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Rosen L. A hemagglutination-inhibition technique for typing adenoviruses. *Amer. J. Hyg.* 71:120-8, 1960. [Laboratory of Infectious Diseases, National Institutes of Health, Bethesda, MD]

The finding that 25 of 27 serotypes of adenoviruses agglutinated the erythrocytes of either rhesus monkeys or laboratory rats *in vitro* led to the development of a simple and rapid hemagglutination-inhibition technique for typing adenoviruses. [The *SCI*[®] indicates that this paper has been cited over 285 times since 1961.]

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"The hemagglutinating properties of adenoviruses were discovered as a by-product of investigations on hemagglutination by reoviruses and enteroviruses — the virus groups which were my major interest at the time. Agglutination of human erythrocytes had recently been reported for a few enterovirus serotypes.¹ In the course of attempting to demonstrate this property for other enteroviruses and reoviruses, I decided to test two adenovirus serotypes, one commonly isolated from humans and another rarer type — which I had noted gave a somewhat different type of cytopathic effect in cell cultures. Only the latter adenovirus agglutinated the human erythrocytes but this observation led to the systematic study of all the adenovirus serotypes and a great variety of erythrocytes. Others had attempted to demonstrate hemagglutination by adenoviruses previously but had failed to do so, probably because they used only the commonly isolated

serotypes and only those erythrocytes (human, guinea pig, and chicken) usually employed in laboratories at that time.

"There probably are several reasons why this paper has been cited relatively frequently. First, the method described is still the easiest and fastest way to type a member of this large group of human viruses, which now includes 34 serotypes. Second, by employing a virus of known serotype the technique can be used to measure relatively type-specific antibody in man. Finally, and perhaps most important, hemagglutinating properties have been proven useful in subdividing the adenovirus family into subgroups which have other biologic properties in common. In this paper, the adenoviruses were subdivided for convenience of typing into several groups on the basis of the type of erythrocyte they agglutinated and the conditions of such agglutination. Later, it was found that these same subgroups also shared other characteristics such as antigenic relationships, epidemiologic behavior, and relative oncogenicity for laboratory animals.

"The research on which this paper is based is particularly memorable to me because a preliminary report was rejected by *Nature*. That in itself was not too bad, although I did, of course, question the judgment of the editor. What was infuriating, however, was that, after hearing nothing for several months, I received both the manuscript *and* the rejection note by sea mail! I confess that, perhaps irrationally, I avoided sending papers to that journal thereafter. The manuscript was next sent to *Virology* where it was accepted without change the day after it was received.² It is relevant to point out that the editor of that journal at the time was C.K. Hirst, a co-discoverer of hemagglutination by influenza viruses."

1. Goldfield M, Srihongse S & Fox J P. Hemagglutinins associated with certain human enteric viruses. *Proc. Soc. Exp. Biol. Med.* 96:788-91, 1957.
2. Rosen L. Hemagglutination by adenoviruses. *Virology* 5:574-7, 1958.