

STIMULATION OF POSTTRAUMATIC REGENERATION OF RAT SKIN UNDER GRAVITATION OVERLOADING

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Albino rats were exposed to repeated gravitation overloading of 11 units and skin wounds 15 mm in diameter were then inflicted on them. A strong vascular response was observed in the wound contents of these animals in the early periods of observation. The appearance and differentiation of granulations and of proliferation of the epidermis were delayed. Healing of the wounds took place on the 30th day (compared with the 15th-18th day in the control). If, under these conditions, skin tissue extract prepared by V. P. Filatov's formula was injected at the time of wounding and until healing took place, the vascular reaction was sharply diminished, differentiation of granulations and epithelization of the wound took place more rapidly, and the process of regeneration more closely resembled, in character and times of development of tissue differentiation, the course of posttraumatic regeneration of the skin under ordinary conditions.

KEY WORDS: skin wounds; gravitation overloading; tissue extract.

The effect of gravitation overloading on the histological structure of certain organs has been demonstrated and described [1-4, 8]. Posttraumatic regeneration of organs has not been studied, however, under these conditions. The writers' earlier observations pointed to a substantial influence of gravitation overloading on posttraumatic regeneration of the skin [7] and spleen [9].

It was therefore decided to study posttraumatic regeneration of the skin under these conditions while using V. P. Filatov's tissue extract. The choice of preparation was based on data showing that it stimulates posttraumatic regeneration of the skin under ordinary conditions [5] and during disturbance of the neuro-hormonal status [6].

EXPERIMENTAL METHOD

Experiments were carried out on 120 noninbred albino rats weighing 120-150 g. The animals were exposed to repeated gravitation overloading of 11 units by spinning them on a special turntable. Standard full-thickness circular wounds 15 mm in diameter were inflicted on all the animals in the dorsal region and the wound edges were tagged with ink. Half of the total number of wounded animals received skin extract, prepared by V. P. Filatov's formula, daily after wounding until healing took place. The diameter of the wounds and the distance between the ink tags were measured during the period of observation.

The animals were decapitated in groups of six after 3, 5, 10, 20, and 30 days. The material was subjected to histological analysis in the usual way.

EXPERIMENTAL RESULTS

Under ordinary conditions of posttraumatic regeneration of the skin the wounds were observed to heal on the 15th-18th day with the formation of an extensive, compact scar.

In the early periods of observation during gravitation overloading (third through fifth day) the wound cavity was filled with fibrin clots, abundantly infiltrated immediately beneath the scab with blood cells. On the

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Fig. 1. Vertical section through skin wound defect on fifth day after preliminary gravitation overloading: marked vascular reaction. Here and in Figs. 2 and 3: hematoxylin-eosin, 125 \times .

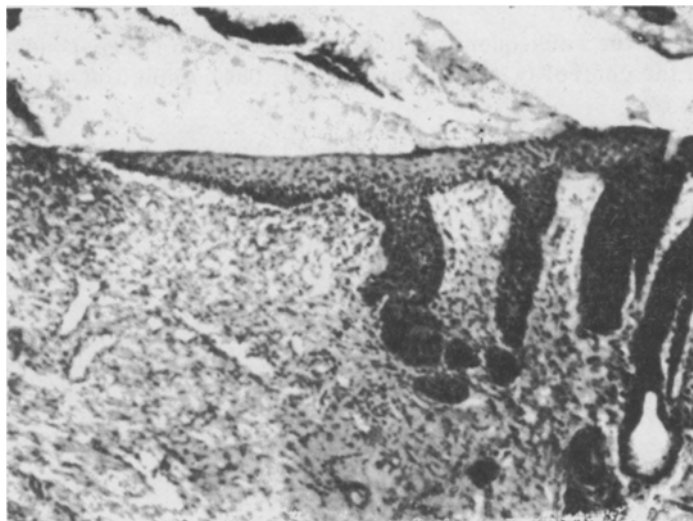


Fig. 2. Vertical section through skin wound defects on 20th day after preliminary gravitation overloading: beginning of proliferation of epidermis; unusual downward growth.

floor of the wound there was a thick layer of fibrin, beneath which a few granulations appeared on the fifth day; no sign of proliferation of the epidermis was observed at the wound edges. The most conspicuous feature was the reaction of the blood vessels. The wound contents were permeated by a network of capillaries with a wide lumen. In some places cavities resembling lacunae, filled with blood, were seen (Fig. 1).

The epidermis at the wound edges formed curiously shaped projections into the underlying undifferentiated granulations and not until the 20th day did it begin to creep over the wound defects (Fig. 2). Healing of the wounds was complete on the 30th day.

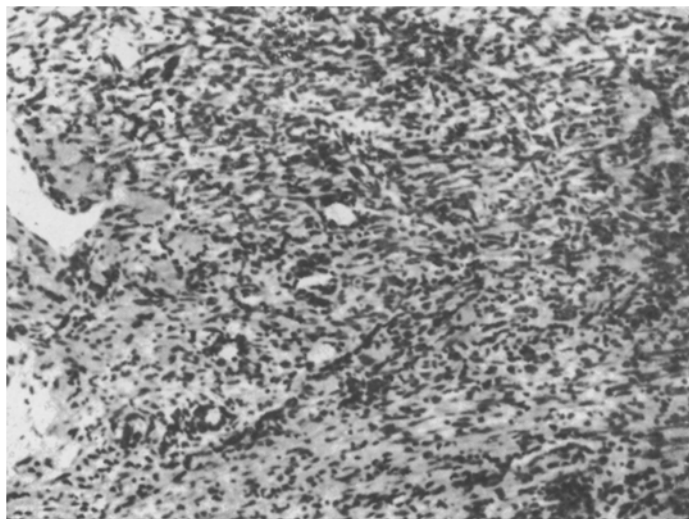


Fig. 3. Vertical section through skin wound defects on fifth day with stimulation after preliminary gravitation overloading: less marked vascular reaction in undifferentiated granulations.

An effect of the tissue extract, when given after preliminary gravitation overloading, was apparent as early as on the fifth day. Under these circumstances the vascular reaction was much less marked. By this time of observation undifferentiated granulation tissue was still present in the surface layers of the wound (Fig. 3).

Proliferation of the epidermis began in the early stages of observation, but the epithelial layer was thin and its rate of progress was slower than in the control.

The histological picture in the subsequent periods of observation corresponded approximately to the development of regeneration in the control (without overloading), but completion of wound healing was delayed 2-3 days.

Tissue extract prepared from skin by Filatov's formula thus appreciably prevented the marked vascular reaction arising after gravitation overloading, speeded up the development and differentiation of granulations and the epithelization process, and brought the course of wound repair in line with the pattern observed under ordinary conditions of posttraumatic regeneration of the skin.

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