Crystallization of the Oral Fluid. Composition and Status of the Sublayer Surface

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Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny*, Vol. 126, No. 12, pp. 693-696, December, 1998
Original article submitted June 26, 1998

Study of conditions of the oral fluid crystallization in normal subjects showed that this process depends on the cleanness of the sublayer surface and its composition.

Key Words: *oral fluid; crystallization; conditions; plastic*

Crystallographic diagnosis of diseases has been extensively discussed [3,6,7]. The majority of studies were performed with the gingival fluid (GF) because of its availability. This fluid is a mucin type liotropic liquid crystal [6]. The morphology of crystallization of liquid crystals of nonbiological origin depends on their composition and the conditions of crystallization. The orienting properties of the underlying tissues, both natural and resultant from its preparation, play a special role.

The morphology of GF crystallization depends on the crystalline properties of the sublayer and manifests best of all on the plastic [1].

We investigated the effects of various plastics and methods of their treatment on GF crystallization.

MATERIALS AND METHODS

Saliva from the oral cavity (basal saliva) was obtained from normal subjects aged 20-25 years; a total of 90 samples were examined. Crystallization was compared on the samples from a GF portion of one patient. GF droplets were put on the sublayer and dried at the same temperature on free surface. The sublayers were: Petri dish (laboratory plastic TU 64-2-19-79), Nunclon plate 30 mm in diameter (Delta) made of nontoxic plastic for cell cultures, and Linbro plate 1.7×1.6 cm (Flow Lab.) for cell cultures. The charge and roughness of the plastic surfaces were different. The morphology of crystallization and effect of the surface cleanliness were examined under an Olympus BH-2 optic microscope (maximum magnification 0.7 μ) with a television headpiece in the direct illumination regimen against the reflection and the "dark field".

RESULTS

Scanning of the surface of dried GF drops showed uneven crystallization of all specimens. The compactness and shape of dendrites changed. The variety of the crystallization patterns was the greatest in the center of the drop. No radial oriented crystals or their uneven distribution were seen in any sample. In some cases the dendrites formed on the surface and inside the drop (Fig. 1, *a*). This variety of crystallization forms can be explained by lenticular shape of the drop, which it acquires on the sublayer. Drying starts from the drop margins, and the crystallization from the center, where the layer is the thickest. To escape this effect, the drop was placed between two layers of plastic, after which the dendritic structure was not observed.

A method for diagnosing a disease by the morphology of crystallization has been proposed [4]. We observed uneven crystallization and dendrites of different shape in all samples, and we consider the proposed method wrong. Our method was as follows: 1) scanning of the entire surface of dried drop at small

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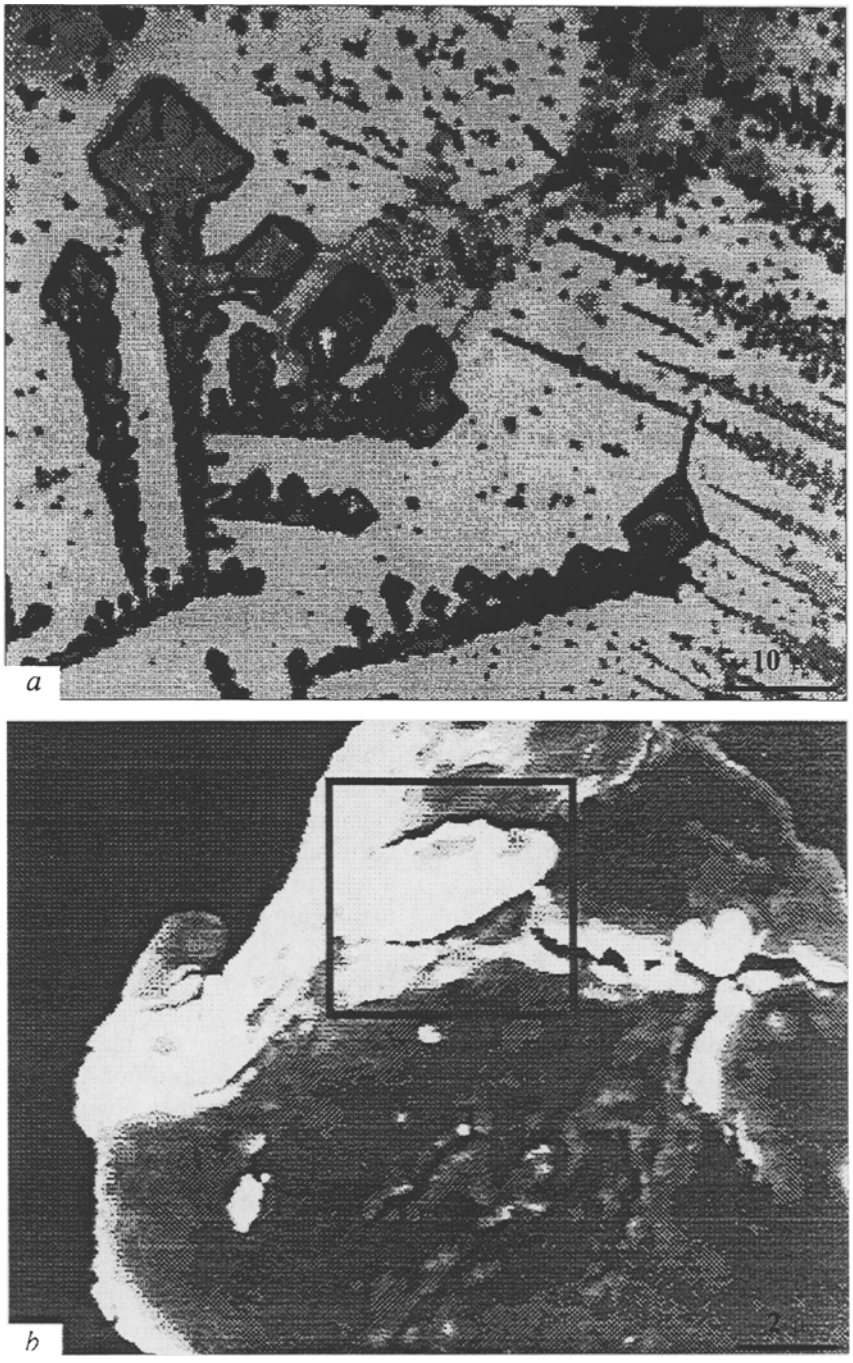

Fig. 1. Crystallization of the gingival fluid. *a*) surface morphology in crystallization on laboratory plastic. Crystallization on the surface is seen in the left corner and inside the drop on the right in the upper part of the picture; *b*) electromicrophotograph of the plastic surface; a foreign (bacterial) body is in the frame. ×10,000.

magnification; 2) scanning at large magnification in order to detect the typical features of crystallization.

The morphology of GF drop surface for one patient on different plastics is shown in Fig. 2. The crystallization patterns and the number and distribution of crystals varied.

On a Petri dish the crystallization was the most complete, while on other plastics it was almost null. This indicated that the surface properties of the plastics were different, because impurities, additional centers of GF crystallization, could modify crystallization patterns.

To assess the influence of the surface cleanness on the morphology of GF crystallization, we compared crystallization patterns on Petri dishes treated and not with ethanol before the experiment. The morphology of GF crystallization in all patients depended on the

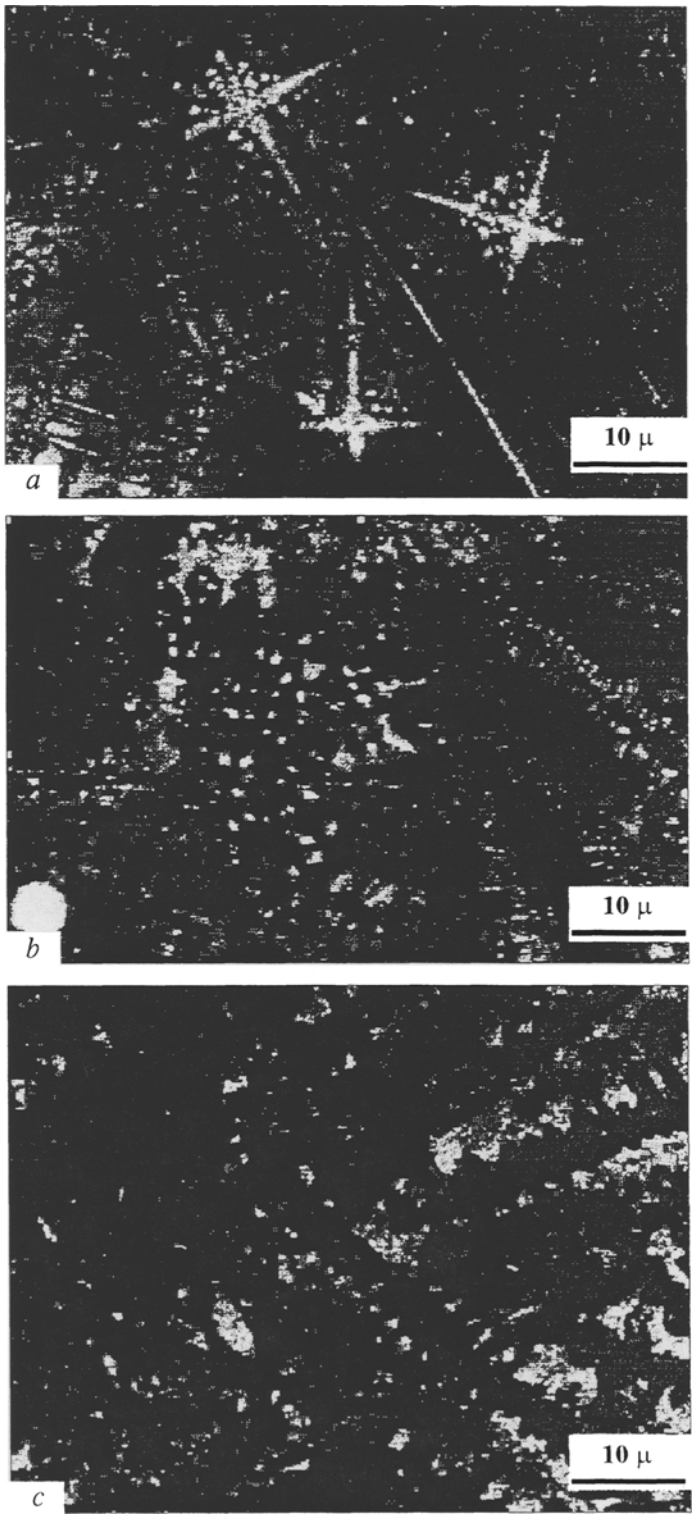

Fig. 2. Morphology of gingival fluid during crystallization on Nunclon plastic treated (*a*) and not treated with ethanol (*b*), and on Linbro plastic (*c*).

method of treatment: the crystallization was more complete after treatment of the surface immediately before the experiment.

Electromicrophotograph of Petri dishe surfaces treated and untreated with ethanol is shown in Fig. 1, *b*. At magnification 10,000 objects looking like bacteriological incorporations were seen. They may serve as the centers of forced crystallization, affecting the shape of crystals.

Thus, the composition and purity of plastics affect the morphology of GF crystallization. The crystalli-

zation of GF is the most complete on a plastic Petri dish treated with ethanol immediately before the experiment.

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