FOREIGN LANGUAGE ARTICLES.
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We hope that making available the relevant information on Pachyonychia Congenita will be a means of furthering research to find effective therapies and a cure for PC.
The article begins with a literature review including the usual references and a description of Kumer's classification system.

Krepler notes that in Kumer's classification, a number of unusual secondary symptoms are not taken into consideration. They include natal or premature dentition, whereby the teeth are decayed and fall out quickly, hyperhidrosis, blistering of the skin, hair anomalies, increased lengthwise bone growth, etc. Krepler points out that a number of cases remain for which the classification as pachyonychia may not be justified (e.g. Ebstein and others). In taking a closer look at the hereditary forms of onychogryposis, confusion becomes apparent since there are doubts as to the justification of this diagnosis (e.g. Schmidt, Mikula) and often the labels pachyonychia and onychogryposis are used as synonyms for minor differences in symptoms.

As Kumer and Loos have shown, the dyskeratoses in pachyonychia, apart from the obligatory nail anomaly, can be so minor, that they either are not noticed by the patient or do not manifest until adulthood. For this reason, it is understandable that they may not be picked up by researchers who are largely dependent on questionnaires for their data. In the family originally described by Orel, Kumer and Loos were able to provide evidence of this symptom by doing an additional examination. In other publications in which the diagnosis of hereditary onychogryposis is considered to be a confirmed fact, without exact descriptions or illustrations (Videbaek), the question of classification has to remain unanswered. Several reports of idiopathic onychogryposis perhaps
should be considered to be monosymptomatic forms of pachyonychia, as in the case described by Andrews, although this remains a complete assumption. It is clear, however, that there is a true hereditary onychogryposis that not only differs from J-L pachyonychia because of the fact that other dyskeratoses of the skin are absent, but also from genetic and morphological points of view. In this case, the nail anomaly can also manifest later (Billroth, Blech, Touraine, and Soulignac) and on individual fingers (Blech) or only on the toes (Köhler, Touraine, and Soulignac), whereby the actually time of manifestation and the localization are genetically set. From the morphological point of view, the more severe curvature of the nails, which are claw-like, directed toward the palm side of the finger, are very hard, and grow quickly is striking, and sometimes take on the shape of a monstrous, ram's horn (Köhler). In contrast, there is generally not a curvature toward the volar side, except on the toes when caused by footwear. Subungual pathological epithelial excrescences push the nail toward the back and only roll inwards on the sides, as our own observation will show.

Personal observation

The two-year-old boy A.S. was admitted to St. Anna Children's Hospital for the first time on November 25, 1952, at the age of six months, presenting whooping cough and convulsions. The striking onychogryposis-like nail dystrophy had been present since birth, according to reliable information. A similar case in the family (5 siblings, parents and grandparents) was not detectable. If we believe the information about the child's family background, we would have to assume a new mutation as a result of the otherwise confirmed diagnosis. The characteristic skin abnormalities did not occur until the course of the second year of life as isolated symmetrical hyperkeratoses on the soles of the feet with increasing intensity and sites, with a predominance, however, at area of the heel, and with a quite constant follicular hyperkeratosis on the right elbow. An additional symptom that stood out was the hoarse voice which was, according to the laryngoscopic findings by chief physician Koschier, to be attributed to a whitish epithelial thickening at the posterior commissure of the vocal cords. Later focal leukokeratoses at the tip of the tongue were also observed, as well as epithelial thickening on the corners of the mouth combined with a tendency towards formation of rhagades. The cornea remained free. Correspondingly, this case is the Riehl type. Anomalies of dentition, hair, perspiration, or mental development were not observed. Seizures did not recur after the pertussis subsided, and the EEG remained normal. A blepharitis, present for

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1 Presented to the Association of Pediatrics in Vienna, June 1, 1954.
months since earliest infancy, and a tendency towards impetigo could be interpreted as an indication for reduced protective function of the epidermis.

The nail dystrophy itself (Fig. 1) is macroscopically observed as the longitudinally straight nail growing upward at an angle of 30° with lateral rolling up. An additional slight curvature in volar direction is only detectable on the toenails. The nails seem to increasingly thicken from the nail root towards the free border, and the surface is cloudy, whitish-grey to brownish with horizontal striation and corrugation. In the fully developed nail, a lunule is no longer visible.

The nails are gradually lifted, also at their proximal part, by the progressive excrescence of the epithelial layers underneath the actual nail plate. They are pushed out of the sinus unguis and eventually fall out spontaneously after several months or after a slight trauma. Since this is such a gradual process it is possible to observe the development of this nail anomaly in its different stages. In a regrowing nail (Fig. 1a), a quite well developed lunule corresponding to the matrix can be seen. The new nail plate is not excessively thickened, but the distal, still free subungual epithelium is irregularly thickened and keratinously hardened. This layer joins with the nail plate pushing over it, resulting in an inseparable, very hard mass which renders the nail plate its abnormal form. This subungual layer shows occasional increased detritions with actual cavities within the nail. The fact that the principal mass of the pachyonychia nails does not consist of compact keratinous substance is also indicated by the repeatedly described observation that after cutting, viscous liquids oozed out of cut surface. The evident painfulness of the cutting of the nails indicates that this abnormal nail substance contains nerve endings.

Although histological findings of diverse, pachyonychia characterizing dyskeratoses are available, we did not come across histological findings of the nail itself. We only found findings concerning a nail with onychogryposis by Heller who, in addition to the quantitative increase of the nail mass within the deeper layers, mentions a qualitative change in terms of parakeratosis. It seemed attractive to gain a deeper insight into the nature of the nail anomaly in PC through a histological examination for which I would like to thank the associate professor, Ms Meier-Obiditsch, PhD (pathological-anatomical institute, chair: Prof. H. Chiari, PhD).

Fig. 2 shows the magnified cross-section of a thumbnail that has fallen off. The composition of two parts, namely the actual nail plate which predominantly consists of solid lamellae, and the idiosyncratic irregularly layered cystic-trabecular tissue can be seen with the naked eye.
This layer, which rests on top of the subungual epithelium and obviously predominantly emerges from it, is covered by the nail plate formed by the actual nail bed, and is also surrounded by it as though enclosed by a pair of pliers. In the peripheral and dorsal part, the spongiform substance is dry and brittle and fell out when it was cut. In the deeper layers the areas which appear to be cystic at the cut edge are filled with a homogeneous, "colloid-like" substance which turned red in a hematoxylin-eosin staining and whose nature of a protein is most probable.

In Fig. 3 we can see with increased magnification that the actual nail plate is also not regularly structured. Instead, the cell nuclei of the keratinous nail cells are preserved to a great extent, and in between its lamellae, even if to a far smaller degree, excrete a substance, which can be stained in the same way as the one in the internal layer, and seeps from the internal part into the frayed lamellae. In the longitudinal section we can observe that the innermost lamellae of the nail plate fan out and move towards the basis. At the same time, the lamellae themselves are infiltrated to a large extent in a cyst-like manner, however, in the cross-section there is also an irregular horizontal stratification that can be observed down to the lower depths.

The high magnification in Fig. 4 allows us to see that the cell beams\(^2\) between the cystic spaces consist morphologically of the same parakeratotic cells as the actual nail plate, only differing in the fact that the order of the nuclei and the lamellas are fundamentally determined by the shape of the neighboring cysts.

Looking at the deeper sections of the epithelium closer to the nail bed (Fig. 5) one gains the impression that the described "colloid-like" substance originates from an idiosyncratic conversion of epithelial cells. Fig. 5 shows clearly how the nuclei become small and pyknotic while the cytosome takes on a homogeneously reddish color, swells up and the cell borders eventually vanish. The farther we shift our focus away from the basis, the more this process continues. We detect increasingly larger areas with this homogeneous, oxyphil substance. Within the substance there are still some bluish keratinized parts, corresponding probably to the remnants of the destroyed nuclei. These, too, eventually disappear. A particular feature of these deeper epithelial layers is also the presence of capillaries within the epithelium (Fig. 5). This indicates a lively but evidently misdirected metabolic change.

The histological examination of the pachyonychia nail makes it even more clear than the previous examinations of skin and mucosal abnormalities that here in this case we have an idiosyncratic qualitative keratinization disorder and that the distortion of the nails probably

\(^2\) Translator's note: German: "Zellbalken".
arises from a singular degeneration and excrescence of the subungual epithelium and the concurrent abnormal formation of the nail plate.

The histological examination on its own, however, does not provide us with sufficient information on the physical-chemical characteristics of this abnormal nail substance. According to the macroscopic behavior, which can be best observed by gradually shortening the nail with heavy nail clippers, the substance is glutinous within the deeper and proximal layers and solidified in the external layers, contributing to the hardness of the nail. The deeper and proximal sections of the nail are soft like cartilage and it is easy to squeeze out a drop of this serous liquid. In the examination of such a drop with the paper electrophoresis with and without the patient's serum, three groups could be isolated. The biggest came to 55.9% and kept wandering between $\lambda_1$- and $\lambda_2$-globulin. The next amounted to 22.4% and was between $\kappa$- and $\kappa$-globulin. The last group of 21.7% followed the $\kappa$-globulin and sometimes superimposed it. The electrophoresis diagram of the serum and the serum protein content were within the normal range. Trials to detect essential differences between the pulverized nail substance and normal nail failed with respect to the solubility and precipitation (Millons, xanthoprotein, Hopkins-Cole reaction). The closest to being detected in a paper chromatographic way would be a striking difference within the chemical structure after a complete hydrolytic splitting.

Concerning the genesis of the disease, heritability is so far the only confirmed fact. As a result, the therapy is basically restricted to symptomatic measures. Etiologically, a disorder of the vitamin A metabolism was assumed resulting in the administration of massive doses of vitamin A (100,000 IU per diem), supposedly with positive impact, at least on the skin keratosis (Porter; Porter and Haber). In our case, however, the vitamin A level was just like with Wise not lower than normal (492 IU) and positive effect of experimentally administered vitamin A was not recognizable.

After surgical removal, the nail grows back in an analogous manner, even when most of the matrix has been destroyed. Only the amputation of the distal phalanges, such as Wright and Quequierre describe it in their case report, can eliminate the irritating nails. But with diligent nail care including the filing of the nail surface most adult patients affected by this anomaly are likewise free from pain.