

## Use of collateral sensitivity networks to design drug cycling protocols that avoid resistance development. - DTU Orbit (09/11/2017)

### Use of collateral sensitivity networks to design drug cycling protocols that avoid resistance development.

New drug deployment strategies are imperative to address the problem of drug resistance, which is limiting the management of infectious diseases and cancers. We evolved resistance in *Escherichia coli* toward 23 drugs used clinically for treating bacterial infections and mapped the resulting collateral sensitivity and resistance profiles, revealing a complex collateral sensitivity network. On the basis of these data, we propose a new treatment framework-collateral sensitivity cycling-in which drugs with compatible collateral sensitivity profiles are used sequentially to treat infection and select against drug resistance development. We identified hundreds of such drug sets and demonstrated that the antibiotics gentamicin and cefuroxime can be deployed cyclically such that the treatment regimen selected against resistance to either drug. We then validated our findings with related bacterial pathogens. These results provide proof of principle for collateral sensitivity cycling as a sustainable treatment paradigm that may be generally applicable to infectious diseases and cancer.

### General information

State: Published

Organisations: Department of Systems Biology, Drug Resistance and Community Dynamics, Novo Nordisk Foundation Center for Biosustainability

Authors: Imamovic, L. (Intern), Sommer, M. (Intern)

Publication date: 2013

Main Research Area: Technical/natural sciences

### Publication information

Journal: Science Translational Medicine

Volume: 5

Issue number: 204

ISSN (Print): 1946-6234

Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed Yes

BFI (2016): BFI-level 1

Scopus rating (2016): SJR 8.595 SNIP 3.104 CiteScore 7.21

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 8.846 SNIP 3.135 CiteScore 6.72

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 8.101 SNIP 3.004 CiteScore 6.18

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 8.376 SNIP 3.025 CiteScore 6.01

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 1

Scopus rating (2012): SJR 6.993 SNIP 2.586 CiteScore 5.23

ISI indexed (2012): ISI indexed yes

Scopus rating (2011): SJR 5.729 SNIP 2.368 CiteScore 3.91

ISI indexed (2011): ISI indexed no

Scopus rating (2010): SJR 2.726 SNIP 1.091

Web of Science (2010): Indexed yes

Original language: English

Electronic versions:

Sci\_Transl\_Med\_2013\_Imamovic\_204ra132.pdf

DOIs:

10.1126/scitranslmed.3006609

Source: dtu

Source-ID: n::oai:DTIC-ART:pubmed/393196980::32361

Publication: Research - peer-review › Journal article – Annual report year: 2013