Protection against MOPC-315 Plasmacytoma by Immunization with C-type Particle Preparations

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ABSTRACT

Mice were given injections of C-type particles extracted from the ascitic fluid of plasmacytoma-bearing mice. These particles, extracted from MOPC-315 tumor-bearing mice and injected into BALB/c mice, protected them against challenge with MOPC-315 tumor cells. The protection was dependent upon tumor cell dose; 66% survival was observed with a lethal dose of tumor cells. No protection was observed against challenge with another plasmacytoma (S-13). Attempts to protect mice against S-13 plasmacytoma by immunizing them with C-type particles originating from S-13 tumor-bearing mice were unsuccessful.

INTRODUCTION

Type-C oncornaviruses (i.e., Gross, Friend, Kirsten, Moloney, and Rauscher) are efficient in preventing leukemias (3, 6, 7, 10-12, 18) and in suppressing the endogenous virogenes (8, 9, 19). C-type particles originating from plasmacytoma (23) resemble the C-type oncornaviruses (1), but they do not have the ability to induce tumors in mice. Since C-type particles have been found in most of the plasmacytomas studied (22, 23, 26), it was of interest to see whether immunization with C-type particles would protect against plasmacytomases. To test this possibility, we challenged mice with tumor cells after immunization with C-type particles extracted from ascitic fluids of mice bearing i.p. plasmacytomases.

MATERIALS AND METHODS

Mice. Inbred BALB/c mice were purchased from The Jackson Laboratory, Bar Harbor, Maine, and were used when 8 to 12 weeks old.

Tumors. The plasmacytoma MOPC-315 and S-13 lines were used. The tumors were grown s.c. or i.p. in BALB/c mice.

Isolation of C-type Particles. The method used was previously described by Yaniv et al. (26). After clarification (200 and 10,000 × g), the ascitic fluid was sedimented in a SW27 rotor at 95,000 × g for 1 hr at 4°. The particles banding at a density of 1.16 to 1.18 g/ml were collected. The particles were sedimented by centrifugation at 95,000 × g for 1 hr and stored at −70° until used. Protein determinations were performed by the method of Lowry et al. (14).

Immunization Procedure. Mice were given s.c. injections 3 times at 3-week intervals with a 0.2-ml solution containing an amount of C-type particles equivalent to 200 µg of C-type particle protein. Freund's complete adjuvant was given with the first injection only. Control groups were given injections of medium alone (Roswell Park Memorial Institute Tissue Culture Medium 1640; Grand Island Biological Co., Grand Island, N. Y.).

Challenging Procedure. Different doses (10⁴, 10⁵, and 10⁶ cells) of viable tumor cells were injected s.c. 1 month after the last immunizing injection.

RESULTS

Groups of BALB/c mice were immunized by 3 injections of C-type particles extracted from the ascitic fluid of mice with i.p. growing MOPC-315 tumors. Age-matched normal and immunized mice were challenged with different doses of viable MOPC-315 tumor cells. Both the control and immunized groups developed tumors of up to 7 to 10 mm. The tumors continued to grow in the mice from the normal (control) group and finally killed the mice, but in the immunized mice a vigorous rejection process occurred, at the end of which the tumors had completely disappeared. The rejection period started approximately 25 to 30 days after the tumor challenge, and it was accompanied by an intense vascularization of the tumor area and loss of hair in the tumor region. The rejection process continued for 10 to 14 days, ending with the mice totally cured of the tumors; the mice lived for 6 months without recurrence of the tumor. The degree of protection against the MOPC-315 tumor depends on the number of tumor cells used for challenge: half of the mice (53%) were protected against 10⁴ tumor cells, 66% were protected against 10⁵ tumor cells, and 100% were protected against 10⁶ tumor cells (Table 1).

To test the specificity of this protection, we injected C-type particles originating from ascitic fluids of the MOPC-315 tumor or the S-13 tumor into the mice. The results obtained show that immunization with C-type particles originating from MOPC-315 will protect the mice against
tumor cells. Interestingly, immunization with C-type parti-

cles originating from S-13 tumor cells did not confer protec-
tion against challenge with MOPC-315. Among different anti-

gens (1), (b) specific tumor antigens (2), and (c) the anti-
gens on BALB/c, C3H, and NZB plasmacytomas by in Vivo


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