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Structure of the Group B Streptococcus Surface Protein C5a Peptidase. C. Kent Brown, Zu-Yi Gu, Yury Matsuka, P. Patrick Cleary, Stephen Olmsted, Douglas H. Ohlendorf, Cathleen A. Earhart, Biochemistry, Molecular Biology & Biophysics, Univ. of Minnesota, Minneapolis, MN 55455.

C5a peptidase (SCPB) is a multifunctional protein expressed on the cell surface of all serotypes of the group B streptococcus (GBS). GBS is a major cause of pneumonia, sepsis, and meningitis in newborns and can also be fatal to immunocompromised adults. SCPB acts to specifically proteolyze the human phagocyte chemotaxin C5a inactivating it. In addition, SCPB functions as an adhesion/invasion molecule. It has been shown to bind to the extracellular matrix protein fibronectin.

A 946 residue fragment of the D120A/S512A mutant of SCPB was crystallized and its structure determined to 1.9 Å resolution using MAD techniques. In the crystallographic asymmetric unit is a dimer of SCPB. Each monomer is composed of 5 distinct domains. At the C-terminus are 3 Type III fibronectin domains (Domains C, D and E). The N-terminal domain, Domain A, has a serine protease fold and is structurally homologous to subtilisin (RMSD = 3.0 Å over 200 of 337 residues). Domain B is a protease-associated domain similar to the apical domain of the human transferrin receptor (RMSD = 2.6 Å over 108 of 125 residues). The details of structural analysis will be presented and discussed in relation to multiple biological functions of this important virulence factor.