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Scientific Editorial:

Dermatoglyphics in Dentistry

Dermatoglyphics is the scientific study of fingerprints. The ridges on palms are classified into whorls, loops, arches, tri-radius etc. It is still at a relatively infancy in the world of dentistry where the co-relation of dental conditions with that of Dermatoglyphic patterns is done. In some studies it has been proved on a sample of population with high *S. mutans* growth had a positive correlation with loops. In a periodontal condition co-related to dermatoglyphics a decreased frequencies of twinned and transversal ulnar loops on all fingers of the patients with Juvenile Periodontitis was found, a decreased frequency of double loops on all fingers and an increased frequency of radial loops on the right second digits of the patients with Rapidly progressing periodontitis, and where as the patients of Acute Periodontitis showed

increase in frequencies of concentric whorls and transversal ulnar loops. Also there was an increase in frequencies of IV and H loops and tetriradii on the palms of the patients with Rapidly progressing periodontitis and an increased frequency of triradii on the soles of the patients with Juvenile Periodontitis. (1) Applying Dermatoglyphics in the dentistry in the light of the above findings may help revolutionize the diagnosis especially in conditions associated with the genetic etiology.

I hope you enjoy this issue of Dental Follicle.

Dr. Syed Nabeel

Editor -in-Chief

Fluorescent Immunocytochemical Study On Expression Of Cytokeratin-13 In Oral Epithelial Dysplasias- An Useful Adjunct For Visual Grading System

1. Dr. UshaHegde, Professor, Dept of Oral & Maxillofacial Pathology, JSS Dental college and Hospital, Mysore.
2. Dr. G. S. Kumar, KSR Institute of Dental Sciences & Research, KSR Kalvinagar, Tiruchengode - 637215, Tamil Nadu.

Abstract

The diagnosis and the grading of the epithelial dysplasias are debatable even today. There is no single defined method to categorically grade the epithelial dysplasias. The most accepted and the widely used visual method of grading is highly subjective. Hence, in search of a more reliable method, the immunocytochemical study on expression of cytokeratin-13 in the different grades of oral epithelial dysplasias was undertaken. By using the fluorescent immunocytochemical method of staining, the pattern and the intensity of its expression were studied and compared with the H & E stained respective paraffin embedded sections to assess its reliability. It was found that the intensity and the pattern of expression of cytokeratin-13 in the suprabasal layers decreased with the increase in severity of dysplasia. The immunocytochemical method was found to be a useful adjunct to the visual grading system of the epithelial dysplasias.

Keywords: Cellular differentiation ,Cytokeratin-13 , Fluorescent immunocytochemical staining ,Oral epithelial dysplasias

Introduction

Oral squamous cell carcinoma is often preceded by morphological changes in the cells, recognized as epithelial dysplasia. The visual method of grading of epithelial dysplasia is highly subjective. Of the many alternative methods tried, the grading of dysplasia by immunocytochemistry appears to be promising. 1

Cytokeratin expression pattern in oral stratified squamous epithelium is related to the cellular differentiation level, and since it is altered in dysplastic epithelium, the study of its altered expression aids in the grading of dysplasias. The keratins have the distinct advantage of being - stable, available in abundance, highly antigenic and therefore are

widely used as markers to characterize cellular differentiation in premalignant and malignant lesions.2

Of the various cytokeratins, the expression of cytokeratin-13(CK-13) in oral epithelial dysplasias appears to be least studied, with few reports like that of Heyden et al. 3 and Depont et al. 4 Therefore, the study on the pattern and intensity of expression of CK-13 in different grades of oral epithelial dysplasias was undertaken. Further, its reliability in indicating premalignant changes, by comparing with the respective Hematoxylin and Eosin (H & E) stained sections was evaluated.

Materials & Methods

Formalin fixed, paraffin embedded tissue sections which were diagnosed as epithelial dysplasias on H & E sections were selected. The dysplasias were graded as mild, moderate and severe based on Burkhardt and Maerker criteria. 5 The biopsies chosen were all from the non-keratinized stratified squamous oral mucosa, namely, buccal mucosa, alveolar mucosa, retro molar trigone, angle of mouth and from the third molar socket region. For the purpose of comparison, normal non-keratinized stratified squamous oral epithelium from similar sites was obtained.

Paraffin embedded sections were cut at 5 microns for the immunocytochemical evaluation, which was carried out by the indirect fluorescent technique. The reagents used for the study were the mouse monoclonal antibody to CK-13 (dilution of 1:100), the secondary antibody-FITC anti-mouse Fab(gt) and FITC antimouse Fc(gt) fragments (dilution of 1:30 each, which were mixed after dilution), the protease enzyme (dilution factor of 0.1% W/V), PBS with 1% BSA and silane prep slides (Sigma, St.Louis, U.S.A.).

The deparaffinized tissue sections were treated with protease enzyme for the retrieval of the tissue antigens. The sections were treated with primary monoclonal antibody, CK-13 for 1-2 hours, followed by secondary antibody for 30 minutes. The sections were mounted using an aqueous mounting medium and viewed under UV fluorescent light (Leica diaplan microscope) with I3 filter block in the blue excitation range, with 450-490 wavelength of light. The fluorescence was seen as bright green areas.

A total of twenty two cases in each of the three grades were studied. The staining procedure was carried out in twenty two batches, with each batch containing a case of mild, moderate, severe epithelial dysplasia and a normal epithelium serving as positive control. An appropriate negative control was also included.

Results

The results of the study obtained were tabulated with regard to the pattern of distribution (focal/diffuse) and intensity of staining ('-' negative, '+' weak, '++' moderate and '+++' severe) in the suprabasal layers of the non-cornified epithelium in different grades of epithelial dysplasias (Table I).

TABLE 1:

Comparison of the expression of CK-13 in different degrees of epithelial dysplasias: Fluorescent immunocytochemical method.

Based on Visual grading system	Number Of Cases		Pattern and intensity of expression in suprabasal layers [No. of cases in parentheses]	
			Pattern	Intensity
Mild	22	Suprabasal layers	Focal (2) Diffuse (20) Absent (+ (2) ++ (19) +++ (1)

			0)	
Moderate	22	Suprabasal layers	Focal (19) Diffuse (1) Absent (2)	-ve (2) + (17) ++ (3)
Severe	22	Suprabasal layers	Focal (1) Diffuse (0) Absent (21)	-ve (21) + (1)

NOTE:

1. St. Basale was not stained in normal mucosa or in any grade of the dysplasia.
2. The intensity of staining was graded from being negative (-ve) to severe (+++).

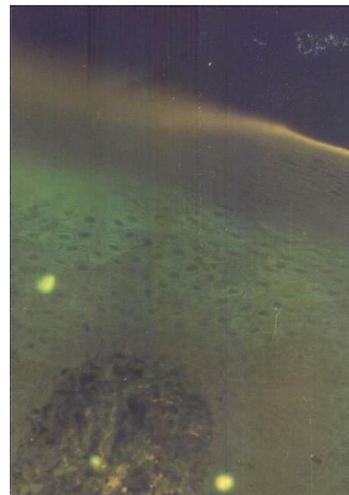
Normal epithelium:

In the normal non-cornified oral epithelium, diffuse staining of the suprabasal layers with severe intensity was noted. The stratum basale did not show any staining (Fig 1).



Mildly dysplastic epithelium:

The pattern of expression in mild dysplastic lesions were consistent in twenty of the twenty two cases, where in, the suprabasallayers showed diffuse pattern of staining. In the other two cases, focal pattern of staining was noted in the suprabasal layers. The intensity of staining was moderate for nineteen of the twenty two cases, with two cases showing weak intensity and one case showing severe intensity of staining (Fig 2).



Moderately dysplastic epithelium:

The pattern of expression was variable in the moderately dysplastic epithelia. Nineteen of the twenty two cases showed a focal expression pattern, two cases did not show

any staining and one case showed diffuse staining in the suprabasal layers. The intensity of staining was generally weak for all the cases (Fig 3).



Severely dysplastic epithelium: CK-13 expression was seen to be absent in all but one case (focal and weak staining of suprabasal layers) of the severely dysplastic epithelia (Fig 4).



The comparison of the grades of epithelial dysplasias by immunocytochemical method with that of H & E stained sections showed that only six cases, of a total of 66 cases, were in disagreement (18.1%) [Table 2].

TABLE 2:

Comparison of dysplastic grades, evaluated by the visual method and fluorescent immunocytochemical staining:

Visual grading	Agreement with visual grading	Disagreement with visual grading: (Immunocytochemical Grading in Parentheses)
MILD (22)	20	2 (1- moderate & 1- normal epithelium)
MODERATE (22)	19	3 (2- mild & 1- severe)
SEVERE (22)	21	1 (1- moderate)

Discussion

The expression of CK-13 has been studied in the premalignant lesions of the various epithelia. Among them, the epithelia of the ventral surface of the tongue and that of the floor of the mouth are of utmost importance, since they are considered to have a high risk of malignant transformation to squamous cell carcinoma. Our findings of decreased

expression of CK-13, with increasing severity of dysplasia are similar to the other two studies.^{3, 4}

The uniform and consistent results of normal epithelium imply the reliability of the technique and the variability seen in six cases proves the subjectivity of visual grading.

The expression seen in moderately dysplastic epithelia was heterogeneous. The attempt made to segregate the moderate from severe grade of dysplasia is of value as a near total absence of expression in the severe grade was observed. These findings assume significance in that the lesions were all from non-keratinized oral mucosa, mainly the buccal mucosa, as carcinoma arising from this site is common in this part of the world (India).

In conclusion, it might be remarked that the reduced expression of CK-13 with increasing severity of dysplasia may be a useful adjunct to visual grading. Studies involving a larger sample may reinforce its usefulness as a more reliable method of grading oral epithelial dysplasias.

References

1. Burkhardt A. Advanced methods in the evaluation of premalignant lesions and carcinomas of the oral mucosa. *J Oral Pathol* 1985; 14: 751-778
2. Cooper D, Schermer A, Sun TT. Biology of disease. Classification of human epithelia and their neoplasms using monoclonal antibodies to keratins: Strategies, applications and limitations. *Lab Invest* 1985; 52(3): 243-256
3. Heyden A, Huitfeldt HS, Koppang HS, Thrane PS, Bryne M, Brandtzaeg P. Cytokeratins as epithelial differentiation markers in premalignant and malignant Oral lesions. *J Oral Pathol Med* 1992; 21: 7-11
4. Depont J, Shabana A, Sawaf H, Gehanno P, Forest N. Cytokeratin alterations as diagnostic and prognostic markers of oral and pharyngeal carcinomas. A prospective study. *Eur J Oral Sci* 1999; 107: 442-454
5. Burkhardt A, Maerker R. A Colour atlas of Oral cancers, Year book medical publishers, Inc, Chicago, 1981; 33.

OSSEOINTEGRATION – A Review

Bayan KhateebSiddiquee, IV year BDS,JSS Dental College & Hospital, Mysore, INDIA.

Abstract

The term osseointegration refers to the bond between the bone and the titanium i.e. dental implant, process of bone growing right up to the implant surface without interposed soft tissue layer. When osseointegration occurs the dental implant is held firm in bone. It is a prerequisite for a successful dental implant.

Keywords: Osseointegration, osteon, osteogenic effect, trabaculae, peri-implantal ligament, alloplastic, cancellous bone, oxinium.

Introduction

The word osseointegration is derived from greek – osteon (bone) and latin – integrate (to make whole).

Definition: it is the structural and functional connection between living bone and the surface of load bearing artificial implant. Also defined as formation of a direct interface between an implant and bone, without intervening soft tissues.¹

HISTORY: In 1952 professor Ingvar Branemark of Sweden conducted an experiment where he used titanium implant chamber to study blood flow in rabbit bone. At the conclusion of the experiment, when the implant had to be removed from the bone he discovered that the bone had integrated so completely with the implant that the chamber could not be removed. He called the discovery osseointegration.

OSSEOINTEGRATION IN DENTISTRY:

In dental medicine the implementation of osseointegration started in mid 1960's In 1965 Branemark professor of anatomy placed dental implant into the first human patient- Gosta Larsson. This patient had a cleft

palate and required dental implants to support an obturator. Gosta Larsson died in 2005 with the original implant still in place after 40 years of function.

THEORIES OF OSSEOINTEGRATION: Branemark's theory of osseointegration:

Branemark proposed that implants integrate such that the bone is laid very close to the implant without any intervening connective tissue. The titanium oxide permanently fuses with the bone, as Branemark showed in 1950s.

Branemark also stated that the implant should not be loaded and left out of function during the healing period for osseous integration to occur.

Wiess theory of fibro osseous integration:

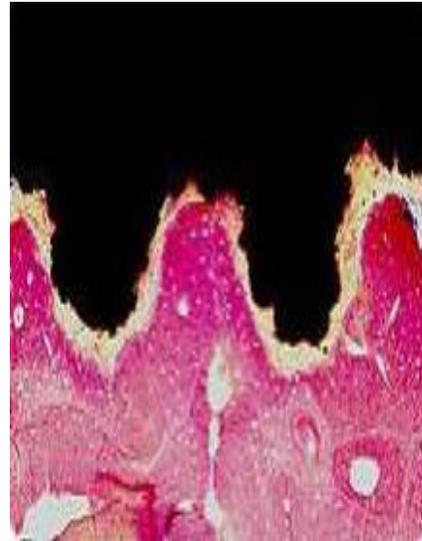
Weiss' theory states that there is a fibro-osseous ligament formed between the implant and the bone and this ligament can be considered as the equivalent of the periodontal ligament found in the gomphosis. He defends the presence of collagen fibres at the bone-implant interface. He interpreted it as the peri-implantal ligament with an osteogenic effect. He advocates the early loading of the implant.

PRIMARY STABILITY: Osseointegration shares many pre requisites with primary fracture healing such as precise fitting, primary stability and adequate loading during the healing period. In addition the surface properties of the implants might influence the elaboration of bone – implant contact. It could be anticipated that rough surfaces will improve adhesive strength compared to smooth surfaces.²

The primary or initial stability of the implant is achieved at insertion in the bone. The primary stability is result of biomechanical interlocking of the implant and the surrounding bone.³ The stability is dependent on bone quality, bone quantity surgical technique and design of the implant.⁴

SECONDARY STABILITY: After implant placement the bone tissue will respond to the surgical trauma which with time results in a change of the cortical/trabaculae bone ratio and also there is increasing degree of bone – implant contact.⁵ The bone formation and remodelling process may continue up to 12 – 18 months after surgery. First evidence of integration occurs after a few weeks, while more connection is progressively effected over the next months or years.⁶

MICROSCOPICALLY



This picture shows a microscopic histological section of bone integrated to the titanium surface of a dental implant (black)

Complications

Though the osseointegration interface becomes resistant to external shock overtime, it may be damaged by prolonged adverse stimuli and overload which may result in failure.

The most frequently encountered complication associated with osseointegration is a soft tissue reaction at the implant site. Other complications may arise even in the absence of external impact. One issue is the growing of cementum, on or around the implant surface, and a functional collagen attachment may attach to it.

Conclusion

Osseous integration, the apparent direct attachment or connection of osseous tissue to an inert alloplastic material without intervening connective tissue. Without osseointegration, long-term success cannot be achieved. When an implant is placed surgically, initial stability is a function of the bone quality, implant design and surgical technique. An implant placed in

dense cortical bone should have higher initial stability than an implant placed in weak, cancellous bone. During the osseointegration healing and maturation process, the initial stability changes with increases in bone-to-implant contact and osseous remodeling. The process and resultant apparent direct connection of the endogenous material surface and the host bone tissues without intervening connective tissue. Other materials like Oxinium, which consists of a zirconium alloy metal substrate that transitions into a ceramic zirconium oxide outer surface which is extremely abrasion resistant compared to traditional metal implant materials.

References

1. Osseointegration and Dental Implants
By Asbjorn Jokstad
2. Andresson. P, Verrocchi. D, Sennerby. L, 2008. A one year study of clinical and radiographical and RFA study of implants Res 6:23-26
3. Branemark . PI, Adell R, Breine U, Hansson BO, Intraosseous anchorage of dental prosthesis, experimental studies 3(2):81-100.
4. Deporter DA, Watson P, Pharoah M, Tomlinson G, 2002 clinical dental implant Res 4:183-189.
5. Tawil G, Younan R, 2003 clinical evaluation of short machined surface implants followed for 12-96 months. Int J Oral maxillofacial implants 18:894-901.
6. Vallancourt H, Pilliar RM, McCammond D, 1995J Applied Biomater 6:267-282.