Universiteit
Leiden
The Netherlands

Virtual patient populations for quantitative pharmacology with its application in antibiotic treatment optimization

Guo, Y.

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Stellingen

Behorende bij het proefschrift

Virtual patient populations for quantitative pharmacology with its application in antibiotic treatment optimization

1. Systematic evaluation of copulas is essential for generating realistic virtual patient populations. *(this thesis)*
2. Multivariate normal distributions fail to capture complex relationships in biology. *(this thesis)*
3. Differences between planktonic and biofilm bacterial growth modes fundamentally shape antibiotic susceptibility, demonstrating the need for tailored treatment strategies. *(this thesis)*
4. Small molecule drugs readily penetrate mucus, whereas large molecules or particles can lead to heterogeneous spatial drug distribution within it. *(this thesis)*
5. Virtual patient cohorts can improve drug development success and enhance personalized treatment strategies for underrepresented patient groups. *(Adapted from Jan A Kleeberger, 2025)*
6. To address the complexity of resistance evolution, mathematical models are needed to inform optimal dosing strategies. *(Adapted from Gwenan M Knight, 2019)*
7. Mathematical models are simplified descriptions of biological processes, whose major value lies in their ability to extrapolate relationships beyond the existing data. *(Adapted from Hartmut Derendorf, 1999)*
8. Sharing the statistical structure of data, rather than the data itself, is invaluable in driving progress, fostering innovation and helping to solve societal challenges. *(Adapted from Tânia Carvalho, 2025)*
9. Meaningful scientific exchange requires clear definitions and assumptions before productive discussion can begin.
10. Interesting things happen along borders – transitions – not in the middle where everything is the same. *(Neal Stephenson)*
11. The most important bridge between different research fields is interdisciplinary researchers who can translate, integrate and synthesize ideas across fields.

Yuchen Guo
Leiden, 11 September 2026