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DISSERTATION SUMMARY

Expression of matrilins in embryo and newborn mice

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Matrilins form a structurally and evolutionarily related group of extracellular matrix proteins. The matrilin family at present has four members, all have the same structure, build up of von Willebrand factor type-A domains, epidermal growth factor-like modules and a coiled coil α-helical module. The prototype is matrilin-1, previously called cartilage matrix protein (CMP). Matrilin-1 and -3 are mostly found in cartilage, matrilin-2 and -4 show a wider tissue distribution. Recently we cloned matrilin-2 cDNA and determined the expression pattern of the gene in adult mice. In order to gain a better understanding of the function of the protein, and to see a potential role in development, we monitored the expression of matrilin-2 during mouse embryo development and in the newborn animal.

RNA and tissue samples were collected from mouse embryos to monitor changes in the expression of the matrilin-2 gene. Matrilin-2 mRNA was detectable by RT-PCR already at the age of E7.5, and the amount of it increased during embryo development. Protein deposition was examined by indirect immunofluorescence or immunohistochemistry in cryostat sections. In 7.5 day embryos matrilin-2 was detectable in large amount in the ectoplacental cone and the decidua and in extraembryonic tissue. At day 9.5 the protein was seen in the basal lamina of the somite epithelium, and in the primordial meninges around the brain vesicles. At day 11.5 deposition of the protein can be observed in the notochord, the wall of dorsal aorta, in the zones of vertebral body primordia and in the developing dorsal root ganglia. Matrilin-4 is more readily detectable in these places. At day 13.5 all the skeletal elements are stained for matrilin-2. In the developing nervous system, the brain and the medulla spinalis are not labeled for matrilin-2, except for the pia matter, the basal lamina of ependymal cells and the choroid plexus. However, the cranial nerves and ganglia, the dorsal root ganglia and the spinal nerves and also the sympathetic trunk show matrilin-2 deposition in the peri- and epineurium. To identify the expressing cell type, nonradioactive *in situ* hybridisation was performed. Expression of the matrilin-2 gene was clearly found in the sensory neurons of the dorsal root ganglia. During eye development, matrilin-2 accumulates almost as early as the lens is formed. At day 11.5 the protein was observed in the lens capsule. It is also visible in sclera and several layers of the optic cup. The corneal stroma, however, which contains abundant quantity of matrilin-4, does not show accumulation of matrilin-2, suggestive of different interacting collagen partners for the two matrilins.

One of the further aims of my study was to compare the expression pattern of matrilins in the developing skeleton using the same techniques. Matrilin-1 is detectable earlier than matrilin-3, but by newborn age expression domain of matrilin-3 becomes broader including the zone of reserve chondrocytes and osteoblasts. Matrilin-2 is less abundant in cartilage with a relative maximum in the zone of the hypertrophic cells, but detectable in large amount at the articular surface, perichondrium, periosteum and menisci (Segat et al. 2000).

The matrilin-2 gene expression was monitored in various cell lines. Both the human and mouse genes are transcribed from two promoters. The upstream, housekeeping-like promoter is active in all cell types tested, while the downstream, TATA-like promoter functions only in embryonic fibroblast and in certain cell lines (Mátés et al. 2002).

References

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