

Localization of Type IV Collagen Alpha Chains in the Basement Membrane of Ameloblastoma, Tooth Germ and Oral Mucosa by Using Indirect Immunofluorescence.

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Introduction

Type IV collagen is a major structural component of basement membrane (BM) and acts as a scaffold for other BM constituents. It is a heterotrimeric molecule that exists in six genetically distinct forms, $\alpha 1(\text{IV})$ - $\alpha 6(\text{IV})$.

The ameloblastoma is the most frequently encountered odontogenic epithelial tumor. The BM zone of the ameloblastoma remains a subject of research interest primarily because of increasing evidence of its mediatory role during oncogenesis. However, the expression pattern of specific collagen α (IV) chains in the ameloblastoma BM has not been previously reported.

In this preliminary study, indirect immunofluorescence was utilized to localize $\alpha 1(\text{IV})$ - $\alpha 6(\text{IV})$ chains in the BM of two

mucosas were prepared for frozen section. One set of the cryosections was stained routinely with hematoxylin and eosin.

Immunohistochemistry

Immunolocalization of type IV collagen α chains was performed by using rat monoclonal antibodies: H11, H22, H31, H43, M54, and M69 (provided by Dr. Naito, I., and Dr. Sado, Y.), recognizing type IV collagen $\alpha 1$, $\alpha 2$, $\alpha 3$, $\alpha 4$, $\alpha 5$, and $\alpha 6$ chains, respectively.

Results

In the two ameloblastoma studied, the BM surrounding the neoplastic epithelial islands (follicular pattern), and interlacing strands (plexiform pattern) showed positive expression for all but $\alpha 3(\text{IV})$ chains. $\alpha 1(\text{IV})$, $\alpha 2(\text{IV})$, $\alpha 5(\text{IV})$, and $\alpha 6(\text{IV})$ were intensively expressed whereas $\alpha 4(\text{IV})$ chain expression was rare and irregular in its distribution. Oral mucosa BM also expressed $\alpha 1(\text{IV})$, $\alpha 2(\text{IV})$, $\alpha 5(\text{IV})$, and $\alpha 6(\text{IV})$ chains.

In the human tooth germ, the BM associated with the inner enamel epithelium was positive only for $\alpha 1(\text{IV})$, $\alpha 2(\text{IV})$, and $\alpha 4(\text{IV})$ chains whereas in the outer enamel epithelium, it was positive for

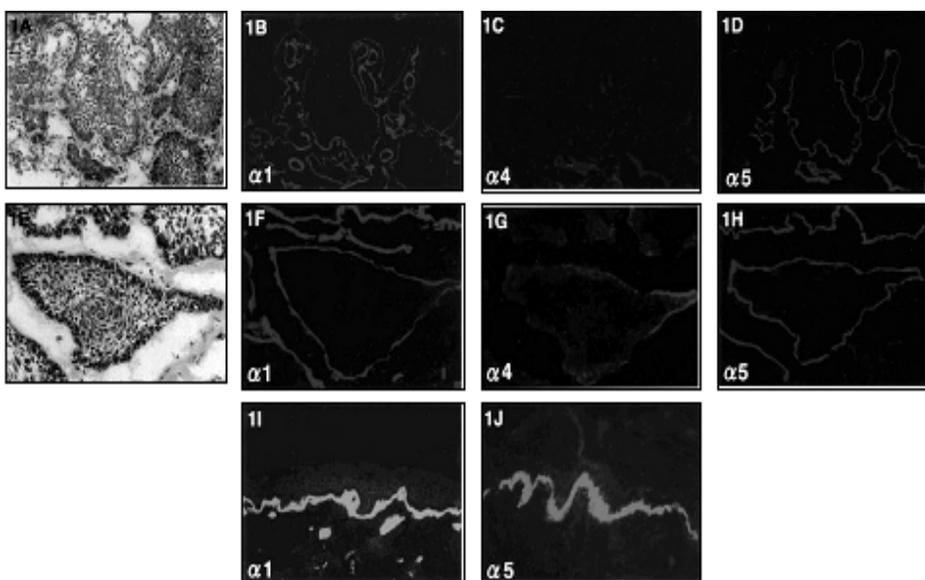


Fig. 1. Immunofluorescence localization of type IV collagen α chain in the basement membrane zone of plexiform ameloblastoma (A-D), follicular ameloblastoma (E-H) and oral mucosa (I-J). Strong expression for collagen (IV) $\alpha 1$ (B, F, I) and $\alpha 5$ (D, H, J) are shown in the BM of both types of ameloblastoma and oral mucosa, respectively. Immunoreactivity for $\alpha 4(\text{IV})$ chain is rare in both types of ameloblastoma (C, G). (A,E) H&E; (A-J) x250.

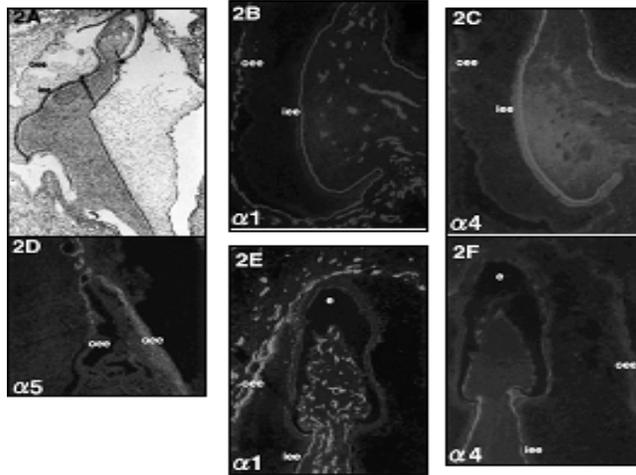


Fig.2. Immunofluorescence localization of type IV collagen α chain in the basement membrane zone of developing tooth germ (A-F). The BM of the inner enamel epithelium (iee) was positive for collagen (IV) α 1 (B, E), and α 4 (C, F) chains whereas in the outer enamel epithelium (oee), it was positive for collagen (IV) α 1 (B) with limited expression for α 5 chains (D). In the cuspal region (E, F), where enamel (e) and dentin formation have occurred, there is loss of collagen (IV) α chain expression. (A) H&E, $\times 125$; (B-F) $\times 250$.

only α 1(IV), α 2(IV), α 5(IV), and α 6(IV) chains. Near the cuspal region no immunoreactivity for collagen α chains was detected.

Discussion

The similar expression patterns of α 1(IV), α 2(IV), α 5(IV), and α 6(IV) in the BM zone of ameloblastoma and oral mucosa suggests

that the ameloblastoma tumor cells with this expression pattern are more mature, whereas tumor areas showing α 4(IV) chain expression may represent a more primitive phenotype. The collagen IV molecular composition in the ameloblastoma BM suggests that these BM constituents play an important role in tumor cytodifferentiation and progression