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# Identification of a high yield cysteine protease from bacillus subtilis A4 and its diverse biotechnological applications

**Sandeepta Burgula**
Osmania University, India

In this study, a protease-producing Bacillus subtilis A4 strain was identified from a local soil sample in Hyderabad, India. The strain was observed to show the highest protease specific activity at 76,153.84 U/mg and after various screening experiments, the enzyme was identified to have 71% sequence similarity with Bacillus subtilis cysteine protease. The crude cysteine protease showed potential role in Meat tenderization, fabric blood stain removal (detergent), silver recovery from Xray films and efficient dehairing of animal skin. To test the application of the cysteine protease in generating bioactive peptides, anchovy fish (Stolephorus indicus) meat was utilized as a substrate and the generated peptides were identified by LCMS/MS analysis. in silico analysis of the peptides using CASTp server and GOLD software revealed two peptides 10 and 13 to have binding scores of 74.99 and 46.71 for binding ACE2 enzyme active sites, mainly by hydrogen bonding. In addition, in TMPRSS2-peptide 10 inhibitor complex, hydrogen atom of Peptide10 formed two hydrogen bonds with oxygen atom (O2) of ARG150 with a binding energy of 99.11 KJ/mol. Further, Peptide 10 showed strong binding with Spike2 protein in the receptor binding domain (RBD) forming a glycoprotein-inhibitor complex by hydrogen bonding with nitrogen atom (N2) of LYS343 at a binding energy of 66.86 KJ/mol. Interestingly, the binding of the peptide was observed to be away from the mutated locations of Spike 2 RBD of the SARS-CoV2 Omicron variant. Due to the multiple binding sites, these peptides can have a potential role in averting entry of SARS-CoV2 virus, that may be due to the prevention of binding of Spike2 glycoprotein to the ACE2 receptor on host cells and also inhibiting TMPRSS2 mediated cleavage of virus entry. Further studies in this direction will be useful in devising strategies to prevent infection.

## Biography

Sandeepta Burgula is currently the Head, Department of Microbiology and Director, Central Facilities for Research and Development at Osmania University, Hyderabad, India. The main thrust area of her research is studies involving molecular pathogenesis. Her laboratory is currently focused on utilizing bacterial enzymes for isolating bioactive peptides from biological sources. Her lab is also works on elucidating the acute phase response in bacterial sepsis and evaluating anti-tumor and anti-microbial activity of medicinal plants and biogenic nanoparticles. She has filed three Indian patents out of which one has been awarded recently. She is a former ASM-INDOUSSTF sponsored Visiting Research Professor under which she worked at St. Jude Childrens' Cancer Research Hospital at Memphis, USA, and has also worked as a UGC sponsored Raman Postdoctoral Fellow in USA (SUNY, Stonybrook, NY), on Epstein-Barr virus mediated STAT3 signalling. She is an Associate Fellow of the Telangana Academy of Sciences, India.

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