BIOCHEMICAL AND PHYSIOLOGICAL PROPERTIES OF TREPONEMA HYODYSENTERIAE ISOLATED FROM DIFFERENT CASES OF SWINE DYSENTERY

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In contradiction with the opinion of Harris et al /2/ and Kinyon, et al /3/, Picard et al /4/ believs that weakly hemolising spirochetes which cause the fermentation of lactose allows biochemical distinction of them from T.hyodysenteriae. Taylor, et al /6/ reported a new form of disease in swine caused by spirochetes as well as identified a strain of spirochetes having different properties. The purpose of this experiment was to establish the biochemical and physiological properties of Treponema sp. strains isolated from swine in Poland.

Materials and Methods

Feces, contens of the large intestine, were collected on the selective medium according to Szynkiewicz and Binek /5/, and cultured according to Binek, et al. /1/. Twenty pure strains were isolated and tested their physiological and biochemical properties, as well as MIC for different chemotherapeutic agents. Hemolysis was read after 48 hours incubation on modified TSA medium /1,5/ with supplementary horse blood. Electron microscopy was performed by dr E. Malicka. Enteropathogenicity was tested by the ligated colonic loops method /LCL/.
The presence of lipase, oxidase, catalase, and reduced nitrates were tested on a solid medium. The production of hydrogen sulphide was tested with indicator paper in lead acetate. Indole was detected on solid and liquid medium using amyl alcohol and Ehrlich's reagent. Gelatinase test was detected upon digestion of charcoal - gelatin disc in the liquid culture of the spirochetes. The results of sugar fermentation were read as positive when there was a fall in pH of at least 0.5. The products of glucose fermentation was determined by gas chromatography.

Results

Twelve spirochete strains isolated from swine with symptoms of acute, bloody diarrhea caused strong beta hemolysis, with characteristics of 7-9 axial fibrils, enteropathogenicity, indole producing, fructose non-fermenting, and 5 in 12 fermented lactose. Glukose was fermented to acetic, propionic and butyric acids. These strains were classified as typical T. hyodysenteriae. Five strains isolated from swine with a milder case of dysentery caused somewhat weaker hemolysis after 48 hours incubation similar to alpha hemolysis produced by Streprococcus. These had 5-9 axial fibrils and were enteropathogenic in LCL. One in 5 fermented fructose, 3 in 5 produced indole. They fermented glukose producing acetic and butyric acids, some also produced propionic acid. It was proposed to name these strains T. hyodysenteriae intermediate -type in regard to their biochemical properties between T. hyodysenteriae and T. innocens. Three strains were isolated from healthy swine. They showed weak hemolysis, and had 7-9 axial fibrils. These were nonenteropathogenic for the LCL test and fermented fructose, lactose, maltose, trehalose and saccharose. They did not produce indole. Glukose brokedown to acetic and butyric acids. These strains were classified as T. innocens. Not one of the tested strains produced lipase, catalese, oxidase, or hydrogen sulphide, nor reduced nitrates or hydrolyzed gelatin. All strains showed high sensitivity to metronidazol and linkomycin MIC 0.19-1.56 µg/ml.

Conclusions

Physiological and biochemical properties, as well as determined enteropathogenicity allows for the separation of twenty spirochete strains isolated from swine into 3 groups.

1. Treponema hyodysenteriae /Harris, et al/
2. Treponema hyodysenteriae with some similar properties to Taylor's strains P43/6/78 and named T. hyodysenteriae intermediate - type.
3. Treponema innocens /Kinyon and Harris/. Lactose fermented part of the tested T. hyodysenteriae. Strains whose passages were made on artificial medium lost their ability to ferment sugars.

Selected references: 1. Binek M., Szynkiewicz Z., Rumińska A., Medycyna Wet. 9:536,1980. 2. Harris D.L., Glock R.D., Christensen C.R., Kinyon J.M.; Vet.Med. /Small Anim.Clin.67:61, 1972. 3. Kinyon J.M., Harris D.L.; Int.J.Syst. Bacteriol.29:102,1979. 4. Picard B., Lariviere S., Sahed S.; Can.J. Microbiol.26:985,1980. 5.Szynkiewicz Z., Binek M.; in press,.6. Taylor D.J., Simmons J.R., Laird H.M.; Vet. Rec.102: 26,1980.