Title: Using real-world data for machine-learning algorithms to predict the treatment response in advanced melanoma: a pilot study for personalizing cancer care.

Author: Dr. R.M. Brohet
Isala Hospital Zwolle
Email: r.m.brohet@isala.nl

In this study, we investigated the use of real-world data to develop a machine learning algorithm that can predict the clinical treatment outcomes of patients with advanced melanoma. This is significant because the substantial heterogeneity in treatment outcomes and life-threatening side effects after targeted immunotherapy warrant the need for personalized treatment approaches in advanced melanoma. The trend in cancer treatment is increasingly moving towards personalization, which is tailored to the specific characteristics of both the tumor and the patient. This approach, known as precision or personalized medicine, aims to improve treatment effectiveness and reduce side effects. Thanks to new technologies using artificial intelligence (AI) and machine learning, it is now possible to utilize large amounts of real-world data stored in our Electronic Health Record (EHR) systems and other data sources for personalized medicine. An AI infrastructure was established to optimize the use of the available real-world data for data-driven healthcare and personalized medicine. Explainable AI (XAI) methods were used to interpret individual predictions and provide insight into the clinical implications of the predictive ML model. Our study shows that integrating real-world data with AI can advance precision medicine in cancer care by supporting tailored treatments and individualized strategies. It serves as a proof-of-concept for predictive ML algorithms, emphasizing the importance of XAI for transparency, trust, and reliability in prognostic assessments.

.