Center for antibody production Rijeka (Capri)- towards a new resource for antibody-based tools

Lenac Roviš, Tihana

S. Passamonti, S. Gustincich, T. Lah Turnšek, B. Peterlin, R. Pišot, P. Storici (Eds.)
CONFERENCE PROCEEDINGS with an analysis of innovation management and knowledge transfer potential for a smart specialization strategy
ISBN 978-88-8303-572-2 / e-ISBN 978-88-8303-573-9. EUT, 2014.

CENTER FOR ANTIBODY PRODUCTION RIJEKA (CAPRI)- TOWARDS A NEW RESOURCE FOR ANTIBODY-BASED TOOLS

Tihana Lenac Roviš

University of Rijeka Faculty of Medicine, Center for Proteomics, Brace Branchetta 20, 51000 Rijeka, Croatia

Abstract — Center for Antibody Production Rijeka (CAPRI) is a part of the Center for Proteomics devoted to mouse monoclonal antibody production. The Center for Proteomics is a department at the University of Rijeka Faculty of Medicine that is to a large extent self-sustainable since it employs scientists, administrative and technical staff and covers all its research costs from competitive international grants which makes it a unique department in the Croatian academia. One of the objectives of the Center for Proteomics is to put emphasis on applied R&D and utilization of the existing large collection of antibodies and antibody-based products, both suitable for further commercial development.

Index Terms — antibodies, antibody based recombinant proteins, cytomegalovirus, varicella zoster virus, lymphocyte receptors

1 BACKGROUND

CAPRI, as a part of the Center for Proteomics, possesses an excellent collection of monoclonal antibodies (mAbs) for research purposes. A major part of this unique collection can be used to investigate the functions of viruses that are widely spread among the world's population. CAPRI has also generated a set of mAbs against surface receptors on human and mouse lymphocytes. These mAbs are fully characterised and ready for market entry. In addition, CAPRI has several research projects based on its mAbs, with the potential to develop new and innovative products.

2 OBJECTIVES

Utilise the generated antibodies for research, diagnostic and therapeutic applications.
Increase the visibility and awareness of business stakeholders about science-business interaction opportunities.

3 APPROACH & METHODS

General approach

CAPRI was established with the focus on production and purification of recombinant proteins and mAbs against viral and cellular proteins. The goal of the CAPRI's spin-off project is to commercialise the available research products and attract grant funds for new and existing products from CAPRI's mAb portfolio.

Methods

1. Custom mAbs/hybridoma development
 Protein (immunogen) production via His-tag and GST-tag purification from E. Coli and Fc-fusion protein production in eukaryotic cells
2. Construction of recombinant proteins (potential therapeutics based on mAbs)
3. Construction of new protein and RNA expression vectors
4. In vivo methods (state of the art animal facility with the impressive collection of genetically modified mice with alterations in various aspects of immune response)

4 RESULTS

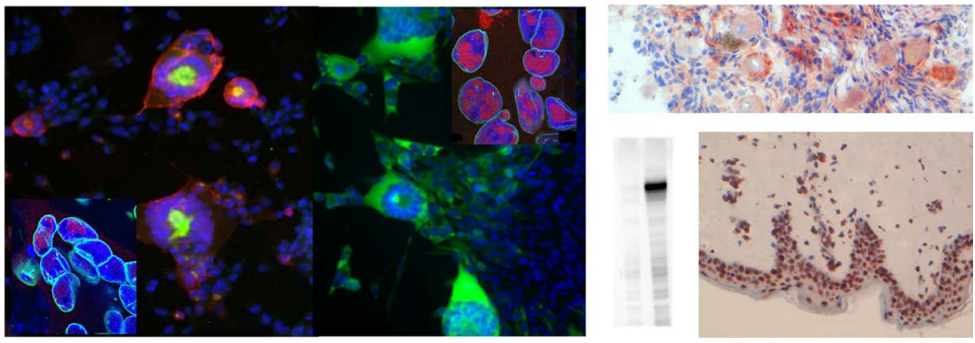

Figure 1: Varicella proteins visualized in the cell culture and in the human skin and ganglium using our unique mAbs

Varicella zoster virus ORF:						
VZ 1	VZ 9	VZ 16	VZ 23	VZ 33,5	VZ 47	VZ 57
VZ 3	VZ 10	VZ 18	VZ 24	VZ 36	VZ 48	VZ 58
VZ 4	VZ 11	VZ 19	VZ 27	VZ 37	VZ 49	VZ 62
VZ 5	VZ 12	VZ20	VZ 31	VZ 36	VZ 50	VZ 63
VZ 7	VZ 13	VZ 21	VZ 32	VZ 37	VZ 53	VZ 67
VZ 8	VZ 14	VZ 22	VZ 33	VZ 41	VZ 54	VZ 68
Human cytomegaloviral proteins:						
UL11	UL21	UL50	UL51	UL52	UL53	UL56
UL71	UL74	UL96	ULL138			
Mouse cytomegaloviral proteins:						
m04	m06	M25	M42	M45	M55	M57
M112-113	m123	m131/129	M147.5	m152	m153	m155
m169						

Human lymphoycte receptors and their ligands:						
NKG2D	KIR2DL1	KIR2DS2	VSTM1	TIGIT	CD300a	CD300c
NKp46	DNAM	PSG	PVR	Transferrin	CCM5(CEA)	

Mouse lymphoycte receptors and their ligands:						
LIR1	NCR1	H60	MULT-1	RAE-1	NKG2D	

Figure 2: CAPRI's mAb bank

5 POTENTIAL NEW PRODUCTS & SERVICES

1. The collection of mAbs against ~100 target proteins, such as immune cell receptors, their ligands and viral proteins. For most of these protein targets there are no other antibodies available anywhere in the world.
2. Innovative recombinant immunotherapeutics
3. Immunotoxin for treatment of glioblastoma multiforme
4. Immunotherapeutic for bridging the innate and the specific antiviral response
5. New strong viral promotor

Center for Proteomics has produced, purified and packed its mAbs according to the standardised protocols, generated a web platform offering its mAb collection and supporting each mAb with the corresponding data sheet file.
The database is available at : http://products.capri.com.hr/

6 CURRENT COLLABORATIONS

In the mAb development Center for Proteomics currently collaborates with the numerous research institutions:

1. University of Alabama, Birmingham, USA
2. Medical University, Innsbruck, Austria
3. Max von Pettenkofer Institute, LMU, Munich, Germany
4. National Institutes of Health (NIH), USA
5. Heinrich-Heine University, Duesseldorf, Germany
6. Medical School, Hannover, Germany
7. Laboratory of Immunology, NIAID, Maryland, USA
8. Ruhr-Universitat Bochum,
9. Medizinisches Proteom-Center, Germany
10. Robert Koch-Institute, Berlin, Germany
11. The Rudjer Boskovic Institute, Zagreb, Croatia

7 CONTACT OR COLLABORATIONS NEEDED

Center for Proteomics is interested in future collaboration with companies/institutes or consultants with extensive experience in GMP and SOP practices in the field of large scale biopharmaceutical production.

8 COMMUNICATION TOOLS

Selected relevant publications 2013:

1. Lenac Rovis T et al. A comprehensive analysis of varicella zoster virus proteins using a new monoclonal antibody collection. Journal of Virology, 2013
2. Juranic Lisnic V et al. Dual Analysis of the Murine Cytomegalovirus and Host Cell Transcriptomes Reveal New Aspects of the Virus-Host Cell Interface. PLoS Pathogens, 2013
3. Trsan T et al. Superior induction and maintenance of protective CD8 T cells in mice infected with MCMV vector expressing RAE-1γ. PNAS, 2013

More on current research projects can be found on: http://www.capri.com.hr

Contact details:
E-mail: info@capri.com.hr
Telephone: +385 51 651 260

9 FUNDS NEEDED

Forecast on the basis of three years

9.1. For applied research on mAb bank exploitation (solutions for real-world problems): 100.000 €

9.2 For ongoing basic research on recombinant immunotherapeutics (investigation of biological mechanisms): 350.000 €

9.3 For subsequent pilot & demonstrator activities (to develop a prototype): 50.000 €

10 CONCLUSION

CAPRI will continue developing its antibody portfolio using the funds granted from various sources. The diversification of antibody commercialization processes offers plenty of opportunities for collaborative projects with academia and innovative SMEs, including licensing opportunities. Please contact us in case you are interested in the presented antibody bank or antibody-based compounds. We also offer a full-service development of new and reliable custom-made monoclonal antibodies.

ACKNOWLEDGEMENT

This work was supported by the "Regional Competitiveness" operational programme 2007-2013; project "Becoming entrepreneurial: Knowledge transfer from the University of Rijeka Faculty of Medicine to the biotechnology business sector" (IPA2007/HR/16IPO/001-040517).

References

Lenac Rovis T et al. A comprehensive analysis of varicella zoster virus proteins using a new monoclonal antibody collection. Journal of Virology, 2013

Juranic Lisnic V et al. Dual Analysis of the Murine Cytomegalovirus and Host Cell Transcriptomes Reveal New Aspects of the Virus-Host Cell Interface. PLoS Pathogens, 2013

Trsan T et al. Superior induction and maintenance of protective CD8 T cells in mice infected with MCMV vector expressing RAE-1γ. PNAS, 2013