

Pufferfish Skin Collagens and Their Role in Inflation

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Abstract : Inflation serves different purposes in different organisms and adds beauty to their behavioral attributes. Pufferfishes are also known as blowfish, swellfish, and globefish due to their remarkable ability to puff themselves up like a balloon when threatened. This ability to inflate can be correlated with anatomical features that are unique to pufferfishes. Pufferfish skin provides a rigid framework to support the body contents and a flexible covering to allow whatever changes are necessary for remarkable inflation mechanism. Skin, the outer covering of animals is made up of collagen fibers arranged in more or less ordered arrays. The ventral skin of pufferfish stretches more than dorsal skin during inflation. So, this study is of much of the interest in comparing the structure and mechanical properties of these two skin regions. The collagen fibers were found to be arranged in different ordered arrays for ventral and dorsal skin and concentration of fibers were also found to be different for these two skin parts. Scanning electron microscopy studies of the ventral skin showed a unidirectional arrangement of the collagen fibers, which provide more stretching capacity. Dorsal skin, on the other hand, has an orthogonal arrangement of fibers. This provides more stiffness to the ventral skin at the time of inflation. In this study, the possible role of collagen fibers was determined which significantly contributed to the remarkable inflation mechanism of pufferfishes.

Keywords : collagen, histology, inflation, pufferfish, scanning electron microscopy, Small-Angle X-Ray Scattering (SAXS), transmission electron microscopy

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