Application number/Title: 33722 - Identifying precision drug treatments by linking phenotype and genotype in drug response

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Keywords provided by the Applicant PI to describe the research project:
drugs, genetics, pharmacogenomics, precision-medicine, sex

Application Lay Summary:
We seek access to the UK Biobank in order to improve understanding of drug response and generate hypotheses of drug-genotype and drug-phenotype combinations for precision medicine. We plan to use the resources available to 1) examine the landscape of drug prescriptions and the co-occurrence with other medications, diseases, and phenotypes, 2) explore how genetics and sex relates to patterns of drug prescription and disease, and 3) develop guidelines for prescriptions based on our findings. Our work will lead to improved understanding of the contributions of drugs to disease progression and will also generate hypotheses about effective treatments. The UK Biobank?s stated purpose includes improving the treatment of illness. Prescription drugs are the primary treatment for many diseases, and treatment efficacy determines patient outcome. The proposed research focuses on examining the landscape of drug prescriptions and indications, and identifying drug-drug, drug-gene, and drug-sex associations with health-related phenotypes. Identifying these associations will lead to hypotheses about treatment indications and mechanisms that could improve drug prescriptions and development. Additionally, highlighting interactions that lead to unfavorable responses can help prevent negative health outcomes caused by drugs or drug combinations that are ineffective or dangerous. We will characterize the landscape of drug prescriptions and their co-occurrence with other drugs and diseases in the UK Biobank. We will perform genome-wide association studies to look for genetic associations with drug prescriptions, disease, and phenotypes related to drug response. Sex and hormone effects will be examined to highlight genetic variants with sex-specific effects, and to test for significant interactions that affect drug related outcomes. We would like to use the full cohort for our research.