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Molecular cloning and expression analysis of a matrix Gla protein gene in the spinyhead croaker, *Collichthys lucidus*

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ABSTRACT. The matrix Gla (gamma-carboxyglutamic acid-rich) protein (MGP), a vitamin K-dependent and Gla-containing protein, is a calcification inhibitor that mainly functions in tissue calcification and mineralization. In this study, we obtained the complete cDNA sequence of *MGP* from the spinyhead croaker (*Collichthys lucidus*), which we named *Cl-MGP*. *Cl-MGP* was 923 bp long with a 384-bp open reading fragment that encoded 127 amino acids. The predicted MGP protein sequence contained a 19-residue hydrophobic signal peptide, suggesting that it possesses secretory characteristics. The Gla domain and the invariant unit ErraEtCedyspC, which has been identified in all known vitamin K-dependent vertebrate proteins, were highly conserved in Cl-MGP, suggesting that it uses the same mechanism to function as the known proteins. An alignment analysis revealed that Cl-MGP had the highest identity with *Larimichthys crocea* (93%), which had

lost five amino acid residues in the C-terminal. A quantitative real-time polymerase chain reaction revealed that *Cl-MGP* expression was highest in the gill, followed by the cholecyst and spleen, with almost no expression in the blood, muscle, or testes. The high *Cl-MGP* expression in the gill is similar to that observed in other fish species, but the relatively high expression found in the cholecyst and spleen is not seen in all species. Future studies should investigate the tissue distributions of both mRNA and proteins in different species, in order to understand the function and evolution of MGP in different species.

Key words: Matrix Gla protein; *Collichthys lucidus*; Gene clone; mRNA expression