Crystallographic studies on carp Fishelectin (FEL)

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A few years ago we isolated and sequenced a novel glycoprotein present in the eggs of the carp (Cyprinus carpio) (1). The protein, that binds to a Sepharose 4B matrix column and can be eluted with 0.4 M N-acetyl glucosamine, behaves like a lectin of molecular mass 26686 Da. On the basis of DLS experiments the lectin is present in solution as a stable dimer. We have determined its 238 amino acid long sequence, the position of its 4 disulfide bridges and the structure of its single N-linked carbohydrate chain. The lectin shows a very low agglutinating activity for human A-type erythrocytes and interacts with both Gram positive and negative bacteria, these last interactions are inhibited by N-acetyl glucosamine. A data base search shows that its amino acid sequence is significantly similar to that of the members of an invertebrate lectin family that includes tachylectin-1, present in the amebocytes of the horseshoe crab Tachypleus tridentatus, and known to participate in the innate defense system of this species (2.3) and two other lectins, characterized in the plasmodium Physarum polycephalum, that are called Tectonins I and II and are located in the external surface of the plasma membrane (4). We have proposed the name fishelectins (by analogy with tachylectins) for this new vertebrate protein family. Homologous genes are present in other bony fish. The carp protein has 85 % identity with a gene expressed in the crucian carp (Carassius auratus gibelio) (5) and 78 % identity with a gene in the cDNA library of the zebrafish (Danio rerio). We have prepared three different crystal forms of the apo protein and two of co-crystals with N-acetyl glucosamine. The orthorhombic form of the apoprotein belongs to space group $P2_12_12_1$ and was solved first using the MIR method. Our poster will present the data collection statistics of the best apo and holo forms of the lectin and the refinement statistics of the holo form and will discuss the structure and similarity of this newly identified family of vertebrate proteins to a well known invertebrate protein family.

References

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