Developing a Molecular Roadmap of Drug-Food Interactions

Recent research has demonstrated that consumption of food—especially fruits and vegetables—can alter the effects of drugs by interfering either with their pharmacokinetic or pharmacodynamic processes. Despite the recognition of such drug-food associations as an important element for successful therapeutic interventions, a systematic approach for identifying, predicting and preventing potential interactions between food and marketed or novel drugs is not yet available. The overall objective of this work was to sketch a comprehensive picture of the interference of ~ 4,000 dietary components present in ~ 1800 plant-based foods with the pharmacokinetics and pharmacodynamics processes of medicine, with the purpose of elucidating the molecular mechanisms involved. By employing a systems chemical biology approach that integrates data from the scientific literature and online databases, we gained a global view of the associations between diet and dietary molecules with drug targets, metabolic enzymes, drug transporters and carriers currently deposited in Drug-Bank. Moreover, we identified disease areas and drug targets that are most prone to the negative effects of drug-food interactions, showcasing a platform for making recommendations in relation to foods that should be avoided under certain medications. Lastly, by investigating the correlation of gene expression signatures of foods and drugs we were able to generate a completely novel drug-diet interactome map.

General information
State: Published
Organisations: Department of Systems Biology, Center for Biological Sequence Analysis, University of Hong Kong
Contributors: Jensen, K., Ni, Y., Panagiotou, G., Kouskoumvekaki, I.
Number of pages: 15
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: PLoS Computational Biology (Online)
Volume: 11
Issue number: 2
ISSN (Print): 1553-7358
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.49 SJR 3.097 SNIP 1.348
Web of Science (2017): Impact factor 3.955
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.41 SJR 3.243 SNIP 1.363
Web of Science (2016): Impact factor 4.542
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 4.69 SJR 3.476 SNIP 1.442
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 4.74 SJR 3.412 SNIP 1.442
Web of Science (2014): Impact factor 4.62
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.91 SJR 3.467 SNIP 1.483
Web of Science (2013): Impact factor 4.829
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
Scopus rating (2012): CiteScore 5.36 SJR 3.523 SNIP 1.645
Web of Science (2012): Impact factor 4.867
ISI indexed (2012): ISI indexed no
Web of Science (2012): Indexed yes
Scopus rating (2011): CiteScore 5.25 SJR 3.613 SNIP 1.591
Web of Science (2011): Impact factor 5.215
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
Scopus rating (2010): SJR 3.709 SNIP 1.555
Web of Science (2010): Impact factor 5.515
Web of Science (2010): Indexed yes
Scopus rating (2009): SJR 3.428 SNIP 1.428
Web of Science (2009): Indexed yes
Scopus rating (2008): SJR 4.045 SNIP 1.397
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 3.396 SNIP 1.329
Scopus rating (2006): SJR 2.419 SNIP 1.082
Web of Science (2006): Indexed yes
Original language: English
Keywords: Biochemical, Mathematical, Database, Update, Discovery, Medicine
Electronic versions:
Developing_a_Molecular_Roadmap.pdf
DOIs:
10.1371/journal.pcbi.1004048

Bibliographical note
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Source: Findit
Source-ID: 274714059
Research output: Research - peer-review; Journal article – Annual report year: 2015