sortase A 3.4.22.70

1 Nomenclature

EC number
3.4.22.70

Recommended name
sortase A

Synonyms
C60.001 (Merops-ID)
SrtA <1,2,3,5,7,8,9,11,12,14,15> [10,11,16,19,25,26,27,28,29,30,31,32,34,36,38,39,40,41,42,43,44,45,47,48,49,51,52,53,54,55,56,57,58,59]
SrtA protein
SrtA sortase <4> [17]
sortase A transpeptidase <1> [22]
sortase SrtA <1> [46]
sortase transpeptidase <1> [26]

CAS registry number
9033-39-0

2 Source Organism

<1> Staphylococcus aureus [2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,19,20,21,22,23,26,29,30,31,32,33,34,35,36,37,38,39,40,41,46,47,51,52,53,54,57]
<2> Enterococcus faecalis [49,56]
<3> Streptococcus pneumoniae [27,42,48,55]
<4> Streptococcus agalactiae [17]
<5> Streptococcus sanguinis [43]
<6> Corynebacterium diphtheriae [24]
<7> Listeria monocytogenes [25]
<8> Streptococcus gordonii [44]
<9> Bacillus anthracis [18,28,38,58]
<10> Staphylococcus aureus (UNIPROT accession number: Q9S446) [1]
<11> Streptococcus suis [45]
<12> Streptococcus pneumoniae D39 [55]
<13> Streptococcus pyogenes (UNIPROT accession number: Q99ZN4) [50]
<14> Streptococcus pneumoniae TIGR4 [55]
<15> Streptococcus uberis 0140J (UNIPROT accession number: B9DS55) [59]
3 Reaction and Specificity

Catalyzed reaction
The enzyme catalyses a cell wall sorting reaction in which a surface protein with a sorting signal containing a LPXTG motif is cleaved between the Thr and Gly residue. The resulting threonine carboxyl end of the protein is covalently attached to a pentaglycine cross-bridge of peptidoglycan.

Reaction type
hydrolysis of peptide bond

Natural substrates and products

Additional information <1,2,3,4,6,8,10,11> (<1> transpeptidase activity: the enzyme catalyzes a cell wall sorting reaction in which a surface protein with a sorting signal containing a LPXT-G motif is cleaved between the Thr and Gly residue. The resulting threonine carboxyl end of the protein is covalently attached to a pentaglycine cross-bridge of peptidoglycan. When a nucleophile is not available, sortase slowly hydrolyzes the LPETG peptide at the same site. Ping-pong mechanism in which a common acyl-enzyme intermediate is formed in transpeptidation and hydrolysis. The nucleophile binding site of the enzyme is specific for diglycine [2]; <10> the enzyme anchors surface proteins to the bacterial cells wall [1]; <1> the enzyme cleaves surface proteins of Staphylococcus aureus at the LPXT-G motif, catalyzes surface protein anchoring by means of a transpeptidation reaction that captures cleaved polypeptides as thioester enzyme intermediates [5]; <1> the enzyme cleaves surface proteins at the LPXTG motif and catalyzes the formation of an amide bond between the carboxyl group of Thr and the amino group of cell-wall crossbridges [3]; <1> gram-positive pathogenic bacteria display proteins on their surface that play important roles during infection. In Staphylococcus aureus these surface proteins are anchored to the cell wall by two sortase, sortase A and sortase B that recognize specific surface protein sorting signals. Sortase A is an essential virulence factor for establishment of septic arthritis [9]; <1> primary role of the SrtA isoform in Staphylococcus aureus adhesion and host colonization [12]; <4> SrtA sortase of Streptococcus agalactiae is required for cell wall anchoring of proteins containing the LPXTG motif, for adhesion to epithelial cells, and for colonization of the mouse intestine [17]; <1> the transpeptidase required for cell wall protein anchoring and virulence in Staphylococcus aureus [19]; <6> two elements of Spa pilin precursor, the pilin motif and the sorting signal, are together sufficient to promote the polymerization of an otherwise secreted protein by a process requiring the function of the sortase A [24]; <8> in addition to its role in processing LPXTG containing adhesins, sortase A has the function of contributing to transcriptional regulation of adhesin gene expression [44]; <3> role of srtA in adherence in vitro is dependent on capsule expression, the role of SrtA in adherence to human cells only being apparent in the absence of the pneumococcal capsule [42]; <2> sortase