Dengue Virus Diagnosis

Dengue is a viral disease that, according to WHO, occurs in diagnosis/million cases, mainly in years, over 30 times in the last 50 years. Nowadays affects 110 countries in the world’s intertropical region and spreading in a pandemic way. From those millions officially diagnosed about 500,000 cases require hospitalization and about 12,500 die, implied high socio-economical costs. Meanwhile, more aggressive serotypes of Dengue virus are emerging, more effective, specific and rapid diagnosis is urgently needed.

This work is focused on the study of technological trends on dengue virus diagnosis. Patent and literature databases were developed using different Boolean keyword search approaches, for selecting those patent and scientific articles specifically related to detection and diagnosis methods on dengue virus. Said documents were filtered and classified according to the type of diagnosis strategy (immunologic, molecular, etc.) and upon time. Afterwards, specific kinds of methodologies (culture media, ELISA, PCR, RT-PCR, etc.) were pointed out, including specific protein or nucleotide sequences related to each document. Our analysis allowed us to detect which methods, proteins or genes are the most protected and studied and the different actors (universities, companies, inventors, researchers) the potential interest from disease/terminal stage, involved in the development of this technology. By analysing both patent and scientific literature documents, the technological trend over diagnosis and detection of dengue virus is provided, which may be helpful for deciding new research—projects based on—detecting—potential—research—diagnosis and development/design over main surface antigens of Dengue virus, which is fundamental.

The fundamental subjects of said articles are on IgG, IgM, IgA immunoglobulins, antigens and viral proteins (left figure).

From the above documents, it’s worthy to mention that results vary depending on the standard referenced, the kind of test or the compared kit. Also, only IgG, IgM or IgA kits or test were compared, wherein the latter has been extensively reported during the last 2 years for point-of-care tests.

Furthermore, NS1 and its combination with IgG, IgM or IgG+IgM is particularly relevant, since although NS1 alone has good sensitivity and specificity, its synergistic effect with said immunoglobulins increases maximum values on serological tests.

**Trends**

**Tech trends for R&D efficiency**

Novel Tech Surveillance method is proposed for increasing efficiency in R&D, grants and Technology transfer from Research centers, companies or inventors. Tech surveillance is a source of vital information for deciding on investing in certain R&D pathways according to business/tech/IP strategy of the user.

Arising from an adapted Technology management model which requires to receive projects at different stages of development, Tech surveillance has become into a important tool for decision making.

For those early-Intermediate stage projects, the R&D team (research/tech/Investor) should have information about prior art (patents, articles, web & products) to visualize next and also could visualize what has not been done. Then, they could evaluate how to set an strategy of R&D with clear goals and risks (technical & IP) related to a market opportunity window or scenarios.

In an advanced stage of R&D and commercialization, Tech surveillance becomes into a tool for securing IP according to sectorial trends, is useful in Tech transferences negotiations and could point out which are the tech trends for adapting a product. R&D efficiency increases when decision makers have the most complete information about the tech, legal and market trends and could evaluate potential scenarios and choose the best R&D route.

**Patent Trends**

184 patent documents from US, Europe, Japan and Especial System documents were found. Furthermore, additional 21 patents not captured on Especial system from China, India, Brazil and Mexico directly related with diagnosis.

**Tech Surveillance Procedure**

**CONCLUSIONS**

From the above analysis, in order to focus R&D efforts on Dengue Virus Detection Methods, the following recommendations were made:

1. **Do not look for detection on NS2, NS3, NS4 and NS5**, because of the low amount of antigens/antibodies on clinical samples.

2. It is not recommended to detect protein E, since it has been protected extensively and with broad scope, unless a new epitope is designed.

3. **Protein NS1 detection should be avoided in its hexameric form by designing mono or polyclonal antibodies or associated to IgG, IgM or IgA immunoglobulins.**

4. In spite of the above, it is recommended to focus efforts in silico and/or experiments directed on changes in pH, temperature or chemical reaction can break the NS1 hexamer or make a difference on external NS1 epithopes. This could help to generate novel antibodies or detection methods, based on said putative novel epitopes.

5. Chimeric or multivalent protein development/design over main surface or serum proteins (E, M and NS1) is encouraged, provided that said sequences are not already protected or disclosed.

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