



TECHNOLOGY

High affinity recombinant sea lamprey antibodies selected by a yeast surface display platform.

OVERVIEW

Immunoglobulin-based antibody therapeutics are enjoying unprecedented success. Hundreds are in clinical trials, with revenues from the top five (Rituxan, Remicade, Herceptin, Humira, and Avastin) increasing from \$6.4 billion in 2004 to \$11.7 billion in 2006 (Dimitrov & Marks, 2009). Thousands more are available for biological detection assays. Nevertheless, such antibodies are difficult to produce. They require elaborate and expensive steps for recombinant expression, possess a complex architecture, are prone to dissociate, and tend to aggregate when fused to effector domains. These technical limitations, as well as major patent restrictions, have driven an intensive search for synthetic antibody alternatives. Researchers at the University of Maryland, Baltimore have now identified a more promising class of natural antigen receptors that could be used as an alternative to both immunoglobulin-based and synthetic antibodies. The variable lymphocyte receptors (VLRs) of lamprey are the only known adaptive immune system not based on immunoglobulin-based antibodies and T cell receptors. This invention incorporates VLRs into a Yeast Surface Display vector, providing a high-throughput eukaryotic platform that can be used to develop systems and methods for diagnostic applications, immunoaffinity purification, and engineering novel fusion proteins that do not include the shortcomings of immunoglobulin-based antibodies. The application also discloses a method for generating VLR proteins displaying a high affinity for an antigen of choice. This method has successfully identified VLR clones that bind specific antigen targets with nanomolar and picomolar affinity (Tasumi et al, 2009; Xu et al, 2011). VLRs are also very stable (Herrin et al, 2008). Ultimately, VLRs could prove to be cheaper and easier to generate than the widely successful immunoglobulin-based antibodies currently being used.

APPLICATIONS

Antibody development
Immunoaffinity purification
Engineering of novel fusion proteins for molecular recognition
Diagnostic applications like microarrays, immunochemistry and flow cytometry

ADVANTAGES

-Immunization is not required -Avoids the difficulties associated with generating recombinant antibodies, such as the elaborate and expensive steps for recombinant expression to ensure proper folding while preventing dissociation and aggregation. -VLRs are natural antigen receptors, unlike antibody alternatives based on synthetic binding scaffolds - VLRs are extremely stable (Herrin et al, 2008) -Patent landscape is much smaller for VLR recombinant antibodies than for Ig-based antibodies

STAGE OF DEVELOPMENT

Yeast Surface Display has identified VLR clones that bind specific antigen targets with nanomolar and picomolar affinity (Tasumi et al, 2009; Xu et al, 2011)

R&D REQUIRED

In-vivo studies to determine efficacy and toxicity

LICENSING POTENTIAL

UMB seeks partners for licensing, clinical development, and/or sponsored research to advance this technology into the healthcare field.

CONTACT INFO

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PATENT STATUS

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CATEGORIES

- Diagnostics
- Platforms

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EXTERNAL RESOURCES

- [Yeast surface display of lamprey variable lymphocyte receptors.](#)
- [High-affinity lamprey VLRA and VLRB monoclonal antibodies.](#)
- [Therapeutic antibodies: current state and future trends--is a paradigm change coming soon?](#)
- [Structure and specificity of lamprey monoclonal antibodies.](#)

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