Current developments and research in creating new antibiotics

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Summary

- Antibiotic discovery
- Antibiotic action
- Classification & targets
- Novel antibiotic classes
Discovery

Antibiotic discovery and resistance timeline

Date of resistance identified
- 1940
- 1953
- 1985
- 1993

Date of discovery
- 1928
- 1948
- 1985

Year

Antibiotic class
- Penicillins
- Macrolides
- Carbapenems
- Tetracyclines
- Fluoroquinolones

30 years since a new class of antibiotics was last introduced
Gram stain
Colour palette for PowerPoint presentations

- Dark blue: R17 G52 B88
- Gold: R217 G171 B22
- Mid blue: R64 G150 B184
- Light grey: R220 G221 B217
- Pea green: R121 G163 B42
- Forest green: R0 G132 B82
- Bottle green: R17 G179 B162
- Cyan: R0 G156 B200
- Light blue: R124 G179 B225
- Violet: R128 G118 B207
- Purple: R143 G70 B147
- Fuscia: R233 G69 B140

X-Y-Z

Broad spectrum

Narrow spectrum

A

B

C

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40 in trial

2-4 ‘first-in-class’ compounds required per decade

15 per decade to include 2 new broad spectrum classes

Teixobactin

Brilacidin
A device referred to by researchers as the ‘ichip’ was used to culture soil bacteria allowing nutrients and signal molecules to pass to the bacteria and stimulate growth.

Binds to lipids

Prevents bacteria cell wall synthesis
A new antibiotic kills pathogens without detectable resistance

Losee L. Ling1*, Tanja Schneider2,3*, Aaron J. Peoples4, Amy L. Spoering1, Ina Engels2,3, Brian P. Conlon4, Anna Mueller2,3, Till F. Schäberle1,3, Dallas E. Hughes1, Slava Epstein5, Michael Jones6, Linos Lazarides7, Victoria A. Steadman7, Douglas R. Cohen1, Cintia R. Felix1, K. Ashley Fetterman1, William P. Millett1, Anthony G. Nitti1, Ashley M. Zullo1, Chao Chen8 & Kim Lewis4

Natural compound → Minimise resistance development → Not yet in human trials

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Novel class of antibiotics - ‘host defence protein mimetics’

Biomimetic polymer

Host defence protein
“A Phase 3, Multicenter, Double Blind, Randomized Study to Evaluate the Efficacy and Safety of Single Dose IV Brilacidin versus IV Vancomycin Followed by Optional PO Linezolid for the Treatment of Patients with Acute Bacterial Skin and Skin Structure Infections (ABSSSI)"
Conclusion

- Some scope for optimism
- i-chip application could lead to development of many more potential antibiotic candidates
- However, new drug development should not be viewed as the solution to antibiotic resistance

Third-generation cephalosporin resistance rates in E. coli across Europe, showing the UK, 1999 to 2012 (Department of Health, 2015)
Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.