IMMUNOFLUORESCENT STUDIES OF TYPE I, II, III AND IV COLLAGEN-DEVELOPMENT IN THE CHICK EMBRYO.

Klaus von der Mark, Helga von der Mark, Helgard Herrmann and Rupert Timpl.

In order to elucidate the role of the collagen types I - IV in cell differentiation and morphogenesis, their temporal appearance and distribution in the developing chick embryo was studied by immunofluorescence, using collagen type-specific antibodies.
The earliest collagen found was basement mebrane collagen (type IV)*, which appeared during the second day of development at the ectodermal-mesodermal interface (Trelstad et al., 1967; *Timpl et al., 1977), followed by type I collagen at the same sites but additionally in the mesenchyme, notochord and in the eye. Type II collagen was found first in the notochord on day 2, in the primary corneal stroma, vitreous and neural retina on day 2 1/2 (stage 20) and finally in hyaline cartilage of the limb bud and vertebral body. Type III collagen was found at day 5 in the perichondrium, presumptive dermis and later on in vessels, tendons and in reticular mesh work of liver, spleen and muscle. A highly complex distribution pattern of all four collagen types was found in the eye.
From the in situ immunofluorescence studies it became apparent that chondrogenic differentiation of limb mesenchyme was preceded by deposition of a loose mesh work of type I collagen. In cell culture experiments we found that type I and type II collagen when used as cell substrates served as promoters of cell proliferation and chondrogenic differentiation of limb bud mesodermal cells. Onset of chondrogenesis was followed by analyzing type II collagen synthesis biochemically and immunologically, whereas differentiation to myoblasts or fibroblasts was indicated by an increase of type I collagen synthesis and begin of type III collagen synthesis (v.d.Mark et al,1977)

References

K. von der Mark, H. von der Mark (1977). J. Cell Biol., in press.
R. Timpl, G. Martin, P. Bruckner, G. Wick, H. Wiedemann (1977) submitted.
R. Trelstad, E.D. Hay, J.P. Revel (1967) Develop. Biol. 16, 78-106.