

# Fibronectin as a Component of Wound Exudate and Its Significance for Wound Healing

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Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny*, Vol. 125, No. 3, pp. 355-357, March, 1997  
Original article submitted December, 22, 1996

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Fibronectin concentration is much lower in wound exudate from the zone of operation for postoperational ventral hernia than in blood plasma. It gradually increases, reaching the plasma level before the end of exudation and wound healing.

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**Key Words:** *fibronectin; wound exudate; postoperational wounds*

In animal experiments we have shown that the healing of clean wound is faster against the background of weak exudation and the emergence of polyblasts, macrophages, and fibroblasts with proliferation and formation of collagen fibers [1].

Then we have found that the concentration of fibronectin (FN) rapidly increases in a culture of fibroblasts for grafting into a burn, and the graft is taken when FN concentration in the culture medium is 49.9-5.0  $\mu\text{g}/10^6$  cells. Generally, this concentration is reached on the 3rd day of culturing. These observations imply that fibronectin has a role in wound healing.

Blood content of soluble FN correlates with functioning of the reticuloendothelial system [4]. The decreases in plasma content of FN in burns, traumas, including surgical operations, shock, and sepsis [2,3,5] is due to massive utilization of FN as a "universal glue": an opsonin which prepares bacteria and cell degradation products for phagocytosis.

Fibronectin forms complexes with the products of collagen degradation and with gelatin. These complexes increase the permeability of intestinal wall, thus impairing bacterial translocation [4].

Insoluble FN serves structural functions. It is an excellent marker of the nutrition status, since its half-life in the plasma is 15-20 h. Plasma FN content immediately increases in response to enhanced

nutrition, while the levels of the conventional markers transferrin and albumin still remain unchanged [3].

Our goal was to study the relationship between the rate of healing of postoperational wounds on FN content in wound exudate.

## MATERIALS AND METHODS

Fibronectin content was measured in blood plasma and exudate formed in a postoperational wound after extensive reconstructive surgery for ventral hernia. There was no purulent inflammation; however, exudate was accumulated in tightly sutured postoperational wound during several days after operation. It was removed through a drainage tube at the level of subcutaneous fatty tissue. Plasma and exudate FN contents were determined by immunoturbidimetric method using Boehringer Mannheim kits.

## RESULTS

On average, exudation lasted 4-6 days, although in 3 out of 14 patients it was observed for 12 days (Fig. 1). Within the first 2-3 days FN content in the exudate was 9-88  $\mu\text{g}/\text{ml}$ . This is much lower than normal plasma FN level presumably due to massive utilization of FN after the operation. Plasma FN content was  $228 \pm 28$   $\mu\text{g}/\text{ml}$ . Then it increased to  $276 \pm 38$   $\mu\text{g}/\text{ml}$  and reached a value of  $380 \pm 30$   $\mu\text{g}/\text{ml}$ . The same tendency in the dynamics of exudate FN

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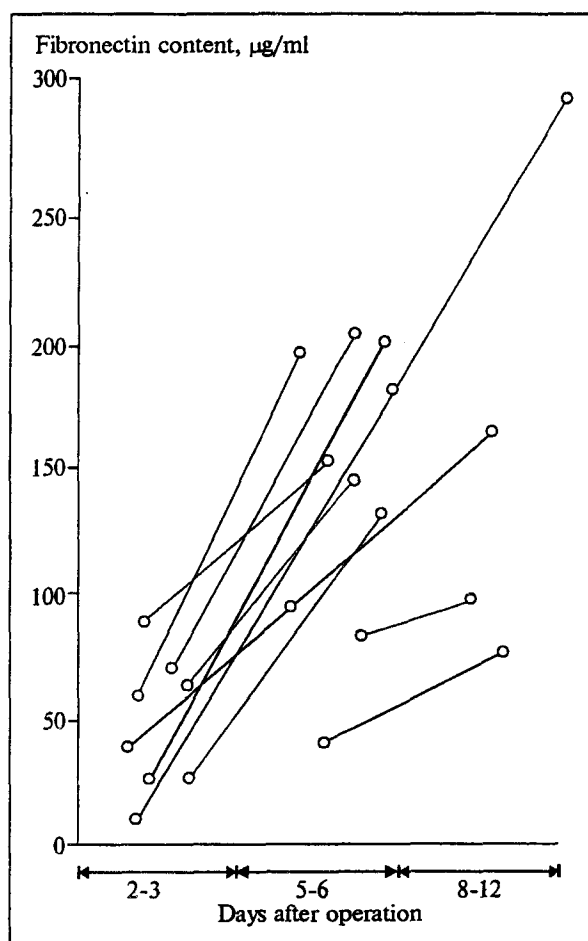


Fig. 1. Dynamics of FN content in wound exudate after repeated reconstructive surgery. The study included 14 patients.

content was observed in all patients. Fibronectin levels gradually increased, although the rate of the

increase and absolute values were different. For example, in a patient with the initial concentration of FN in the exudate 9 µg/ml an increase to 291 µg/ml was observed by the 5th day after surgery, while in a patient with an initial FN concentration of 82 µg/ml FN content increased only to 91 µg/ml at the same terms. It should be noted that the increase did not depend on the volume of exudate. Thus, exudate FN content tended to increase toward the plasma content for several days after the operation. Then exudation declined and stopped, the wound edges adhered to each other and the process of healing started.

In 2 patients the concentration of FN in the exudate increased very slowly; exudation was longer, wound healing was slower, and plasma FN content lower than in other patients.

From our findings it can be concluded that FN is an important component of wound healing. The mechanisms underlying the effects of FN are associated with its opsonin and adhesive activities providing wound cleansing and closure. Local application of FN may be prospective for stimulation of reparative processes in sluggish wounds.

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