High-density peptide microarray exploration of the antibody response in a rabbit immunized with a neurotoxic venom fraction

Polyvalent snakebite antivenoms derive their therapeutic success from the ability of their antibodies to neutralize venom toxins across multiple snake species. This ability results from a production process involving immunization of large mammals with a broad suite of toxins present in venoms. As a result of immunization with this wide range of toxins, many polyvalent antivenoms have a high degree of cross-reactivity to similar toxins in other snake venoms - a cross-reactivity which cannot easily be deconvoluted. As a proof of concept, we aimed at exploring the opposite scenario by performing a high-throughput evaluation of the extent of cross-reactivity of a polyclonal mixture of antibodies that was raised against only a single snake venom fraction. For this purpose, a venom fraction containing short neurotoxin 1 (SN-1; Uniprot accession number P01416, three-finger toxin (3FTx) family), which is the medically most important toxin from the notorious black mamba (Dendroaspis polylepis), was employed. Following immunization of a rabbit, a specific polyclonal antibody response was confirmed by ELISA and immunodiffusion. Subsequently, these antibodies were investigated by high-density peptide microarray to reveal linear elements of recognized epitopes across 742 3FTxs and 10 dendrotoxins. This exploratory study demonstrates in a single immunized animal that cross-reactivity between toxins of high similarity may be difficult to obtain when immunizing with a single 3FTx containing venom fraction. Additionally, this study explored the influence of employing different lengths of peptides in high-density peptide microarray experiments for identification of toxin epitopes. Using 8-mer, 12-mer, and 15-mer peptides, a single linear epitope element was identified in SN-1 with high precision.

General information
State: Published
Organisations: Network Engineering of Eukaryotic Cell factories, Department of Bio and Health Informatics, Genomic Epidemiology, Immunoinformatics and Machine Learning, Department of Biotechnology and Biomedicine, Universidad de Costa Rica
Contributors: Engmark, M., Jespersen, M. C., Lomonte, B., Lund, O., Laustsen, A. H.
Pages: 151-158
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Toxicon
Volume: 138
ISSN (Print): 0041-0101
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.4 SJR 0.692 SNIP 0.9
Web of Science (2017): Impact factor 2.352
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.33 SJR 0.766 SNIP 1.047
Web of Science (2016): Impact factor 1.927
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.47 SJR 0.904 SNIP 1.033
Web of Science (2015): Impact factor 2.309
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.48 SJR 0.972 SNIP 1.101
Web of Science (2014): Impact factor 2.492
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.9 SJR 1.022 SNIP 1.24
Web of Science (2013): Impact factor 2.581
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.85 SJR 1.019 SNIP 1.346
Web of Science (2012): Impact factor 2.924
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.54 SJR 0.908 SNIP 1.059
Web of Science (2011): Impact factor 2.508
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.872 SNIP 1.138
Web of Science (2010): Impact factor 2.451
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.756 SNIP 0.974
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.898 SNIP 1.056
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.828 SNIP 1.108
Scopus rating (2006): SJR 1.115 SNIP 1.078
Scopus rating (2005): SJR 0.844 SNIP 1.194
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.966 SNIP 1.147
Scopus rating (2003): SJR 0.806 SNIP 1.306
Scopus rating (2002): SJR 0.699 SNIP 1.272
Scopus rating (2001): SJR 0.494 SNIP 1.035
Scopus rating (2000): SJR 0.736 SNIP 1.164
Scopus rating (1999): SJR 0.72 SNIP 1.083
Original language: English
Keywords: Dendroaspis polylepis, Epitope mapping, Short neurotoxin, Single toxin immunization, Three-finger toxin
Electronic versions:
high_dens.pdf. Embargo ended: 01/09/2018
DOIs: 10.1016/j.toxicon.2017.08.028
Source: FindIt
Source-ID: 2373555195
Research output: Research - peer-review › Journal article – Annual report year: 2017