shape and function of platelets (Frojmovic and Milton, 1982) and the influence of these anticoagulants on the platelets of stress susceptible pigs needed to be delineated. This investigation was undertaken to examine whether the morphological alteration reported in stress susceptible pigs (Basrur et al., 1983) is a consistent feature of the syndrome.

MATERIALS AND METHODS

Animals

The animals used in this study were males ranging in age from 3 to 6 months. These animals included 25 pigs identified as stress susceptible on the basis of their reaction to the halothane challenge as described by Seeler et al. (1983), and 21 normal pigs from a genetic stock known to be free from porcine stress syndrome. Pigs of the latter group were exposed to the halothane/succinylcholine challenge (Seeler et al., 1983) to confirm their status as normal (non-responders to stress induced by halothane). Prior to blood collection, animals of both groups were allowed a minimum recovery period of two weeks after halothane challenge.

Blood Collection

Blood samples were drawn from the anterior vena cava as described by Brown (1979). Blood, aspirated with a syringe fitted with a 17 gauge needle (3.5 inches long), was transferred immediately into commercially available vacutainer tubes (Becton-Dickinson, Mississauga, Ontario, Canada) coated with different anticoagulants. The anticoagulants used were sodium heparin (143 USP units), sodium citrate (0.5 ml of 0.1M buffered solution of trisodium citrate), sodium oxalate (0.5 ml of 0.1M solution) and potassium oxalate (14 mg potassium oxalate with 17.5 mg of sodium fluoride). Vacutainer tubes coated with different anticoagulants were filled in random order with the blood of the same animal.

Electron Microscopy

Blood was processed following the procedures described by Yamashiro et al. (1983). In brief, the blood samples were centrifuged for 15 minutes at 1800 RPM in a Damon/IEC clinical centrifuge, the plasma layer was discarded and the platelet rich layer was transferred with a Pasteur pipet to Wintrobe