

## Computational Study of Interspecies TOP2A Similarities for Further Development of New Double Targeted Therapeutic Immunoconjugates

Radu TAMAIAN<sup>1)</sup>, Ioan MARCUS<sup>2)</sup>, Violeta NICULESCU<sup>1)</sup>, Bogdan SEVASTRE<sup>2)</sup>,  
Mihai ANGHEL<sup>1)</sup>, Iulia PRODAN<sup>2)</sup>

<sup>1)</sup> Research and Development Department, National Research and Development Institute for Cryogenics and Isotopic Technologies – ICIT Rm. Vâlcea, 4 Uzinei Street, VL 240050, Râmnicu Vâlcea, Romania; [radu@icsi.ro](mailto:radu@icsi.ro)

<sup>2)</sup> Faculty of Veterinary Medicine, University of Agricultural Science and Veterinary Medicine, 3-5 Manastur Street, CJ 400372, Cluj-Napoca, Romania; [ioanbmarcus@gmail.com](mailto:ioanbmarcus@gmail.com)

**Keywords:** antibody, DNA topoisomerase 2-alpha, cancer, *in silico*, quinones

### SUMMARY

Targeted therapies are a growing research area with important implications in veterinary and human health. DNA topoisomerase 2-alpha (TOP2A) is over-expressed in highly proliferative cells and represents the molecular target of the anticancer quinones (anthracycline antibiotics and naphthoquinones). The purpose of this study is to identify interspecies TOP2A similarities as possible epitopes for further development of therapeutic immunoconjugates with multiple species reactivity: *Mus musculus* (Ms), *Rattus norvegicus* (R) and *Homo sapiens* (H). The main idea is to make possible testing the same therapeutic immunoconjugates (with various quinones as active substance) on main species used as laboratory animals before clinical trials. Moreover, in this case, TOP2A acts as double target: first as epitope for a specific antibody and second as molecular target for quinones. This paper used NCBI Reference Sequences and NCBI Blastp Suite to find regions of similarity between protein sequences of H-TOP2A (NP\_001058.2) as query sequence, and Ms-TOP2A (NP\_035753.2) and R-TOP2A (NP\_071519.2) as blast hits. An overview of the two blast sequences aligned to the query sequence is shown in Fig. 1.



Fig. 1. Distribution of the two blast hits on the query sequence

Results and colour-codes indicate that both blast hits are in the range of best alignments with query sequence. Reliabilities of alignments are high predicting good similarities between structures of the three isomerases. It is highly probable that quinones have inhibitor activities on all three species and antibody to have interspecies reactivity.

**Acknowledgments.** This study has been financed by Romanian Ministry of Education and Research, National Authority for Scientific Research, National Centre for Programmes Management on Grant Agreement no. 61-002/2007 (Project no. 1885/2007): Obtaining and characterization of new targeted-nanodrugs with naphthoquinonic active substance.