Degradation of the starch components amylopectin and amylose by barley α-amylase 1: Role of surface binding site 2

Barley α-amylase isozyme 1 (AMY1, EC 3.2.1.1) contains two surface binding sites, SBS1 and SBS2, involved in the
degradation of starch granules. The distinct role of SBS1 and SBS2 remains to be fully understood. Mutational analysis of
Tyr-380 situated at SBS2 previously revealed that Tyr-380 is required for binding of the amylose helix mimic, β-
cyclodextrin. Also, mutant enzymes altered at position 380 displayed reduced binding to starch granules. Similarly, binding
of wild type AMY1 to starch granules was suppressed in the presence of β-cyclodextrin. We investigated the role of SBS2
by comparing kinetic properties of the wild type AMY1 and the Y380A mutant enzyme in hydrolysis of amylopectin,
amylose and β-limit dextrin, and the inhibition by β-cyclodextrin. Progress curves of the release of reducing ends revealed
a bi-exponential hydrolysis of amylopectin and β-limit dextrin, whereas hydrolysis of amylose was unaffected. The Y380A enzyme showed no detectable inhibition by β-
cyclodextrin but displayed similar kinetics to the inhibited wild type AMY1. These results point to SBS2 as an important
binding site in amylopectin depolymerization.

General information
State: Published
Organisations: Department of Systems Biology, Enzyme and Protein Chemistry, University of Copenhagen
Contributors: Nielsen, J. W., Kramhøft, B., Bozonnet, S., Abou Hachem, M., Stipp, S. L. S., Svensson, B., Willemoes, M.
Pages: 1-6
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Archives of Biochemistry and Biophysics
Volume: 528
Issue number: 1
ISSN (Print): 0003-9861
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.32 SJR 1.35 SNIP 1.02
Web of Science (2017): Impact factor 3.118
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.89 SJR 1.373 SNIP 0.916
Web of Science (2016): Impact factor 3.165
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.21 SJR 1.513 SNIP 0.993
Web of Science (2015): Impact factor 2.807
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.76 SJR 1.381 SNIP 0.949
Web of Science (2014): Impact factor 3.017
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.56 SJR 1.599 SNIP 1.172
Web of Science (2013): Impact factor 3.043
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.23 SJR 1.357 SNIP 1.112
Web of Science (2012): Impact factor 3.37
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1