SOFTWARE DEVELOPMENT FOR COMPOUND SCREENING ON MOLECULAR TARGETS OF NEGLECTED TROPICAL DISEASES

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Neglected Tropical Diseases (NTD) are the ones that primarily or exclusively affect tropical regions and thrive between low-income populations (WHO). The DNDi (Drugs for Neglected Diseases initiative) research new treatments for NTD of special importance to Brazil for being endemic to the country. They publish their results, including the developed compounds, in a database that is publicly available. However, this database is of little use to most researchers for being very hard to query because it is comprised of information from multiple other projects and their search tools are very restrictive. To facilitate the access to this base of knowledge, we are implementing a software that is capable of screening the compounds available in the database and returning to the user the ones that have a high probability of interacting with a protein of interest to the user. The development of the software was divided in four steps. (I) Extract the compounds from the DNDi’s database. (II) Generate an optimized 3D model of each compound. (III) Dock the compounds to the target protein. (IV) Analyze the results and order them according to tested and true metrics available in the scientific literature such as binding free energy. Java and Python are used for development. OpenBabel is used to optimize the 3D structure of the compounds and Autodock Vina is used to dock protein and ligands. To test the methodology we have selected three different proteins from Plasmodium falciparum. We extracted the compounds from the database together with metadata like IC50 when available and generated the 3D model of every compound. Right now, we are optimizing the code that automatically docks the compounds to the proteins. We expect to finish the development by the end of the year and make it available through a website to the Scientific Community.

Acknowledgements: Capes-BioComputacional & CNPq