The Concept:

In order to facilitate (international) SME interaction with academia and other SMEs we have launched a "Call for Challenges" from interested SMEs within BioRN cluster and selected **5 CELIS Challenges**.

Are you up to it? If your technology, platform, or process could solve one of these Challenges, submit your solution to partner with them!

The Process:

1. Call for Challenges - *completed*
2. Selection of CELIS Challenges - *completed*
3. ***Call for solutions* – Accept the CELIS Challenge and apply with your solution!**
4. *Partnering* – If your solution is fitting, you can then meet the SME proposing the Challenge, in one-on-one meetings, during the CELISXchange WEEK (28 June- 2 July 2021).

The Guidelines:

Your solution has to solve one of the selected Challenges. Explain your solution as concisely as possible (non-confidential), by using the simple template attached. Please send your solution informally by email until **21. May 2021** to Friedemann Loos fl@biorn.org. You can also discuss your solution with us before submission.

The Timeline:

Deadline Call for solutions	**21. May**
CELISXchange week (*digital*)	**28. June – 02. July**

CELIS is funded by the European Union's COSME Programme (GA No.: 873857)

Immune competent humanized mouse models to investigate the co-stimulatory power for Apogenix unique HERA-ligands as anti-cancer candidates

Apogenix is developing HERA-ligands - a novel class of TNFSF receptor agonists - for the treatment of various types of cancer. Their unique molecular structure perfectly mimics the endogenous ligands and overcomes the known limitations of antibodies and other biologics targeting TNFSF receptors. Antibodies can only bind two TNFSF receptors in a spatially undefined manner and require secondary cross-linking via Fcγ receptors. In contrast, Apogenix' HERA-ligands bind to 6 receptors per molecule and lead to well-defined TNFSF receptor clustering without the need for further cross-linking. This results in a sufficient level of the appropriate signal being transmitted into the target cell, whereas agonistic antibodies transmit these signals at insufficient levels. Preclinical work at Apogenix has demonstrated the producibility and biological activity of these novel TNFSF receptor agonists as well as their superiority over agonistic antibodies. The most advanced HERA-ligands target CD40, CD27 or GITR and it has been shown that they are potent agonists demonstrating single-agent anti-tumour immune responses.

The anti-tumour efficacy in animal models relied on syngeneic mouse models employing the according HERA-ligand mouse surrogates. In order to translate this efficacy to fully human HERA-ligands, according humanized mouse models with a functional human immune system are needed. Apogenix is therefore looking for cooperation partners experienced with these humanized mouse models to investigate the co-stimulatory power for the different HERA-ligands.

The Company proposing the Challenge:

Apogenix has developed a promising portfolio of innovative immuno-oncology therapeutics for the treatment of cancer and other malignant diseases. These protein therapeutics target different TNFSF-dependent signaling pathways, thereby restoring the anti-tumor immune response, and thus have the potential to transform the treatment of oncological and malignant hematological diseases. The company's lead immuno-oncology candidate, asunercept, is in late-stage clinical development for the treatment recurrent glioblastoma, the most frequent and aggressive brain tumor. Apogenix' scientific team has developed the proprietary HERA-ligand technology platform for the development of novel fusion proteins. In 2017, AbbVie initiated a phase I trial with this HERA-TRAIL receptor agonist (ABBV-621) in patients suffering from solid tumors, non-Hodgkins´s lymphoma, or acute myeloid leukemia. http://www.apogenix.com

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Ovarian Cancer: HRD Prediction and Prognosis of PARPi from H&E slides

Context

Homologous Recombination Deficiency (HRD) is a DNA repair deficiency condition which is thought to arise from an impaired function of one of the actor genes of homologous recombination. HRD tumors are supposed to be more sensitive to DNA damaging agents and therapies inhibiting DNA damage response . Therefore, it is a valuable marker to improve treatment 1 strategies using drugs such as Poly(ADP-ribose) polymerase (PARP) inhibitors for patients with ovarian cancer. However, HRD status is not widely used in clinical practice and there is actually no gold standard measure to identify HRD tumours.

Goal and project details

The overall goal of the projects is to validate two different AI models. These models in question already perform well at either predicting HRD or response to PARP inhibitors in ovarian cancer from digitized H&E-stained WSI only. As a next step, we are looking for a partner that has both expertise in Ovarian Cancer and is interested in validating such models with us as we are aiming at an application in clinical practice.

The Company proposing the Challenge:

Owkin is a French-American startup founded in 2016. As an AI-powered life science company, advancing therapeutics in several research areas such as oncology, immunology or cardiology, Owkin is building a unique platform to break research silos and engage a large community of the best medical researchers. This platform connects toptier academic medical centers and their highly curated patient datasets with state of the art privacy-preserving federated learning technologies, which permit AI model training on decentralized data at scale. Owkin also deploys AI solutions in the life science industry to help understand why drug efficacy varies from patient to patient, to enhance the drug development process and to identify the best treatment for the right patient at the right time. https://owkin.com/

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Next Generation T Cell Epitope Analysis

Cancer immunotherapies have improved the clinical outcome in several types of cancer. However, personalized therapies such as therapeutic vaccines directed against patient-specific epitopes are far from clinical standard. A difficult step in this process is the identification of highly immunogenic peptide candidates. Human leukocyte antigens (HLA) play a central role in the generation of immune responses. They present antigenic peptides derived from cancer or pathogenic antigens to T cells, thus activating humoral or cytotoxic immune responses. Hundreds of HLA alleles have been identified in various populations; each individual has a unique set of HLA molecules, which further complicates the process of epitope selection. PEPperPRINT intends to apply its peptide microarray technology for HLA-II specific epitope discovery. High density peptide microarrays can be screened in a high-throughput fashion, providing information on HLA ligandomes derived from protein or neoepitope libraries.

For the identification of T cell epitopes and the general monitoring of immune responses in cancer immunotherapies, PEPperPRINT is looking for (1) HLA class II proteins that are functional and stable without stabilizing ligands to be used for microarray screening, (2) new alternative technologies for the multiplexed monitoring of T cell responses and (3) improved software algorithms for T cell epitope prediction.

The Company proposing the Challenge:

PEPperPRINT is a young and innovative biotech company located in Heidelberg, Germany, and a spin-off of the German Cancer Research Center. The company provides the new PEPperCHIP® Peptide Microarray platform with an unrivaled content flexibility, signal quality and peptide diversity. Besides a number of standard peptide arrays available on the PEPperPRINT website, user defined custom peptide microarrays can be prepared with any peptide content and in short turnaround times based on a proprietary laser printing technology. Applications include epitope mapping of antibodies, analysis of serum profiles and kinase signatures, immunological research, biomarker discovery and peptide drug development. PEPperPRINT's product portfolio is complemented by the fully integrated PEPperMAP®, an Epitope Mapping and Serum Profiling Services, covering a wide range of applications from full epitope substitution scans to highly multiplexed epitope mappings. http://www.pepperprint.com

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Open source phage library for antibody development for research purposes – reducing animal use

Phage display has been in use for antibody development for nearly 30 years but was mainly limited to development of commercially attractive therapeutic antibodies. In the area of diagnostic and, even more so, in research, phage display was and is not used at large scale beyond individual projects in research labs.

Although attractive and very beneficial with regard to reducing animal use for antibody research, phage display was always limited by the availability of a phage library (e.g. mouse scFv) as the core component of the technology. Every library generated by different groups needed major efforts and therefore is either not available for external groups or requires collaboration or license agreements with the owner.

An easily accessible/licensable und usable phage library open to every research lab would remove this obstacle and make it much more attractive to generate new antibodies based on this technology instead of the much cheaper animal based methods.

In case of a planned commercial use of such antibodies later in the process, it could be included in the licensing agreements that royalties would be due in such cases.

Progen is looking for a partner with the technological expertise and interest to co-develop such an open source phage library. The long term aim would be to establish phage display as a common research tool.

The Company proposing the Challenge:

PROGEN has been operating for years in the in vitro diagnostic fields like microbiology, infectious disease serology, immunology, as well as in biomedical and cell biology research with antibodies, reagents and tools for use in fields such as gene therapy research, antibody phage display technology, recombinant antibody engineering, and lipase activity. The company has a well-established reputation in the manufacture of antibodies, purified native and recombinant polypeptides and of in vitro diagnostic tests for niche markets. Since October 2012 Progen is a 100% subsidiary of the R-Biopharm AG. Together with R-Biopharm Group Progen will further develop its product range to meet market needs and strengthen its core competence in the field of research products. The company's product sections attract and serve a well-diversified clientele in research institutes and universities, pharmaceutical and biotech companies, private and clinical laboratories. With a qualified academic and technical support and marketing team, Progen serves the German and international market, advises and supports its distributors and customers worldwide. http://www.progen.com

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proteona Improved dead cell removal for cryopreserved human bone marrow

In droplet based single cell sequencing assays, sample viability is the largest problem the field faces. We regularly assay cryopreserved human tissue and tumor samples and find that the viability varies greatly depending on multiple issues including the age of the sample and which patient the sample was taken from. Commercially available tools for removing dead cells generally use the presence of phosphatidylserine on the cell surface, a marker of apoptosis, to remove the dead cells from a sample. However, these methods suffer from poor specificity, removing many live cells while retaining many dead and dying cells that may not be apoptotic. Flow cytometry is too slow to be scalable for processing multiple samples. Our own custom dead cell removal methods are an improvement over the commercial ones, but are still not ideal. We are looking for a partner to develop an improved dead cell removal method for cryopreserved human bone marrow that can be completed across 8 samples in less than an hour and results in >80% cell viability regardless of the starting viability.

The Company proposing the Challenge:

Proteona is a new biomedical company based in Singapore, the US, and Germany, that is pioneering the use of DNA barcoded antibodies to provide both proteomic and genomic information from the same single cells. Proteona is a spin-off from the National University of Singapore (NUS) and the Agency for Science, Technology and Research's (A*STAR). The platform is a comprehensive sample to answer service that enables users to phenotype cells using standard protein markers and gain a deeper understanding of cell activity based upon their gene expression profiles. https://proteona.com/

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About CELIS project

CELIS project combines some of the world-class life science ecosystems in Europe, where cross-sectoral fertilisation has given rise to promising new technologies and products, resulting in new value chains. The project builds on the existing Health Axis Europe Alliance, with the aim to professionalise and expand this inter-regional cooperation and increase its impact, especially for SMEs among their members. https://www.health-axis.eu/celis

About ClusterXchange (CXC) financial support

Taking this Challenge and having a short partnering meeting during the CELISXchange WEEK will be only the very first step toward establishing a cooperation with the new partner.
CELIS project can support the further development of the cooperation through travel vouchers (up to 1 100 Euro), within the so-called ClusterXchange. We can help you navigate through the process and application. More information: https://clustercollaboration.eu/clusterxchange

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