Histology of port-wine stain*

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Summary. Our present histological knowledge of the port-wine stain is limited because of the small size of biopsies taken in the past. During the last two decades, Clodius has performed subtotal excision of port-wine stains, and has covered the defects with full thickness skin grafts. The availability of large surgical specimens of dermis affected by port-wine stain prompted the present study. Specimens from 50 locations were obtained in 28 patients. The pathomechanism of the port-wine stain was found to be telangiectasia of normal capillaries, sometimes congenital abnormal increase of the number of cutaneous vessels, or both. The theory of gradual age-dependent transformation of port-wine stain is true in regard to the colour of the affected skin, but is not valid in regard to the parallel increase of the vessel lumina and RBC filling grade. One-third of the patients below the age of 30 had the wide type lesion. The extreme histological differences in the size of the abnormal vessels, and the percentage of vascular area filled with RBC's were repeatedly noted in the different regions of the face in the same patient. Furthermore, even within the same area, the histology of port-wine stain varies greatly. The value of the small biopsies presently used for the assessment of laser treatment for these lesions is questioned.

Key words: Port-wine stains – Face – Vessels – Colour – Histology

Because biopsies were usually small, the true histology of the lesion was not appreciated [1, 2, 20, 22, 25]. Little has been added since the classic histology studies of Schnyder [24, 25]. His theory that vessels initially multiplied, “Vermehrung”, and later gradually dilated, “Erweiterung” is attractive, but can it be proved; an animal model does not exist. Clinical studies are limited by several factors: reluctance to create repetitive scars in the facial region, wide variations in the normal and abnormal vasculature in the various areas of face of each patient [18], and finally, the time required for such an investigation.

New interest in PWS morphology was stimulated by the availability of Argon laser treatment. It was reported [20] that improvement was achieved when dilated pseudo-capillary vessels and densely filled RBC’s prevailed, whereas a predominantly narrow vascular lumina did not respond to laser therapy. These observations prompted interest in taking biopsies of PWS to determine suitability for Argon laser treatment [2, 14, 22]. An elegant theory of age-dependent transformation of the color of the affected skin directly related to the increase in diameter of the vascular lumina, and the increase of RBC filling grade was formulated [2] and gained acceptance [17, 21, 23] (Diagram 1). Because of the small size of the biopsies, this has not been definitely proven (Fig. 1).

Excision of small areas of PWS and cover by a full thickness skin graft was first mentioned by Brown and

Port-wine stain (PWS) is a vascular lesion of the facial skin, frequently involving an area in the trigeminus nerve distribution. It has been called nevus flammeus, nevus telangiectaticus lateralis, nevus planus and nevus vinosus. Until recently, it was considered to be an intractable condition [12].

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Diagram 1. Traditional concept of colour, vessel width and RBC filling grade changes paralleling the process of aging
Fig. 1. Distribution of 50 specimens of PWS obtained from various regions of the face in 28 patients.

Fig. 2. a ML age 46. Cobblestone appearance of the skin seen in the mature PWS in the region of the upper lip. b In the upper corium, there are multiple ectatic vessels lined with flattened endothelial cells. Abundant pigment cells are present in the basal layer of the epidermis (HE x 70).

Fig. 3a–d. Three histologic types of PWS (HE x 70): a narrow, b intermediate and c wide. d HS age 20. All three specimens were obtained from different regions on the right cheek.