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Short Communication

The Nanobodies Concept and Its Relations with Invertebrate Primitive Antibodies (IPA)

Michel Leclerc*

Department of Immunology of Invertebrates, Orleans University, 556 Rue Isabelle Romée, 45640 Sandillon, France

DESCRIPTION

In 1986, an antibody-like factor composed of 4 subunits of 30 Kda, each was isolated [1]. It was an anti- Tri-Nitro-Phényl (TNP) antibody-like substance. Later in 2011, by the help of Genomics, it was discovered that there was an anti-HRP Kappa genes Horse-Radish Peroxydase (HRP) in the genome of the sea star *Asterias rubens* C. from animals immunized to HRP [2]. In 2014, A new gene, a sea star IG-Kappa gene, showing two IG sites, was obtained, also from the *Asterias rubens* genome [3], it was called Invertebrate Primitive Antibody (IPA). Then, a recombinant protein issued from the cloning of sea star IGKappa gene through HeK cells was found [4]. The corresponding protein, in SDS -Page had a molecular weight of 14 Kda. In conclusion, at least 2 sorts of Invertebrate Primitive Antibodies (IPA) coexist in the sea star immune system and researcher thought that they must constitute the nanobodies they want to explore later. The first IPA (anti-TNP) has a mass weight of 30 Kda, the second one of 14 Kda. The second one belongs to Kappa genes (light chain of IG) the first one remains enigmatic when compared to heavy or to light chains of vertebrate immunoglobulins. In the year 2013 Doctor Serge Muyldermans worked on Camelids and their sera, he found that, sera of camelids contain both conventional hetero-tetrameric antibodies and unique functional Heavy-Chain Antibodies (HCAbs) [5].

The H chain of these homodimeric antibodies consists of one antigen-binding domain, the VHH, and two constant domains. HCAbs fail to incorporate light (L) chains owing to the deletion of the first constant domain and a reshaped surface at the VHH side, which normally associates with L chains in conventional antibodies. The genetic elements composing HCAbs have been identified, but the *in vivo* generation of these antibodies from their dedicated genes into antigen-specific and affinity-matured bona fide antibodies remains largely under investigated. However, the facile identification of antigen-specific VHHs and their beneficial biochemical and economic properties (size, affinity, specificity, stability, production cost) supported by multiple crystal structures have encouraged antibody engineering of these single-domain antibodies for use as a research tool and in biotechnology and medicine.

Muyldermans initiated the notion of nano bodies with a weak molecular weight as our own sea star antibodies. It is of special interest to continue these types of researches, to explore these new IPA to determine their capacity in supposed anti-viral activity. In 2012, one year sooner, an abstract of C. Vincke and Muyldermans, said that: The immune response of infected or immunized dromedaries (camelids) contains a diverse repertoire of conventional and heavy chain-only antibodies, both functional in antigen binding [6]. By definition, a heavy chain antibody is devoid of a light chain and in the case of the heavy chain antibodies in camelids the CH1 domain is also missing. Consequently a camelid heavy chain antibody associates with its cognate antigen *via* a single domain, the variable heavy chain domain of a heavy chain antibody or VHH.

CONCLUSION

It was attempted to do the same work with the sea star antibody by many researchers (mainly with the anti-HRP sea star antibody of 14 Kda). An antigen-specific VHH, also known as nano body, with excellent biochemical properties can be obtained in various ways. Their recombinant expression provides access to user-friendly tools for a wide variety of applications. In this paper one of the precedents of 2013 was added and it was confirmed only by the work of Muyldermans which opened large conception of nano bodies and their preparation from Dromaderies sera.

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Correspondence to: Michel Leclerc, Department of Immunology of Invertebrates, Orleans University, 556 Rue Isabelle Romée, 45640 Sandillon, France, E-mail: mleclerc45@gmail.com

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