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DÖHLE BODIES IN NEUTROPHIL LEUCOCYTES OF ANAEMIC SWINE

By
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In man Döhle bodies are described as small bodies in the cytoplasm of the neutrophil leucocytes. They are stained a blue colour with the usual Romanowsky stains.

Von Döhle (1912) noticed these bodies in patients suffering from scarlet fever, and at that time he considered them to be the cause of the disease (*Weiner & Topley,* 1955). But subsequent to this first discovery Döhle bodies were also found in some other infectious conditions (*Horsters et al.,* 1951), in patients with burns (*Weiner & Topley,* 1955) and in *Hegglin*'s anomaly (*Wintrobe,* 1956). As regards animals it appears from available haematological literature that Döhle bodies are found only in the cat (*Ackart et al.,* 1940). The authors reported occurrence of Döhle bodies in 3—80 per cent of the neutrophil leucocytes in normal cats.

The nature and significance of the bodies are unknown. *Horsters et al.* (1951) discuss the possibility that they may be produced by abnormalities in the maturation of the leucocytes or that they are formed by the influence of infectious agents on the cells.

In this paper basophilic structures in the neutrophils, observed during the investigation of an anaemic condition in young pigs, are described.

CASE HISTORY

Three different herds of newly purchased young pigs were studied. The pigs appeared healthy on arrival, but gradually

became unthrifty, with poor appetite, loss of weight and anaemia. Five animals, weighing from 20 to 30 kg., had succumbed, but no post mortem examination had been done.

The *clinical findings* suggested the possibility of *Eperythrozoon*-infection, and blood films from 8 of the anaemic pigs were sent to our laboratory by *T. Vik*, veterinary surgeon, Sandeid. The blood films were stained by the combined May-Grünewald-Giemsa method. Films from 6 healthy young pigs were stained at the same time as controls.

One of the affected animals (No. II, O.F.) was transported to the Research Station for more careful examination. The pig weighed 25 kg. It was distinctly anaemic with pale mucous membranes. The temperature was subnormal and the respiration rate was about 40 per min. The pig appeared extremely dull, was unable to stand on his feet and adopted a resting posture with the elbows held away from the chest wall. Just after arrival a sample of heparinized blood was collected and blood films were made. The animal was dead the next morning.

Post mortem the anaemic condition was confirmed. The blood was thin and watery. Otherwise the most important findings were splenomegaly and partial adherence between the left lung and the chest wall. Dilatation of the right side of the heart and partial adherence to the pericardium were also present.

A variety of aerobic bacteria were isolated from the pericardium, one of which appeared to be *Corynebacterium pyogenes*.

Laboratory findings

Blood cell count from pig No. II, O.F. gave the following values:

Red cells, 1.5 million per cu.mm. Leucocytes, 121.600 per cu.mm.

Differential count: Lymphocytes, 16.6 %, Monocytes, 0, Neutrophils, 82.7 %, Basophils, 0.7 %, Eosinophils, 0.

There was a distinct shift to the left of the neutrophils.

Microscopy of blood films from the anaemic pigs

Basophilic structures in the neutrophil leucocytes were found in 6 out of the 8 sick animals. Of these 6 pigs 5 were from the same herd. Pig No. II, O.F. also belonged to this herd. The cytoplasm of the neutrophils in the controls was stained a normal, pinkish colour.

In the stained films from all these 8 animals there was a marked increase in the number of nucleated red corpuscles, and red cells with polychromasia and Howell-Jolly bodies were present. In addition to these changes, some degree of anisocytosis was also found. In the films, in which the basophilic structures were seen, there was a relative increase in the neutrophil leucocytes, the differential counts showing up to 80 per cent of neutrophils. From the 6 animals neutrophils with basophilic structures ranged from one to 30 per cent of the total number.

Eperythrozoon-like organisms were not found in any of these animals.

Morphology of the basophilic structures

The basophilic structures or bodies were seen in the cytoplasm of both band forms and the polysegmented neutrophils. The colour was light bluish in contrast with the pinkish cytoplasm of the cells. The bodies appeared as round forms or as thick rods with a maximum dimension of up to 2 μ. Several irregular forms were also seen. Some of these forms appeared as cloudy formations in the cytoplasm. Usually only one distinct body occured in each neutrophil and in most cases in the periphery of the cell. But in some cells several bodies, up to 3 or 4, were present, and in few cases there was a more diffuse occurence of small, irregular forms.

In addition to these discrete basophilic structures the cytoplasm of some cells showed a diffuse bluish colour. Several round, unstained areas were also seen in the cytoplasm of a few cells. These two kinds of cytoplasmic changes occured in films especially from 2 of the animals with basophilic structures.

DIAGNOSIS

It appears from the clinical and laboratory findings that only a presumptive diagnosis could be made regarding the etiology of the anaemic condition. The necropsy lesions in the one pig and the relative neutrophilia in the blood films from the affected animals strongly indicated the primary cause to be an infectious disease resulting in secondary anaemia. Supporting this suggestion are also the other observed changes in the cytoplasm of the neutrophils: the diffuse bluish colour and the vacuoles. Diffuse basophilia may be seen under infectious conditions in animals

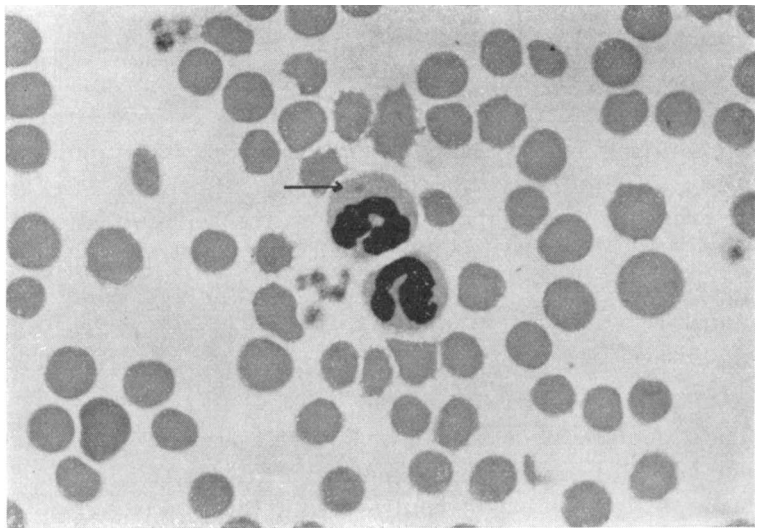

Fig. 1. One oval shaped body in the cytoplasm of a neutrophil leucocyte. Foto E. Aspøy.

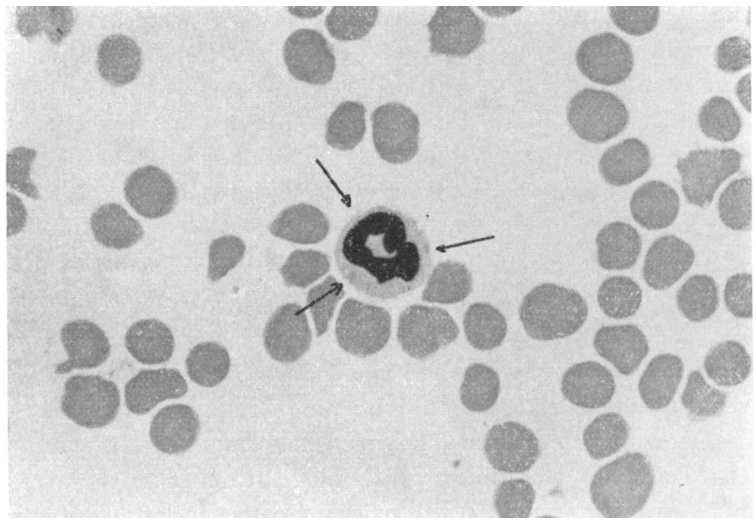

Fig. 2. Three basophilic, rod-like bodies in the cytoplasm of a neutrophil leucocyte. Foto E. Aspøy.

(*Schalm*, 1961) as well as in man (*Gordin*, 1952). In man cytoplasmic vacuoles are reported to be present under the same conditions (*Ponder & Ponder*, 1943, *Gordin*, 1952).

Blood films from suckling, iron deficient pigs

As said above it was suggested an infectious disease causing the anaemic condition. The question that then naturally arose, was whether these basophilic structures do occur in nutritional anaemia or not. So far only one litter of 8 anaemic iron deficient pigs have been studied. In two of these animals similar structures were observed in 3 respectively 5 per cent of the neutrophils. The haemoglobin concentrations were 5.5 and 6.0 gm.%.

Blood films from 50 healthy pigs.

In connection with the above material, blood films from additional 50 apparently normal pigs were examined. Of these animals 15 were 3—5 weeks old. The remaining ones, 6—8 months old, brought in for slaughter at a local slaugther house, were selected at random. In each May-Grünewald-Giemsa stained film 100—200 neutrophils were examined.

Basophilic, rodlike structures of similar type were found in 1—2 per cent of the neutrophils from 4 of the 50 healthy animals. These 4 pigs originated from the same farm.

DISCUSSION

The basophilic structures observed in these cases correspond to Döhle bodies described in man as regards staining properties, morphology and position in the cells.

From the examinations recorded above it appears that small numbers of similar bodies may be seen in blood films from piglets suffering from nutritional anaemia and in apparently healthy pigs. The latter observations are in agreement with the reported occurrence of Döhle bodies in the cat (*Ackart et al.*, 1940). From the present material it is not possible to ascertain the significance or the etiology of these bodies. However, the fact that the bodies have been observed under other conditions than infectious ones, indicates that they may be produced by abnormalities in the maturation of the leucocytes as has been discussed by others (*Horsters et al.*, 1951). Further investigations in animals may throw more light on this subject.

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SUMMARY

The occurrence of Döhle bodies in the neutrophil leucocytes of anaemic pigs, iron deficiency anaemia included, is described.

In blood films from 50 apparently healthy pigs similar basophilic structures were observed in small numbers in 4 of them.

ZUSAMMENFASSUNG

Döhle-Körper in neutrophilen Leukozyten bei anämischen Ferkeln.

Das Vorkommen von Döhle-Körpern in neutrophilen Leukozyten wird bei Ferkelanämie, einschliesslich der Eisenmangelanämie bei Jungferkeln, beschrieben.

In Blutausstrichen von 50 anscheinend gesunden Ferkeln wurde eine geringe Anzahl ähnlicher basophiler Strukturen bei 4 Tieren ermittelt.

SAMMENDRAG

Döhle-legemer i neutrophile leucocytter hos anemiske griser.

Det beskrives forekomst av Döhle-legemer i neutrophile leucocytter hos anemiske griser, jernmangelanemi hos smågriser innbefattet.

I blodutstryk fra 50 tilsynelatende friske griser ble et lite antall lignende basophile strukturer funnet hos 4 dyr.

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