BONE-MARROW INTERFERON

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Nucleated bone-marrow cells of mice, rats, guinea pigs, hens, cows, and man are shown to be capable of producing interferon on induction with Newcastle disease virus in vitro. Interferon production by these cells was characterized by high stability. Bone-marrow interferon is not inferior in its activity to interferon obtained by the use of blood leukocytes and spleen cells.

KEY WORDS: bone marrow; interferon; Newcastle disease virus.

A new source of interferon formation has been discovered in recent years – nucleated bone-marrow cells [7]. The writers have established optimal conditions for the production of mouse bone marrow interferon [5].

This paper describes an investigation of the interferon-producing activity of bone-marrow cells of animals of various species and man.

EXPERIMENTAL METHOD

Bone-marrow interferon was obtained by the method described previously [5]. Newcastle disease virus (NDV), strain H, was used as the interferonogen, the multiplicity of infection was 10, and the incubation time 22-24 h. Mouse interferon was titrated on L cells, rat, hen, and human interferon on appropriate cultures of embryonic fibroblasts, and interferon from guinea pigs and cows on embryonic kidney cells of these animals. The interferon titer was determined relative to inhibition of the cytopathic action of vesicular stomatitis virus, used in a dose of 100 TCD_{50}.

EXPERIMENTAL RESULTS

Bone-marrow cells of several animals (mice of different lines, rats, guinea pigs, hens, cows) and man can produce interferon in response to infection of the cell suspension with NDV (Table 1). Interferon production by bone-marrow cells was characterized by high intensity and stability of the results. In most cases it was not inferior to, or even higher than when peripheral blood, spleen, or thymus cells were used as interferon producers. For instance, when the interferon-producing ability of bone-marrow cells of several lines of mice was investigated, and also when many tests were carried out with these cells taken from CBA mice, a high level (titers 1 : 160-1 : 2560) of interferon production was always observed (Tables 1 and 2). By contrast to this, peripheral blood cells

TABLE 1. Interferon Formation by Nucleated Bone-Marrow Cells on Induction by NDV in vitro

Source of bone-marrow cells	Interferon titer
Mice of various lines	160—2 560
Wistar rats	10 240
Guinea pigs	80—160
Hens	640—1 280
Cows	640—1 280
Man	8—512

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TABLE 2. Interferon Formation by Blood Cells and Cells of Hematopoietic Organs of Mice on Induction by NDV in vitro

Line of mice	Titer of interferon produced by cells			
	bone marrow	peripheral blood	spleen	thymus
BALB/c	160	<10	10	<20
A/M	1280	10	40	<20
CC57W	1280	80	640	<20
CBA	1280	160	320	80

TABLE 3. Interferon Formation by Bone-Marrow Cells of CBA Mice of Different Ages

Age of mice	Interferon titer
1—2 days	<20
7 days	20
2 weeks	80—160
3—4 weeks	160—320
Over 1 month	320—1280

taken from these animals differed greatly in their ability to produce interferon (titers from under 1:10 to 1:640). The lowest intensity of interferon formation was observed when thymus lymphocytes were used as the producer cells (titers from under 1:20 to 1:80).

As a rule the intensity of interferon production by peripheral blood and spleen cells taken from mice of the same line corresponded (Table 2). For instance, peripheral blood and spleen cells of BALB/c mice were characterized by very low interferon-producing activity (titers from under 1:10 to 1:20), whereas the same cells from CBA mice had high activity. In experiments on BALB/c mice the lowest production of bone-marrow interferon was observed (titer 1:160). Investigations on bone-marrow cells of mice of other lines showed a higher level of interferon formation.

All these results were obtained in experiments on adult animals. However, leukocytes taken from animals on the first days of life are known to produce much less interferon than leukocytes of adult animals [4]. A similar rule was observed as regards bone-marrow cells, for the interferon production of these cells was very low in newborn mice (Table 3).

Human bone-marrow cells are known to produce interferon when induced by Sendai virus [7]. Similar results were obtained by the use of NDV as the interferonogen (Table 1). Cells obtained from different individuals differed in their interferon-producing activity (titers ranging from 1:8 to 1:512). In most cases (80%), however, under the experimental conditions used they produced interferon in titers of 1:32-1:128. High stability of the results was thus found by the investigation of interferon-producing activity of human bone-marrow cells.

It can be concluded that the results of these investigations, together with data in the literature [5-7], indicate the ability of bone-marrow cells of animals and man to produce interferon in response to infection by viruses. This ability is evidently inherent in the bone-marrow cells of all animals, but the intensity of its manifestation is determined not so much by species as by individual characteristics. An interesting feature is the curious inertia of the bone-marrow cells of newborn mice and, possibly, of newborn animals of other species, and this requires special study. The high stability of the results of the experiments on induction of bone-marrow interferon is noteworthy. Previously the writers reported that bone-marrow cells of immune [2] and germfree [3] animals produce the same quantity of interferon as cells taken from normal animals. No effect of infection by vesicular stomatitis virus [1] on the interferon-producing activity of mouse bone-marrow cells likewise could be found. Taking these facts into account, together with the comparative ease of obtaining bone-marrow cells, their use as producers of animal interferon would seem to be very promising. To put this conclusion into practical effect, an appropriate method has been developed and has been approved by the Sera and Vaccines Committee of the Ministry of Health of the USSR.

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