Lack of Detectable Circulating Interferon in Mice Protected Against Vaccinia Virus by Induction and Elicitation with Bacterial Systems

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Received for publication 10 October 1972

Mice which had been subjected to mycobacterial infection and specific elicitation were bled from the orbital sinus at the time the mice were challenged intravenously with vaccinia virus. Assays of the sera were negative for interferon. Sera of rabbits sensitized with staphylococci and elicited by Staphage Lysate also lacked detectable circulating interferon.

Mice which had been specifically sensitized and elicited with mycobacteria and old tuberculin or staphlococci and staphylococcal phage lysate (SPL; Staphage Lysate, Delmont Laboratories, Inc., Swarthmore, Pa.) were found to be protected to a significant degree against intravenous challenge with vaccinia virus (1). At the time of virus challenge, pooled serum samples were collected from the mice by bleeding from the orbital sinus for determination of interferon level.

Sensitization with Mycobacterium tuberculosis. Mice were injected intraperitoneally (ip) twice at 2-week intervals with about 10⁴ live M. tuberculosis strain H37Ra. Seven days after the last injection, the sensitized mice were elicited either once with 0.1 ml of a 1:500 dilution of old tuberculin (1:5,000 old tuberculin equivalent to 0.04 μg of purified protein derivative), injected ip 24 hr before bleeding, or twice at 48 and 3 to 5 hr before bleeding (1).

Sensitization with Staphylococcus aureus. Mice were injected subcutaneously (sc) with 10⁴ live S. aureus 18Z at weekly intervals for 8 weeks. The sensitive mice were elicited with 0.1 ml of Staphage Lysate (Delmont Laboratories, Inc., Swarthmore, Pa.) sc, ip, or intravenously (iv) either once at 48 hr before bleeding or twice at 48 and 3 to 5 hr before bleeding (1).

The mice treated as above were divided into two groups. One group was used for bleeding, and the other group at the same time was challenged iv with vaccinia virus.

Three methods of interferon assay were used: (i) cytopathic inhibition; (ii) hemagglutinin-yield inhibition (2); (iii) plaque reduction.

Monolayers of mouse embryo fibroblasts, L929 strain from an established line, were exposed to the experimental mouse sera (in dilutions from 1:4 to 1:50) or to known interferon-positive serum, and challenged either with vesicular stomatitis virus employing cytopathic inhibition and plaque reduction methods or with GD-7 virus in hemagglutinin-yield inhibition tests.

The experimental sera were uniformly negative for interferon, whereas the control sera known to contain interferon were positive.

One of these mice sensitized with S. aureus and elicited by Staphage Lysate also were tested for interferon, although these rabbits were not later challenged with virus. Rabbits were sensitized by intradermal injection of 10⁴ live S. aureus 18Z into each flank at weekly intervals for 5 weeks; 1 week after the last injection, the rabbits received 0.2 ml of Staphage Lysate sc each day for 3 successive days (3). One to four weeks later, these rabbits were given a single injection of 0.2 ml of Staphage Lysate sc, and after either 3 or 6 hr or 4 to 5 days were bled from the heart. The experimental sera (in dilutions from 1:2 to 1:100) were negative for interferon when assayed by cytopathic inhibition tests on primary rabbit kidney cell cultures. The control sera known to contain interferon were positive.

Cellular immunity probably played the
major role in the protection of the mice against vaccinia virus. However, since interaction of sensitized reticuloendothelial cells with homologous antigen is known to release interferon, it is impracticable to eliminate the possibility that interferon, liberated locally and quickly adsorbed to tissue cells, might have been a factor in protection.

M.S. was a Fellow of the Theresa F. and Joseph Felson Memorial Fund.

LITERATURE CITED