A Semantic-based Visualization of Drug Safety Profiles

Chen Yanover✉, Karni Marcus and Pini Akiva
KI Research Institute, Kfar Malal, Israel

The Israeli Institute for Applied Research in Computational Health

Background

Information about drugs' adverse events (AEs) is abundant but typically unavailable to clinicians and patients in an accessible and comprehensible way to facilitate treatment decisions.

Objectives

To visualize **drug safety profiles in a semantically meaningful manner,** allowing straightforward comparison of multiple treatment choices and focusing on their clinically relevant AEs.

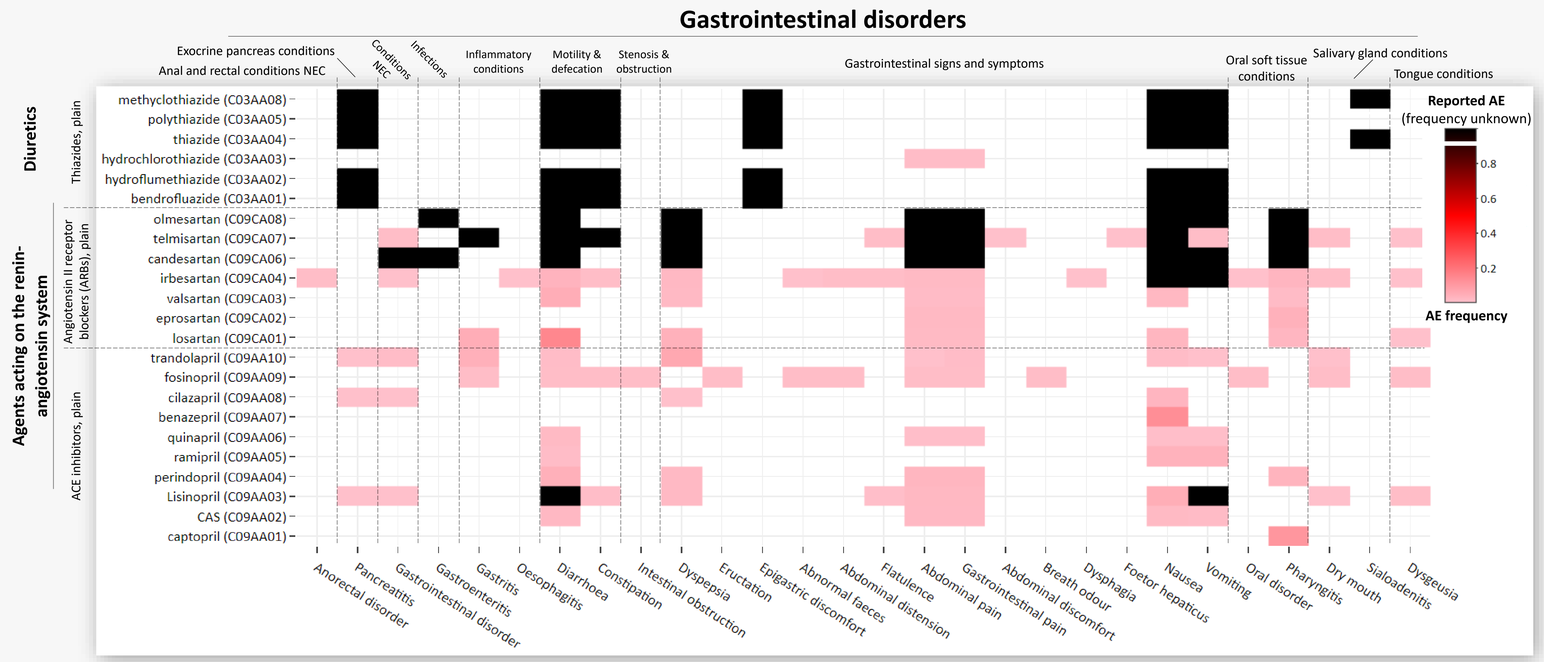
Methods

As a test-case, we processed the SIDER database, version 4.1 (Kuhn et al., 2016), comprising 1,430 compounds (or drug ingredients), 4,251 AEs (MedDRA®, the Medical Dictionary for Regulatory Activities, lowest level terms) and 145,321 drug-AE pairs. Of these, occurrence frequency is also available for 59,542 (41%) drug-AE pairs. MedDRA terminology is, by construction, hierarchical; drug ingredients are mapped to the Anatomical Therapeutic Chemical (ATC) Classification system. We represented SIDER information as a heatmap, with entities ordered according to the corresponding classification system, color coding occurrence frequency, where available, and, otherwise, indicating a known drug-AE pair.

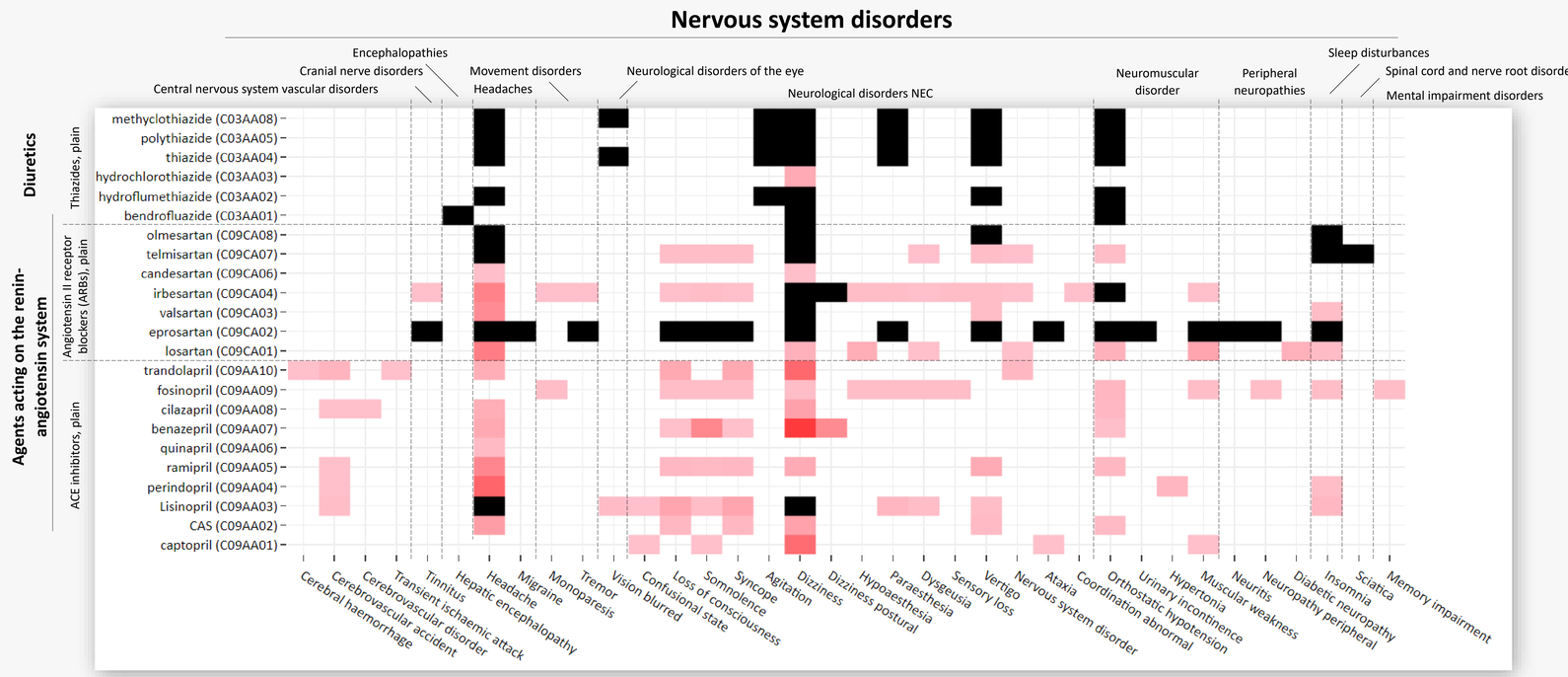
Conclusions

Our semantic-based visualization of known drug-AE data facilitates understanding of the drug-AE landscape. This may lead to **better informed prescription**, **reduction of AE burden**, **increased adherence**, and, importantly, **improved treatment outcomes**. SIDER information, extracted from drug labels, can be supplemented with risk estimations inferred from observational health data (Suchard et al., 2019).

Results



Click on each figure to view a dynamic version



References

Kuhn, M., *et al*, 2016. The SIDER database of drugs and side effects. Nucleic Acids Res. 44, D1075–D1079.

Suchard, M.A., *et al*, 2019. Comprehensive comparative effectiveness and safety of first-line antihypertensive drug classes: a systematic, multinational, large-scale analysis. The Lancet 394, 1816–1826.