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SIMPLE DETECTION OF MUMPS VIRUS NEURAMINIDASE AND ANTI-NEURAMINIDASE WITH THE LECTIN NEURAMINIDASE TEST

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Summary. — The lectin neuraminidase (LN) test is based on specific interaction between *Arachis* lectin and the glycoprotein receptors treated with the neuraminidase (NA) of myxoviruses. The test is suitable for detection of mumps virus NA and of corresponding antibodies and is more sensitive than the conventional neuraminidase inhibition test.

Key words: *mumps virus*; *neuraminidase*; *antibodies*; *lectin neuraminidase test*

Comparative studies on the LN-test and conventional neuraminidase inhibition test (NI-test) described by Aymard-Henry (1973), confirmed the considerably higher sensitivity of the LN-test (Luther *et al.*, 1981; Luther *et al.*, 1982; Weber, 1982). Investigations made with the LN-test showed that the results were in agreement with those of NI-test ($r = 0{,}67$; $\alpha = 1\%$) (Luther *et al.*, 1981).

Because of its sensitivity, the LN-test was used for detection of mumps virus NA, which is difficult to determine in the NI-test. The test was carried out as follows:

1. Demonstration of the biological activity of mumps virus NA

mumps virus 25 µl + erythrocytes (dog) 25 µl —(4 hr, 233K; pH 6.0)→ + Arachis lectin 25 µl —(60 min, agglutination)→

2. Demonstration of antibodies against mumps virus NA

mumps virus 25 µl + immune serum 25 µl —(2 hr, 233K)→ + erythrocytes (dog) 25 µl —(4 hr, 233K; pH 6.0)→

+ Arachis lectin 25 µl —(60 min)→ inhibition of agglutination

Experiments with sheep, hamster, rat, rabbit, pigeon and fowl erythrocytes were not successful because haemolysis had occurred under the conditions

Table 1. Demonstration of the biological activity of mumps virus NA in the LN-test

Erythrocytes*	incubation period at 233K (hr)	pH of medium	Titre
Human O	18	7.2	1024**
B	18	7.2	512
Guinea pig	18	7.2	2048
Goat	4	6.0	40
Ferret	4	6.0	80
Dog	2	6.0	128

* Washed three times; **mean value of 5 determinations (dilution reciprocals).

of reaction and it was difficult to observe the agglutination pattern. In contrast, human, guinea pig, goat, ferret and dog erythrocytes were found useful for detection of the enzyme activity under such conditions. Antibodies against NA could be detected only with dog erythrocytes (Tables 1 and 2).

Antibodies to mumps virus are generally detected by complement fixation reaction or haemagglutination test. The relatively low sensitivity as well as the cross-reactions with other paramyxoviruses are disadvantages of these methods. In contrast, the determination of NA inhibiting antibodies seems to be specific for the mumps virus (Leprat, 1978). Antibodies to mumps virus NA are usually detected by the NI test, recommended by WHO. However, in NI-test only highly concentrated virus can be used to detect the comparably low activity to the mumps virus NA. Moreover, the NI-test is not applicable for screening. Antibodies against mumps virus can possibly be better detected by the LN-test (Table 2). The reproducibility of the LN-test was found satisfactory, either with influenza antigens (Luther *et al.*, 1981) or for detection of mumps virus NA and the corresponding antibodies. The antubody titres in the latter system ranged between 32—128 when determined 6 times in the same plate; in 5 repeated determinations on 5 different days it ranged from 64 to 128. Since haemagglutinin and NA of mumps

Table 2. Detection of antibodies to mumps virus NA under various conditions of the LN-test

Serum	Inhibition-titres with various erythrocytes		
	dog 4 hr*, pH 6**	human 18 hr*, pH 7.2**	guinea pig 18 hr*, pH 7.2**
Hyperimmune, guinea pig n = 4	1024—4096***	8	16
Immune, guinea pig n = 3	128—512	4—8	16
Negative control, human n = 3	0—2	0	0
Tested, human n = 20	32—256	4—8	8—16

Antigen: mumps virus, strain Enders, (IAV Berlin—Schöneweide) in dilution 1 : 20,
* Duration of incubation; ** pH of the cell culture medium; *** mean value of 3 determinations expressed in dilution reciprocals.

virus are located on the same molecule, one has to take into consideration the steric inhibition of NA by anti-haemagglutinin antibodies (this applies to other methods of NA detection, too). The detection of antibodies to mumps virus NA is an additional application of the LN-test, which is recommended when other methods are to expensive or their sensitivity is not sufficient. The usefulness of the LN-test in large trials is regarded for its most important advantage.

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