

*Brief Communication*

CORRELATION BETWEEN THE PATHOGENICITY OF FIELD STRAINS OF AUJESZKY'S DISEASE VIRUS AND THEIR ABILITY TO CAUSE CELL FUSION — SYNCYTIA FORMATION — IN CELL CULTURES

Susceptible cells infected with Aujeszky's disease virus will generally show one of two kinds of cytopathic effect (CPE), characteristic of the virus strain concerned: either pronounced syncytia formation or rounding of the cells with appearance of scattered small giant cells (cf. Kaplan 1969).

In connection with studies on the epidemiology of Aujeszky's disease in cattle (Bitsch 1975 a, b) it was noted that isolates from outbreaks in cattle with anterior localization of pruritus, which was found indicative of infection by the respiratory route, were very often syncytia-forming, while isolates from cattle with posterior pruritus — indicative of infection by the alimentary or genital route — as well as the majority of isolates from outbreaks in pigs would produce rounded, so-called balloon cells.

As from January 1978, all isolates of Aujeszky's disease virus were evaluated with respect to the kind of CPE produced in cell cultures.

In preliminary testings, some series of isolates were inoculated into cultures of MDBK, PK-15, HeLa, and primary pig kidney and testis cells. The CPE observed differed considerably according to the kind of cell culture used, but marked variations could also be seen from one preparation to another of the same kind of cell culture. Primary pig kidney cells were found to be best suited for the evaluation.

The virus isolates were tested in series, each time with reference strains included. In practically all cases the isolates could be separated into two distinct groups on the basis of their CPE. The results for strains originating from outbreaks in 1978 and 1979 are shown in Table 1. Four isolates from pigs were judged to be of an intermediate CPE type, and among the syncytia-forming isolates some would repeatedly produce larger syncytia than others in parallel testings.

Some 20 % of all isolates were syncytia-forming. For isolates of bovine origin a correlation seems to exist between the type of CPE and the clinical manifestation of the disease (cf. Table 2).

Table 1. Cytopathic changes in primary pig kidney cell cultures induced by Aujeszky's disease virus isolates from outbreaks occurring in 1978 and 1979.

	Number of isolates (outbreaks)	With syncytia formation	With no syncytia formation	With intermediate type of cytopathic changes
Swine	127	25	98	4
Ruminants	18 <sup>1</sup>	5	13	—
Carnivores	14	2	12	—

<sup>1</sup> 17 in cattle, 1 in goats.

Table 2. Cytopathic changes induced in cell cultures by virus isolates from outbreaks of Aujeszky's disease in cattle, as related to clinical manifestations.

	Number of outbreaks (isolates)	Number of affected animals	Affected animals per outbreak	Type of cytopathic changes produced by isolates
Anterior pruritus	5	31 <sup>1</sup>	6.2	4 S, 1 NS <sup>3</sup>
Posterior pruritus	12	16 <sup>2</sup>	1.3	0 S, 12 NS

<sup>1</sup> 1, 5, 16, 5 and 4 animals, resp.

<sup>2</sup> 1 or 2 animals in each outbreak.

<sup>3</sup> S: syncytia formation; NS: no syncytia formation.

To elucidate further this relationship, preserved isolates from 25 earlier outbreaks in cattle were included in the study. The results for the total of outbreaks (42) are shown in Table 3. None of 25 isolates from outbreaks with posterior pruritus were syncytia-forming, as against 14 of 17 isolates from outbreaks with anterior pruritus.

While syncytia-forming viruses were isolated in 20 % of outbreaks in pig herds during 1978—79, such viruses have so

Table 3. Type of cytopathic changes induced in cell cultures by virus isolates from 42 outbreaks of Aujeszky's disease in cattle.

	Number of isolates (outbreaks)	With syncytia formation	With no syncytia formation
Anterior pruritus	17	14	3 <sup>1</sup>
Posterior pruritus	25	0	25

<sup>1</sup> 1 animal affected in each outbreak.

far been isolated from 26 (51 %) of 51 outbreaks diagnosed in 1980. Until a couple of years ago, abortion of fetuses infected with Aujeszky's disease virus had not been recognized in this country. Now abortions during outbreaks seem to have increased, and virus has so far been demonstrated in fetuses from eight herds. And it is striking that all the isolates from fetuses, like all isolates so far obtained from more severe outbreaks in swine herds, have been found to induce syncytia formation in cell cultures.

From the results and observations presented it seems justifiable to conclude that strains of Aujeszky's disease virus possessing high pathogenicity for swine and cattle will regularly be syncytia-forming, and that, practically speaking, only such strains are capable of infecting cattle by the respiratory route.

Recently, *Sabó et al.* (1979) examined five isolates from cattle with respect to a number of properties, including CPE. They found the isolates to be non-syncytia-forming, and concluded that they were attenuated. In Denmark there is no reason to assume that non-syncytia-forming strains are attenuated, since live vaccines have not been used. It seems more likely that these strains are identical with native strains of the virus, and that syncytia-forming strains have developed from such strains or have been introduced from abroad.

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