THE INFLUENCE OF PHYTONCIDES ON PHAGOCYTOSIS

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Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 54, No. 9, pp. 85-86, September, 1962
Original article submitted October 12, 1961

Present work deals with the influence of the phytoncides of the onion and garlic on the phagocytosis of leucocytes.

METHODS AND RESULTS

The experiments were carried out on 16 rabbits. A silk thread, as used for ligatures, was soaked in India ink and introduced beneath the mucous membrane of the right cheek; the animals so treated were of approximately the same age and weight. The tissues around the thread were then infiltrated with a preparation of OG* in 0.5% novocaine.

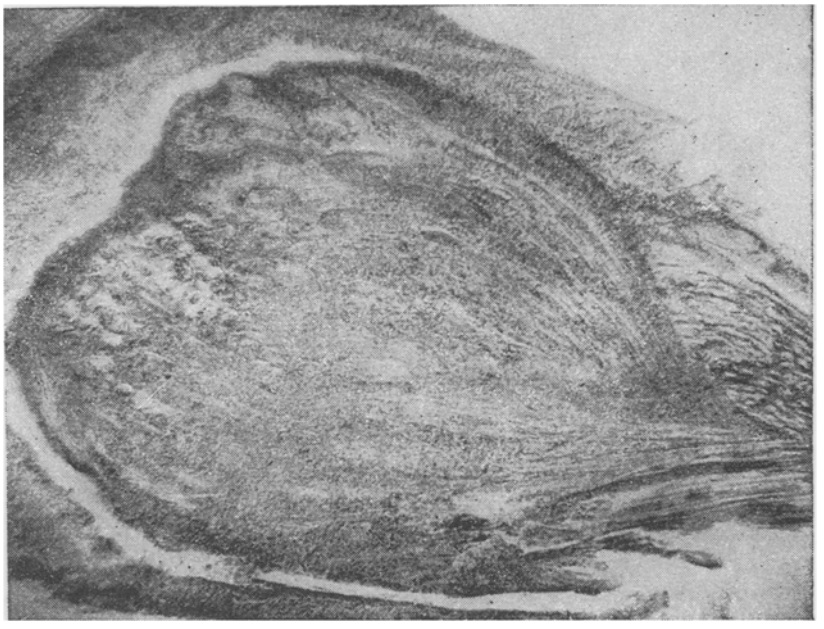

Fig. 1. Changes in the tissues 30 days after the introduction of India ink; no phytoncides used. Early stages of formation of a fistula along the thread; necrosis and infiltration by polymorphs. (Ocular 7×, objective 10×; stain — hematoxylin-eosin.)

At $1\frac{1}{2}$, $2\frac{1}{2}$, 6, 12, 24, 48, 72 h, and one month after the operation, the silk thread together with the surrounding tissues was removed under 0.5% novocaine solution local anesthesia, for investigation. The material was embedded in celloidin; sections were cut with a freezing microtome, and stained in hematoxilin-eosin. They were examined for phagocytosis, and for the presence of connective-tissue elements.

The results of the experiments showed that the nature of the phagocytosis and the response of the connective tissue was influenced by the phytoncides.

*The OG preparation is a 70% solution of equal amounts of the juices of onion and garlic in distilled water.

We will now report the histological findings:

Twelve hours after operation. No phytoncide used: Surrounding the thread there was a necrosed area in the center, and at the periphery there was a much marked leucocytic infiltration, chiefly of neutrophils, most of which contained India ink particles.

With phytoncides: Granulation tissue consisting mostly of fibroblasts was formed, there was a marked phagocytosis, for which eosinophil leucocytes were maily responsible.

Thirty days after operation. No phytoncides used: Granulation tissue had grown around the thread, and round cells and polymorphs (chiefly eosinophils) had infiltrated; a stratified squamous epithelium lined the path of the thread. The epithelium was infiltrated with a large number of leucocytes (cheifly eosinophils). There were still necrotic masses within the fibers of the thread. In the granulation tissue certain of these masses still contained inclusions of India ink (Fig. 1).

With phytoncides: Deep in the tissue the path of the thread could be seen to be almost completely lined with stratified squamous epithelium; there were no inflammatory changes either in this or in the surrounding region. Further out, occasional inclusions of India ink could be seen in the tissues, which showed no inflammatory reaction (Fig. 2).

Fig. 2. Changes in the tissues 30 days after the introduction of India ink; phytoncides used. A fistula has been formed, lined with stratified squamous epithelium (ocular 7×, objective 10×; stain – hematoxylin-eosin.

Therefore, the influence of phytoncides shows up as a more active leucocytic response, chiefly on the part of the eosinophils, and as an increase to phagocytosis, due again chiefly to the eosinophils, and only partly to the neutrophils (in the control animal the neutrophils are more active). Because the infiltration by neutrophils and leucocytes is typical of acute suppurative inflammation, the reduction in the number of neutrophils and the preponderance of eosinophils in rabbits treated with phytoncides indicates the anti-inflammatory influence of these substances. Phytoncides enhance the activity of connective tissue.

SUMMARY

Rabbits were treated by the introduction of a silk thread soaked in India ink beneath the mucous membrane of the cheek. Onion and garlic phytoncides were found to intensify leucocytic phagocytosis, mainly on the part of the eosinophils, and to a lesser extent by the neutrophils. Connective-tissue activity was also intensified, which accelerated wound healing.