

# DISTRIBUTIONS OF FIBRONECTIN, LAMININ, AND TYPE I AND IV COLLAGENS DURING RUMINAL PAPILLAE FORMATIONS IN BOVINE FETUSES

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## Introduction

It has been revealed there are certain interactions between the epithelium and mesenchyme in many organs during organogenesis (Sawyer and Fallon, 1983).

The ruminal papillae are very active in both structural and functional aspects. Therefore, their developing patterns have been considered to have a vital role in the ruminal stomach formation (Amasaki and Daigo, 1987; 1988; Tamate et al., 1962).

Present study describes the developmental patterns of extracellular matrices (ECM) including fibronectin (FN), laminin (LM), and Type I and IV collagens in the bovine ruminal papillae.

## Materials and Methods

Ten bovine fetuses from 5 cm crown rump length (CRL) to 100 cm CRL were used in the present study.

## Histological procedure

Each tissue of the rumen at atrium ruminis or at cranial part (5 cm CRL fetus) was excised and fixed in Zamboni solution. The samples were dehydrated in a series of ethanol, embedded in paraffin and serially sectioned at 4  $\mu$ m. Each sample was stained with the anti-ECM serum, using ABC method (Banks, 1979) and observed under a light microscope. Histogenesis was observed in the ruminal papillae stained with HE.

## Anti-ECM serum

We used the commercial anti-bodies against the various components of ECM for the present study. Included were anti-bovine FN, anti-mouse LN, and anti-bovine type I and IV collagen serum (Djids, Advance Co., Ltd., U.S.A.).

## Results

Before the formation of the rudiment of papillae of the lamina propria (5 cm CRL), the mesenchymal cells were thin but homogeneously distributed in subepithelial tissue beneath the epidermal basement membrane. Epidermal placode was not seen. FN and type I collagen were detected in the ECM around the mesenchymal cells. At 16 cm CRL, the mesenchymal cells were found in the upper layer of subepithelial tissue. Mesenchymal condensation was not seen. FN and type I collagen were found in wide area of the subepithelial tissue just beneath the epidermal basement membrane. After the probable onset of protrusions of the ruminal papillae to the luminal surface (27 cm CRL), density gradient of FN was marked. It was denser at the lamina propria than was at the subepithelial region. Type I collagen was found in the area of the submucosal layer.

LN and type IV collagen were always detected at the epidermal basement membrane in all bovine fetal specimens, from 5 cm to 100 cm CRL.

## Discussion

The present study revealed that the epidermal placode and mesenchymal condensation were not formed during the ruminal papillae formation in the bovine fetus. This finding differs from the condensation in the early stage of the ectodermal formations; i.e., feather rudiments in the chick (Kitamura, 1981; 1987).

FN and type I collagen were condensation as not found at the ruminal papillae rudiments (figure 1), which coincided with that the epidermal placode and mesenchymal condensation were not seen.

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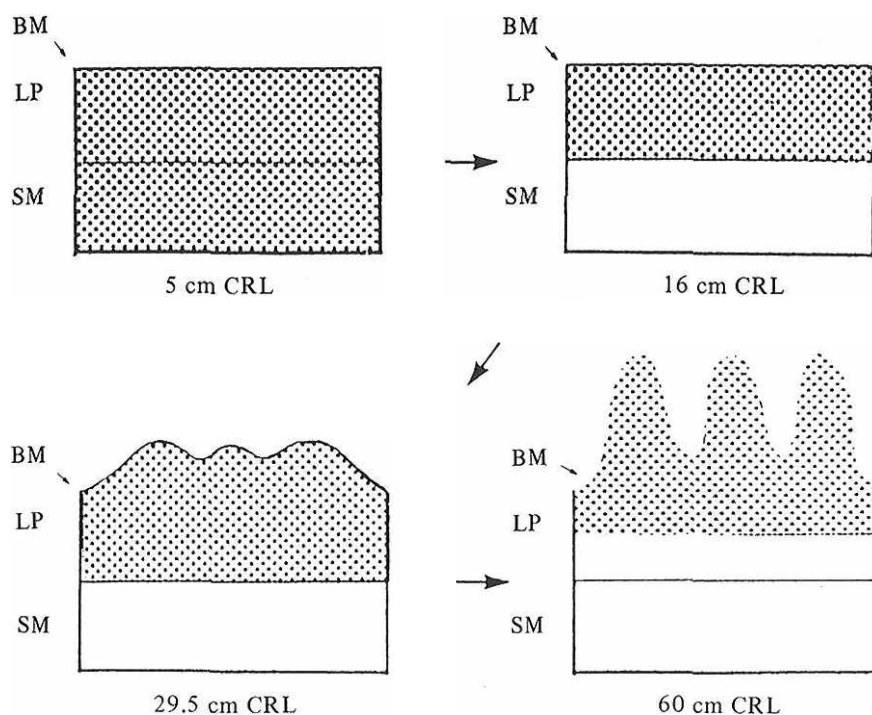


Figure 1. Schematic diagrams of distribution of fibronectin in subepithelial connective tissues during ruminal papillae formation. BM; epidermal basement membrane. LP; lamina propria. SM; submucosa.

(Key Words: Distribution, ECM, Rumen, Bovine Fetus)

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