7th IBERIAN CARBOHYDRATE MEETING

January 15-17 2024

BARCELONA Sitges

ABSTRACT BOOK

GRUPO ESPECIALIZADO HIDRATOS DE CARBONO

RSEQ Real Sociedad Española de Química

Sociedade Portuguesa de Química

OC-9

DESIGN OF GLYCOPEPTIDES FOR PANCREATIC CANCER DETECTION

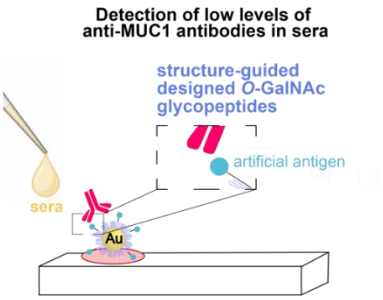
Francisco Corzana,[a] Alicia Asín,[a] Ander Eguskiza,[b] Elisa de Tomi,[c] Alfonso Martín-Carnicero,[d] María P. Martínez-Moral,[e] Vincenzo Mangini,[f] Francesco Papi,[g] Alberto Avenoza,[a] Jesús H. Busto,[a] Ramón Hurtado-Guerrero,[h] Cristina Nativi,[g] Jesús M. Peregrina,[a] Alfredo Martínez,[e] Giovanni Malerba,[c] and Roberto Fiammengo[b]

[a]Department of Chemistry, Universidad de La Rioja, Centro de Investigación en Síntesis Química, 26006 Logroño, Spain. [b]Department of Biotechnology, University of Verona, 37134 Verona, Italy. [c]Department of Life and Reproduction Sciences, University of Verona, 37134 Verona, Italy. [d]Medical Oncology Department, Hospital San Pedro, 26006 Logroño, Spain. [e]Angiogenesis Group, Oncology Area, Center for Biomedical Research of La Rioja (CIBIR), 26006 Logroño, Spain. [f]Center for Biomolecular Nanotechnologies@UniLe, Istituto Italiano di Tecnologia (IIT), 73010 Arnesano, Lecce, Italy. [g]Department of Chemistry, University of Florence, 5001Sesto Fiorentino (FI), Italy. [h]Institute of Biocomputation and Physics of Complex Systems, University of Zaragoza, 10 Fundación ARAID, 50018, Zaragoza, Spain

e-mail: Francisco.corzana@unirioja.es

Keywords: *glycopeptide, mucin, cancer, diagnosis*

Pancreatic cancer is the seventh leading cause of cancer-related deaths worldwide because it is often detected in the late stages.[1] Several studies indicate the presence of anti-MUC1 antibodies in early cancer stages. In light of this, we have applied a structure-guided strategy to develop an artificial antigen derived from the glycoprotein MUC1. Specifically, we have replaced the *N*-acetyl group of the GalNAc moiety in the glycopeptide with an *N*-propionyl group, which significantly enhances the CH/π interaction between the 5E5 antibody and the antigen.[2] This simple modification leads to a tenfold increase in affinity. By immobilizing this modified antigen on gold nanoparticles, we have developed a highly sensitive biosensor capable of accurately distinguishing patients with pancreatic cancer from healthy individuals. Our detection system shows higher sensitivity and specificity compared to other proposed biomarkers for clinical use, such as CA19-9 and CEA. The approach presented in this study has potential for the development of diagnostic tools not only for the detection of various cancers, but also for various biomedical applications.



Acknowledgments: We acknowledge financial support by the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska Curie grant agreement No 956544, AEI (PID2021-127622OB-I00 and PDC2022-133725-C21), AECC (INNOVA 2023).

References

[1] H. Sung, J. Ferlay, et al., *CA Cancer. J. Clin.* **2021**, *71*, 209-249.

[2] J. Macías-León, I. A. Bermejo, et al., *Chem. Commun.* **2020**, *56*, 15137-15140.