Todor Antonijevic, Ph.D.

SCIENTIST III

CONTACT INFORMATION

ToxStrategies, Inc.
23501 Cinco Ranch Blvd, Suite B226
Katy, TX 77494
(346) 439-1858
E-mail: tantonijevic@toxstrategies.com

PROFESSIONAL PROFILE

Dr. Todor Antonijevic is a toxicologist, physicist, and mechanical engineer in ToxStrategies' Houston, Texas, office. He has seven years of experience specializing in computational toxicology, machine learning, and nanomaterials.

He implemented a novel quantitative analytical model to predict a chemically specific critical concentration ("toxicological tipping point") as a threshold in biological systems between adaptation and adversity from time-course concentration-response high-throughput screening (HTS) data. Dr. Antonijevic uses pharmacokinetics (PBPK) modeling—precisely, quantitative *in vitro*–to–*in vivo* extrapolation (qIVIVE)—to translate critical phenomena at a cellular level to apical outcomes and to compare these results with subchronic, repeat-dose animal studies.

Dr. Antonijevic integrated machine learning and qIVIVE to predict hepatotoxicants by developing a new approach to connect high-content imaging (HCI) concentration-response data to adverse hepatic effects observed in animal studies. He also developed a new machine learning algorithm to infer Boolean network responses from multidimensional concentration- and time-course-dependent RNA-seq and HCI data following chemical treatments.

He obtained his Ph.D. in Nanoscience from the University of North Carolina at Greensboro, where he studied phase transition in low-density lipoproteins (LDLs) by applying molecular dynamics analysis and Metropolis Monte Carlo simulations.

EDUCATION AND DEGREES EARNED

2015 University of North Carolina, Greensboro—Ph.D. in Nanoscience

2011 North Carolina Central University, Durham—M.Sc. in Physics

2006 University of Belgrade, Belgrade, Serbia—B.Sc. in Mechanical Engineering

PROFESSIONAL ASSOCIATIONS

2015–Present Society of Toxicology

SELECTED PROFESSIONAL EXPERIENCE

Developed and applied new computational tools to evaluate chemical safety as part of research into new techniques for toxicity testing based on predictive computational modeling that relies on HTS data.

- *Toxicological Tipping Points as Points of Departure (PoD) for safety assessment*. Implemented a new computational model that predicts a critical concentration ("toxicological tipping point") between adaptation and adversity using time-course concentration-response HTS data. The analysis estimated critical concentrations from rat high-content imaging (HCI) data for 88 chemicals and compared them with rat hepatic lowest-observed-adverse-effect levels (LOAELs) from subchronic repeat-dose animal testing (ToxRefDB) by solving a full PBPK model ("httk" package) and estimating average liver concentrations produced by LOAELs. The approach is applied to analyze developmental tipping points using iPSC and RNA-Seq.
- *Integrating machine learning and qIVIVE to predict hepatotoxicants*. Developed a new approach to phenotypically anchor HCI concentration-response data to adverse hepatic effects observed in repeat-dose animal testing studies using qIVIVE ("httk" package) and investigated the predictive accuracy of different supervised machine learning approaches for predicting hepatotoxicants directly from HCI endpoints collected across multiple time points.
- Developed a new machine learning algorithm to infer network responses from multidimensional time-course RNA-seq and HCI data following chemical treatments.

Supported development of a novel, noninvasive method to assess risk for heart conduction instabilities by fitting Chernyak-Starobin-Cohen (CSC) model to ECG data.

Investigated self-assembly of cholesteryl esters (CEs) in the core of low-density lipoprotein (LDL) nanoparticles (~25 nm) by performing molecular dynamics analysis. The LDL particle was constructed by modeling the 3D structure of Apolipoprotein B100 (4563 amino acids) and arranging it within the phospholipid shell that wraps around the CE core of the LDL.

Computationally predicted phase transition in the core of the LDL nanoparticles by implementing statistical Metropolis Monte Carlo Simulations.

Prepared lectures for online learning in "Nanophysics" course, and actively provided ongoing training by mentoring and coaching graduate students in physics.

TECHNICAL EXPERIENCE

Programming Languages

Python (Pandas, Scikit-learn, Jupyter Notebook, JupyterLab, NumPy, SciPy, Numba, Cython, rpy2)

R

MATLAB

FORTRAN

Scientific and Engineering Software

GROMACS molecular dynamics

CATIA V5

AutoCAD

Visualization Software

Matplotlib (python package for 2D and 3D visualization)

Inkscape

Adobe Photoshop.

PUBLICATIONS

Lea IA, Pham LL, **Antonijevic T**, Thompson C, Borghoff SJ. 2022. Assessment of the applicability of the threshold of toxicological concern for per- and polyfluoroalkyl substances. Regul Toxicol Pharmacol 133:105190, open access.

Saili KS, **Antonijevic T**, Zurlinden TJ, Shah I, Deisenroth C, Knudsen TB. 2020. Molecular characterization of a toxicological tipping point during human stem cell differentiation. Reprod Toxicol 91:1–13 (*selected as journal's best paper of 2020*).

Yoon M, Ring C, Van Landingham CB, Suh M, Song G, **Antonijevic T**, Gentry PR, Taylor MD, Keen AM, Andersen ME, Clewell JH. 2019. Assessing children's exposure to manganese in drinking water using a PBPK model. Toxicol Appl Pharmacol 380:114695, https://doi.org/10.1016/j.taap.2019.114695.

Lancaster JL, **Antonijevic T**, Starobin JM. 2014. Ordering and stability in lipid droplets with applications to low-density lipoproteins. Physical Review E89(6):062708.

Antonijevic T, Lancaster JL, Starobin JM. 2014. Modeling order-disorder transition in low-density lipoprotein. In: Engineering in Medicine and Biology Society (EMBC), 2014 36th Annual International Conference of the IEEE, pp. 5220–5223.

Idriss SF, Krassowska W, Varadarajan NV, **Antonijevic T**, Gilani SS, Starobin JM. 2012. Feasibility of non-invasive determination of the stability of propagation reserve in patients. In: Computing in Cardiology (CinC), pp. 353–356. IEEE, 2012.

Bondarev IV, **Antonijevic T**. 2012. Surface plasmon amplification under controlled exciton-plasmon coupling in individual carbon nanotubes. Physica Status Solidi C 9(5):1259–1264.

PRESENTATIONS

Proctor DM, **Antonijevic T**. Refined health risk assessment for residential exposures to manganese in EAF steel slag. Poster presented at Society of Toxicology Annual Meeting, San Diego, CA, March 2022.

Antonijevic T, Shah I. Predicting subchronic and chronic animal toxicity from in vitro high content imaging data using PBTK and machine learning. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3376.

Saili KS, Zurlinden TH, **Antonijevic T**, Shah I, Deisenroth C, Knudsen TB. Endodermal differentiation trajectories diverge with increasing all-trans retinoic acid (ATRA) exposure. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.