INTERACTIONS BETWEEN ERYSIPELAS BACTERIA AND SWINE MACROPHAGES WITH SPECIAL REFERENCE TO VIRULENCE

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Introduction:
Most of the publications on the rôle played by swine phagocytic cells in Erysipelas infection are restricted to the activities of the PMN granulocytes (Arend, 1966; Suphasindhu, 1972 and Böhm and Suphasindhu, 1980). The rôle played by mononuclear phagocytes (monocytes and macrophages), however, is not yet fully understood. Therefore we investigated the phagocytic and degrading activities of swine macrophages against virulent and avirulent strains of Erysipelothrix rhusiopathiae in vitro.

Materials and Methods:
Bacteria: Five strains belonging to different serotypes and groups of Erysipelothrix rhusiopathiae were used in this study. Three of these strains (Me 7; T 28 and T 20) are virulent to swine, one (T 59) is weakly virulent, and the last (N Frankfurt) is avirulent.

Labelling of the bacteria with radioactive isotope ^{75} Selenomethionine (^{75} Se-M):
the used erysipelas strains were labelled with ^{75}Se-M according to Soliman et.al., 1981.
Swine: 19 apparantly healthy, conventional pigs, mostly of "Deutsche Landrasse" were used as a source of macrophages.

Separation and cultivation of swine macrophages from peripheral blood monocytes:
Swine macrophages were cultivated in vitro from peripheral blood monocytes after Owen, et.al., 1975; and Wardly et.al., 1980.

Phagocytosis experiments: Experiment 1 was designed to determine the relationship between bacterial virulence of various erysipelas strains and the phagocytosis by swine macrophages: bacterial strains labelled with ^{75}Se-M were added to the 72 h old swine macrophages, (100 bacteria : 1 cell) and after 1 h phagocytosis at 37°C the plates were washed 4 times for the removal of the non phagocytosed bacteria. The adherent macrophages together with the phagocytosed bacteria were removed and measured in the γ-counter to determine the no. of phagocytosed bacteria / well. Experiment 2 was designed to investigate the interactions between virulent (T28) and avirulent (N Frankfurt) strains of erysipelas bacteria and macrophages from 7 pigs, during different periods of incubation time.
After 1 h primary phagocytosis and 12, 24 and 40 h post incubation (Following 1 h primary phagocytosis), two parameters were measured: 1) the number of bacteria/macrophage and 2) the amount of released ^{75} Selen in supernate.

Results:
Experiment 1: macrophages from 12 pigs have phagocytosed the avirulent N Frankfurt strain more strongly than the virulent strains (Me 7, T 28 and T 20). In case of N Frankfurt the phagocytic index was 30,91 $\pm$ 1,24 x 10^5 bact./well, while that for the other strains was, 15,76 $\pm$ 0,54 x 10^5; 11,0 $\pm$ 0,46 x 10^5 and 18,88 $\pm$ 0,51 x 10^5 bact./well respectively.

Experiment 2 showed the following results:
a) It has been proved again that after 1 h primary phagocytosis, the avirulent N Frankfurt strain was phagocytosed at a more higher rate (96 bact./cell) than the virulent T 28 strain which showed a phagocytic index of 29 bact./cell.
b) Post-phagocytic incubation of the infected swine macrophages for 12, 24 and 40 h after 1 h primary phagocytosis have showed that the avirulent N Frankfurt strain was digested and degraded more rapidly and strongly than the virulent T 28 strain. After 12 h post incubation the no. of the avirulent strain decreased to 16 bact./cell, while the no. of the virulent bact./cell remained nearly unchanged (from 29 bact./cell at 0 h to 25 bact./cell after 12 h).

The decrease of the no. of bact./cell during the post incubationtimes was inversally correlated with the specific ^{75}Selen release from the digested bacteria.

Conclusions:
Swine macrophages prepared from peripheral blood monocytes represents an available cell population which is suitable for studing the function of these cells in vitro.

The avirulent strain N Frankfurt was phagocytosed more strongly than the virulent or weakly virulent strains.

Swine macrophages were not able to digest the virulent strain T 28 with the same effectivness as they did with avirulent strain.

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