Levels diagnostics: rely on Aeonian Biotech-rated antibodies!

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Science and the 'reproducibility crisis'

Medical diagnostics as well as applied and fundamental biosciences heavily rely on antibodies to detect molecules of interest. And these antibodies come in many forms nowadays: full antibodies, F_{AB} fragments, single chain F_V molecules or nanobodies, for example. As a result of that, there is huge market for production of highly specific and selective, good affinity antibodies. Many of these well-developed molecules have been designed through the ongoing hard work of researchers. Once the aim of the research is reached, scientists publish the newly obtained antibodies in a journal of their choice. The spectrum for scientific publications is very broad: there are thousands of scientific journals. Nowadays, most antibodies on the market are produced by companies and their values are assessed by researchers, both in fundamental research as well as in diagnostics. Some researchers start their own companies based on selection and optimization (and sometimes humanization) of the retrieved antibodies and expand their businesses to tailor-made selection of antibodies to all sorts of targets. In other cases, interesting antibodies are purchased by larger companies dedicated to the life science market in general. Since the field has exploded over the last decades, there are hundreds of companies worldwide selling antibodies. Antibodies that perform well, sell themselves: they are reported in numerous publications. For an overview of companies active in the field, see also www.antibodyresource.com.

As a result of the wide field of antibody discovery and the huge, widespread and diffuse antibody market, a general validation scheme is lacking. Most studies are only performed once and after publication, either in a scientific report, or in a datasheet, the materials are made available but never thoroughly checked for quality criteria. This situation not rarely leads to a scene which has been described as the *reproducibility crisis*, especially in situations where an antibody has solely been described in a datasheet. Since 2016, a formal method for validation of antibody molecules is in place, published in Nature Methods. However, a scientist is obviously not enthusiastic about a validation process as part of his or her scientific work. An antibody should basically perform its task as described by the manufacturer (recognition, binding, inactivation etc.) in reported assays, and, ideally also in non-reported assays. It does not need further explanation that quite some money is wasted by companies and institutes by using non-validated antibodies. And it goes without saying that start-up companies cannot afford to waste their valuable resources by conducting uncertain, non-reproducible experimental work.

Aeonian Biotech Netherlands BV

The Leiden Bioscience Park is home base to Aeonian Biotech, initially founded in 2017 in the United Kingdom and, per 2021, registered in the Netherlands as Aeonian Biotech Netherlands BV. CEO Dr Jan Voskuil, who has a longstanding reputation in antibody research, is the proud owner of the company. Already ten years ago he noticed that the weak validation of antibodies influenced the work of many researchers in the field and started working on an instrument that might be of use to those investigators that do not intend to waste their energy, time and resources on uncertainties. Voskuil published several papers on the issue and worked with renowned scientists in the field of antibody research. Launching his tool and starting this valuable work for customers in the Leiden Bioscience Park region has been the result of this hard work.

In the largest life science cluster in Europe, there is a demand for companies like Aeonian Biotech, focusing on antibodies (https://aeonianbiotech.com). As said, the market for antibodies is huge and demands for high quality molecules is ever-increasing. Though list prices for antibodies are not that low, the damage to research is not so much in the purchase of a non-functional antibody, as it is in the use of this unreliable reagent over a longer period. Think about costs of personal, valuable materials, use and maintenance of equipment: these factors exceed the initial purchase price many times and cause the real damage to a biotech company or an academic research group. A good preselection and substantiation of the chosen antibody is therefore of utmost importance.

Jan Voskuil took up the challenge to design a tool that allows for rating antibodies before purchasing. Now, his system, the Aeonian Rating®, is fully functional to the benefit of his customers. To set the stage: antibodies can be offered to identical targets by different companies. Sometimes, however, false claims are made about applications of the antibodies. In many cases, specificity or selectivity are not even mentioned. On top of that, antibodies can be offered under different names in different global catalogues, or they are made available for a limited time period. Companies face a big challenge to find the best antibodies for their research questions, especially when the investigators are not highly specialized in the field of antibody research and technology. Voskuil solves this problem for his customers by doing research work on antibodies offered worldwide. He applies a filter on the data sheet information of the products, and it meticulously subjects the information to a set of Aeonian criteria, categorized as performance-independent or performance-dependent criteria. The molecular characteristics like formulation, clonality and epitope specificity fall under the first category and performance in various experimental procedures (western blot, immunocytochemistry etc.) fall into the second category. The outcome of the rating is presented as a number on a scale of 100, the AR score for 'Aeonian Rating'. A description of criteria can be found on the Aeonian website in a blog: the 'What is our Aeonian Rating' (Aeonian Rating® - Aeonian Biotech). This way, the choice of commercial antibodies against one target can be reduced from many hundreds to a handful of the highest quality. The long-term savings made by using this service at this early stage can be enormous.

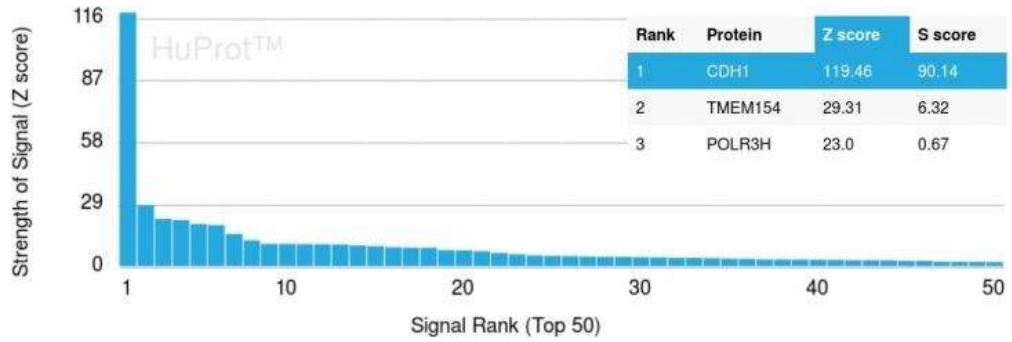

Figure 1. An example of demonstrating specificity and selectivity of antibody AE00264 on a protein array. The antibody is specific for Cadherin1 (CDH1) and shows no significant cross reactivity to other proteins including the related CDH2 and CDH3 proteins that are also present on the array test system. The figure shows the ranked intensity signals (CDH2 and CDH3 show no signal).

Advice is not the only service Aeonian offers. It maintains and constantly expands a catalogue of well-validated antibodies subjected to the Aeonian Rating® algorithm. Aeonian offers these antibodies at a market-compatible price and all antibodies in this catalogue are provided with a

Research Resource Identifier (RRID), which can be retrieved from the Antibody Registry database that includes well over 2.5 million records.

Levels Diagnostics

Triggered by the overuse of antibiotics worldwide and the threat of running out of functional antibiotics in a future which may not be too far away, a team of young and enthusiastic entrepreneurs set out to start the company Levels Diagnostics (Levels Dx, https://levels.bio) in the Bioscience region in Leiden. CEO Coen Breedveld and his colleagues focus their efforts on viral and bacterial lung infections. To do so, they aim at finding biomarkers indicative of immune responses resulting from either viral or bacterial infections. Novel technologies like high-throughput proteomics and protein-protein interactions are explored in cooperation with biotech companies worldwide. Validation by ELISA technology is core business; reliable antibodies are crucial in the design of the required validation assays in the laboratories of Levels Dx.

The energetic team is also interested in the early identification of liver cancer. Again, finding novel biomarkers is the holy grail for the Levels Dx team. And, designing the required assays to screen for interesting molecular candidates is routine work in at Levels Dx. For their exploring work in this field, Levels Dx has received several grants, one of them being an MIT feasibility grant to expand the work on easy point of care diagnostics.

Figure 2. A major focus of Levels Dx is developing easy monitoring tools for bacterial infections.

Aenonian Biotech and Levels Dx: Business to business at a Leiden Bio Science Park networking event

As an active player in the field, the Leiden Bio Science Park organization (https://leidenbiosciencepark.nl) regularly coordinates formal and informal meetings for companies in the region. Events held in the park include Benchtalk meetings, Techtalk symposia and larger conferences (the Medical Delta and Dutch Life Science meetings for instance). The Leiden Bio Science Park organization partners with Iventus, Luris, Lugus, OVBSP and BioPartner to offer programs interesting to a wide variety of companies located at the park.
It was during one of these events that Jan Voskuil and Coen Breedveld met. In an informal meeting, they discussed if Aeonian Biotech might be a good partner for Levels Dx in the search for suitable antibodies. Indeed, there was a match between the two companies and Aeonian Biotech

started selecting and rating antibodies to the obtained putative biomarkers applying its registered Aeonian Biotech rating algorithm. As a result, Aeonian Biotech came up with a list of antibodies and Levels Dx is currently testing these interesting candidates in their labs. And a number of these antibodies show promising results.

Figure 3. Jan Voskuil (Aeonian Biotech) and Coen Breedveld (Levels Dx).

Aeonian Biotech: reliable antibodies and a partner that is nearby

Are you also in search of well-validated antibodies? And you do not have the time to scrutinize all databases and literature out there? CEO Jan Voskuil warmly welcomes you to Aeonian Biotech for an introductory meeting and a demonstration of the capabilities of the Aeonian Biotech algorithm. The company also offers a selection of antibodies against market-competitive prices. You can meet Jan Voskuil also at the mentioned networking events hosted by the Leiden Bio Science Park organization or one of their partners.

Further reading

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