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**A/Professor
Siouxsie Wiles**

Microbiologist
Head of the Bioluminescent
Superbugs Lab
University of Auckland

Sunday, August 11, 2019

(Room 9)

**8:30 - 10:30 WS #147: Pharmac Session: Antimicrobial Resistance -
Global Threat or Myth? (120mins, not repeated)**

Mechanisms of antimicrobial resistance

Associate Professor Siouxsie Wiles
Bioluminescent Superbugs Lab



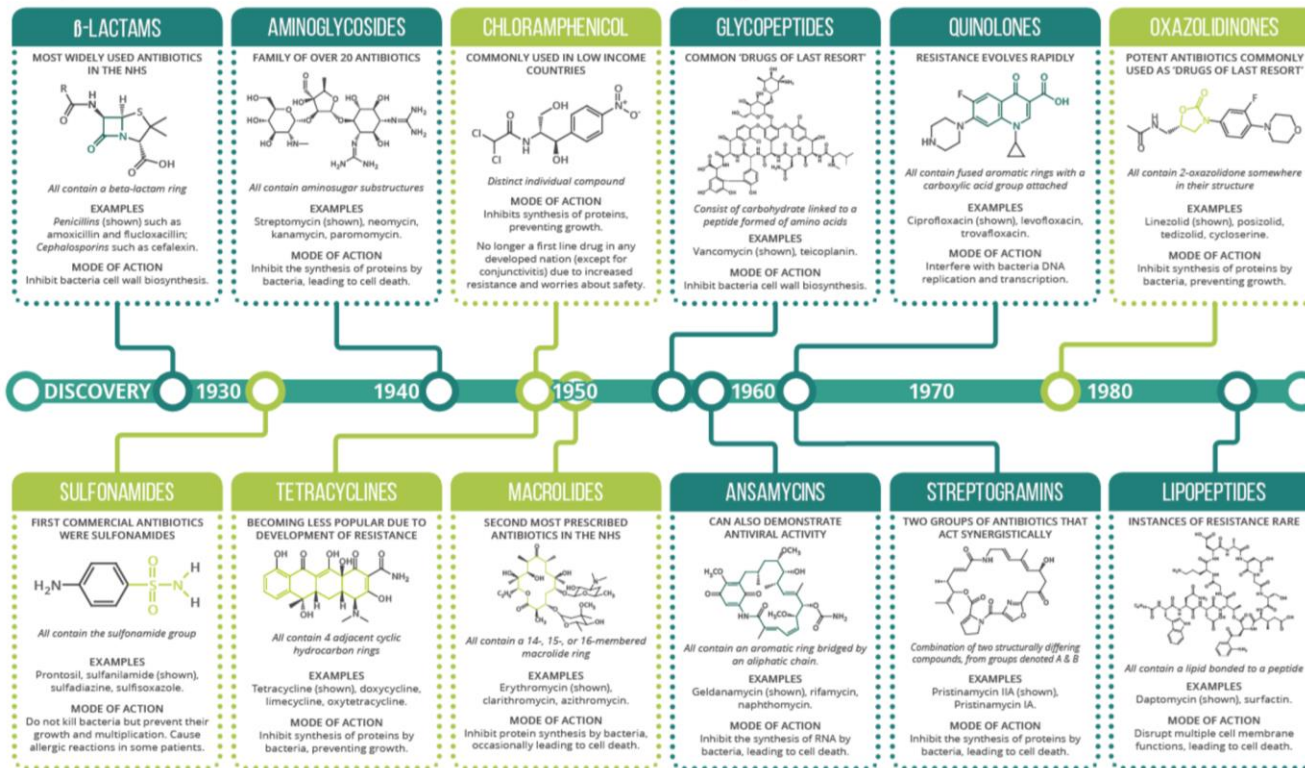
THE UNIVERSITY OF
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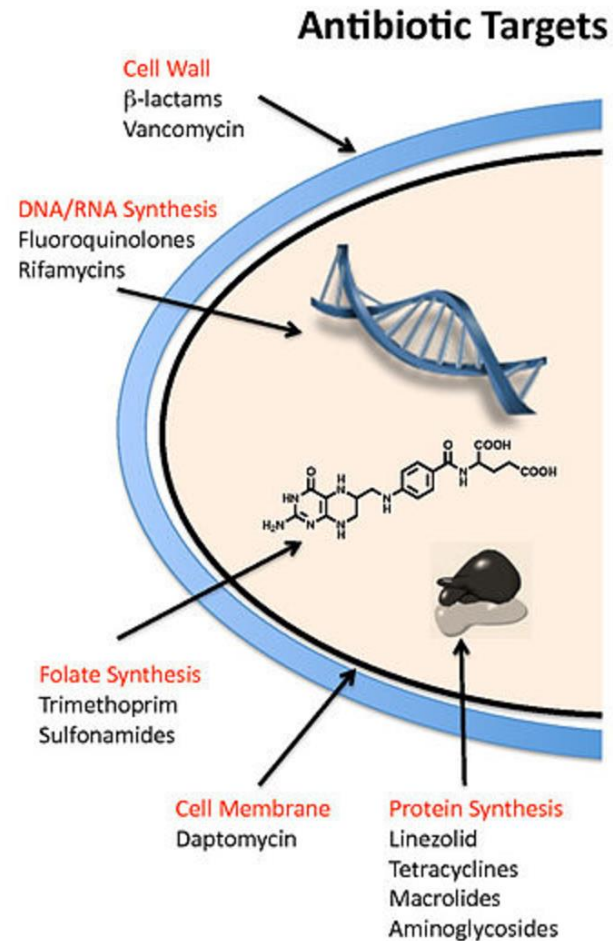
**MEDICAL AND
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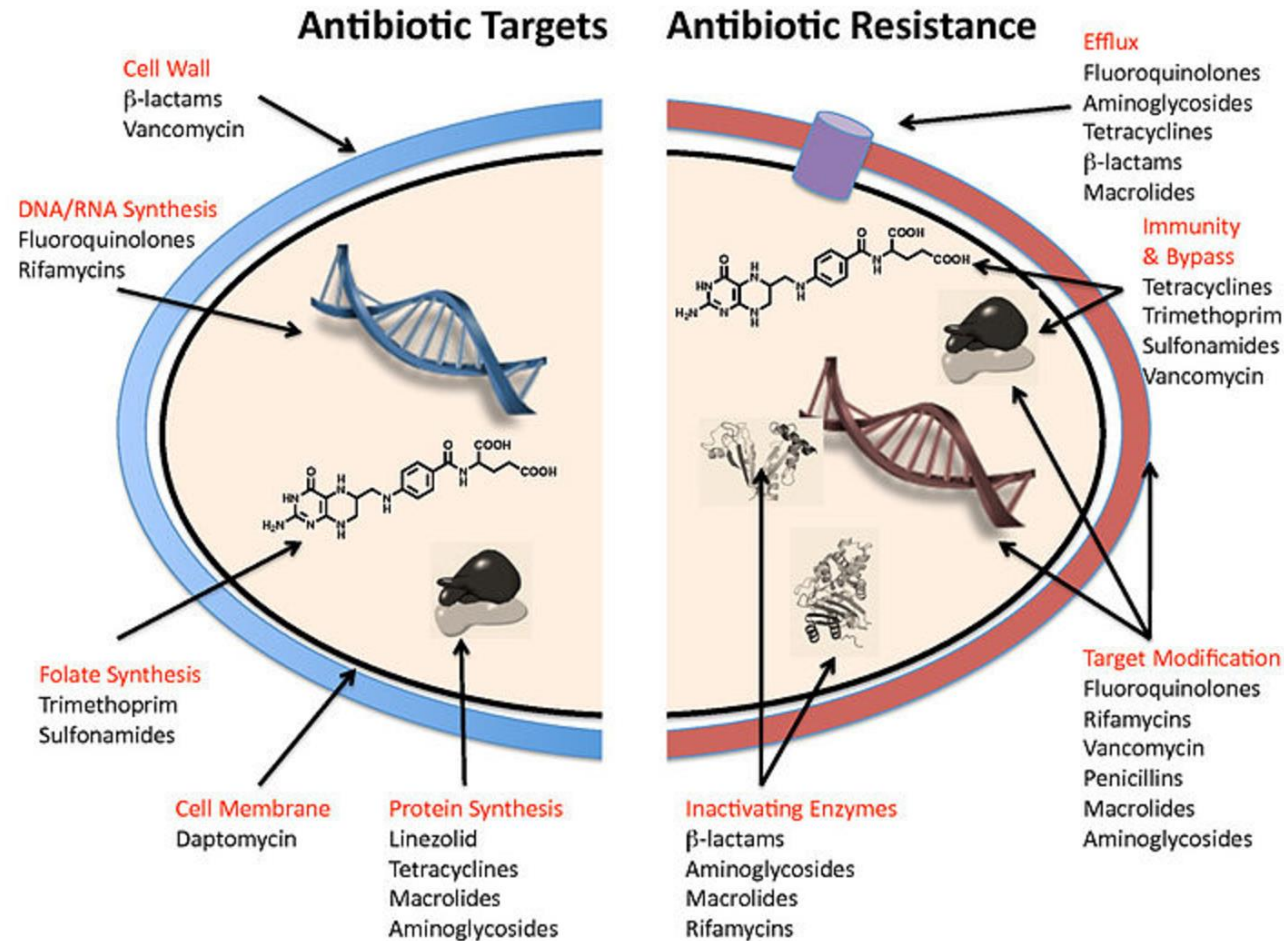
DIFFERENT CLASSES OF ANTIBIOTICS - AN OVERVIEW

Key: ● COMMONLY ACT AS BACTERIOSTATIC AGENTS, RESTRICTING GROWTH & REPRODUCTION ● COMMONLY ACT AS BACTERICIDAL AGENTS, CAUSING BACTERIAL CELL DEATH





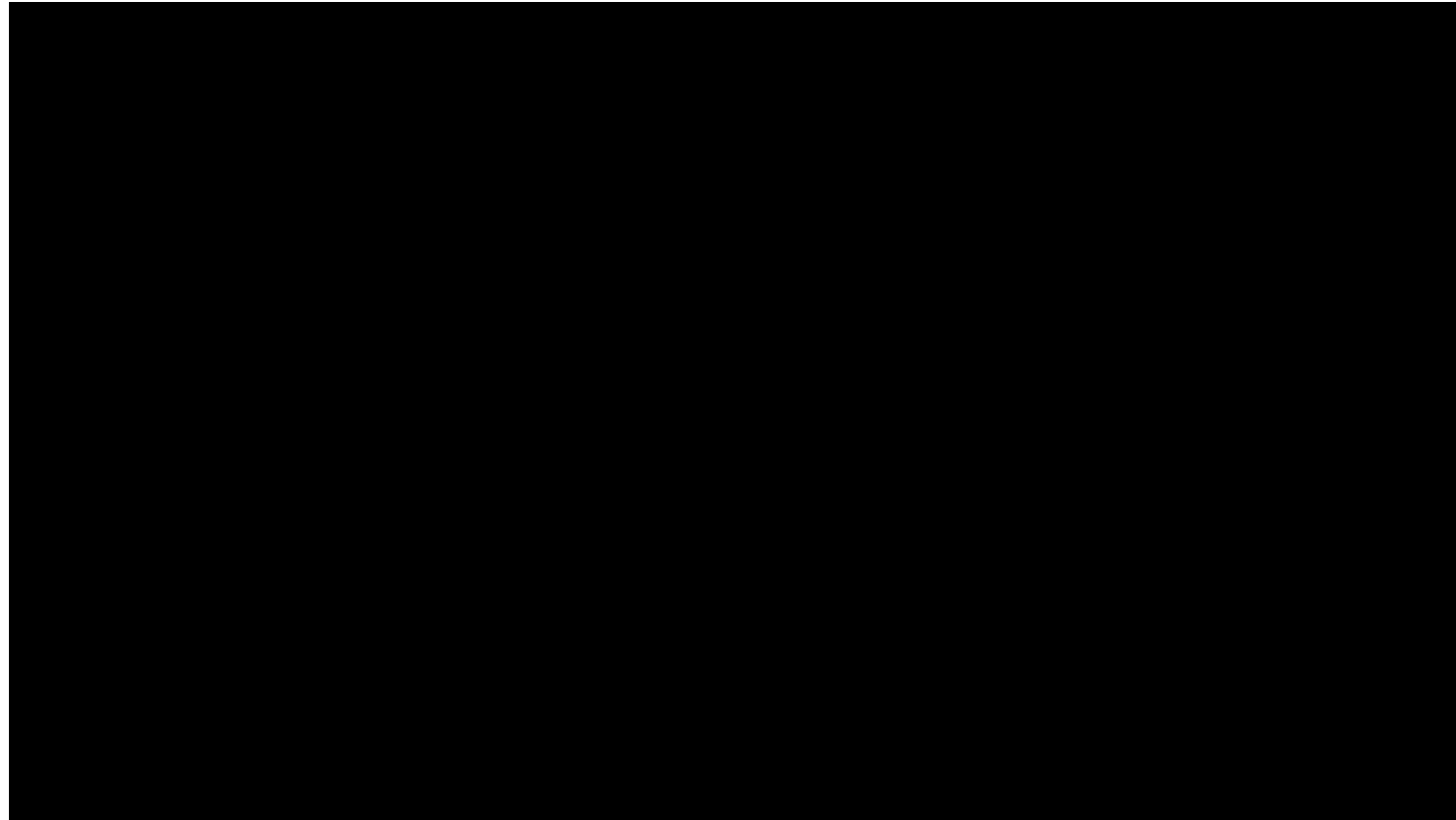
Broad vs narrow spectrum
Bactericidal vs bacteriostatic



 @SiouxsieW



**MEDICAL AND
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<https://vimeo.com/180908160>



 @baym



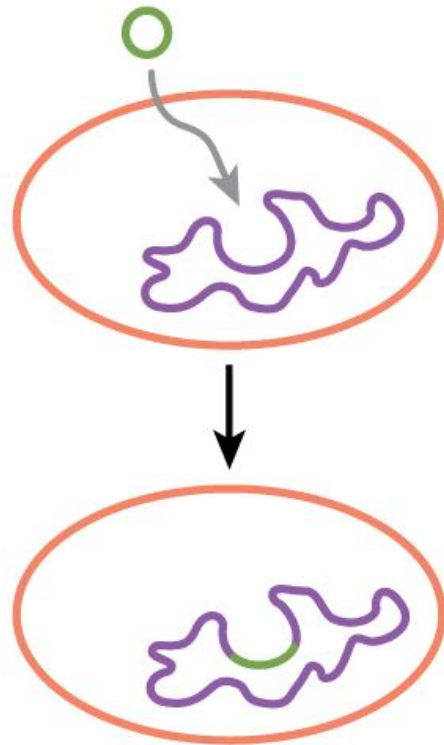
**DEPARTMENT OF MOLECULAR
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Understanding molecular mechanisms of human disease

Mutation

Rates differ between species

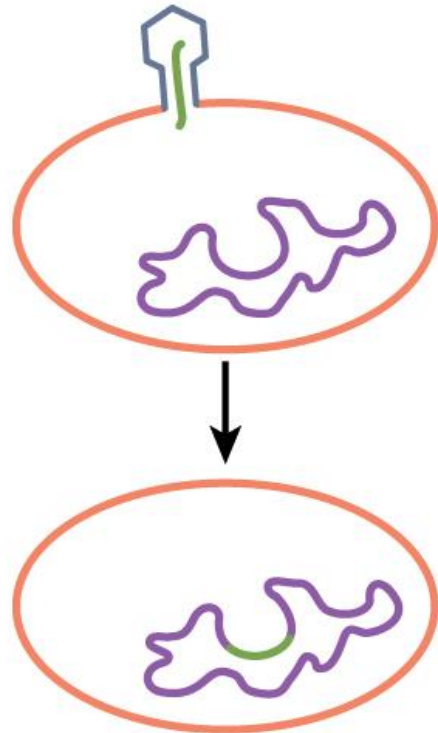
Can be influenced by external factors/environment

Transformation



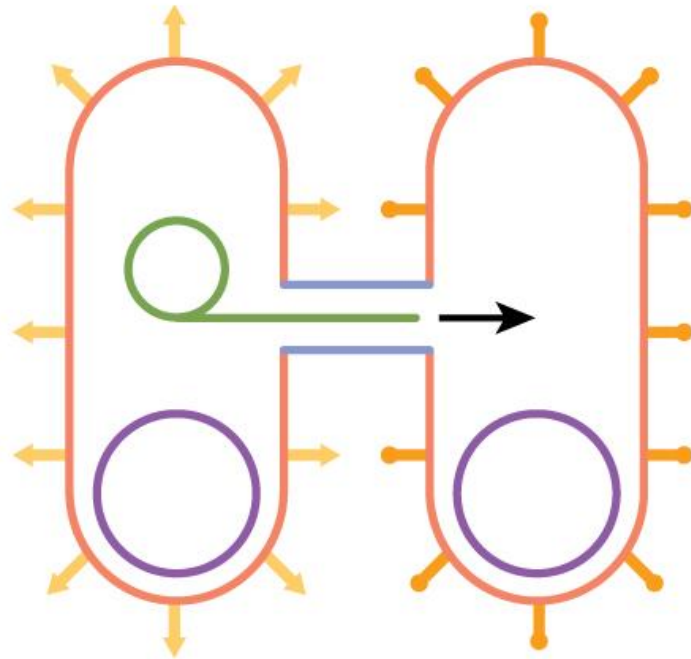
Taking up genetic material from their environment, e.g. plasmids

Transduction



Receiving genetic material after
infection with a virus

Conjugation



Transfer of genetic material between bacterial cells of same or different species by direct cell-to-cell contact.

Horizontal gene transfer

Differs between species

Can be influenced by external factors/environment

Newshub.

Superbug infects National Burns Centre patients

07/02/2018

Newshub staff

 Like 43



Three people have become infected with the bug. Photo credit: iStock

<http://www.newshub.co.nz/home/health/2018/02/superbug-infects-national-burns-centre-patients.html>



**DEPARTMENT OF MOLECULAR
MEDICINE AND PATHOLOGY**
Understanding molecular mechanisms of human disease

Patient number	Species	Resistance	Specimen date	Likely place of acquisition
35	<i>K. pneumoniae</i>	NDM-1	5 Jan	Tahitian hospital
	<i>P. aeruginosa</i>	NDM-1	9 Jan	
37	<i>P. stuartii</i>	NDM-1	2 Jan	Middlemore Hospital
	<i>K. pneumoniae</i>	NDM-1	5 Jan	
	<i>K. oxytoca</i>	NDM-1	5 Jan	
	<i>E. coli</i>	NDM-1	5 Jan	
	<i>E. cloacae complex</i>	NDM-1	12 Jan	
39	<i>E. coli</i>	OXA-48	12 Jan	Middlemore Hospital?

Journal of Antimicrobial Chemotherapy

Issues

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Volume 72, Issue 1

January 2017

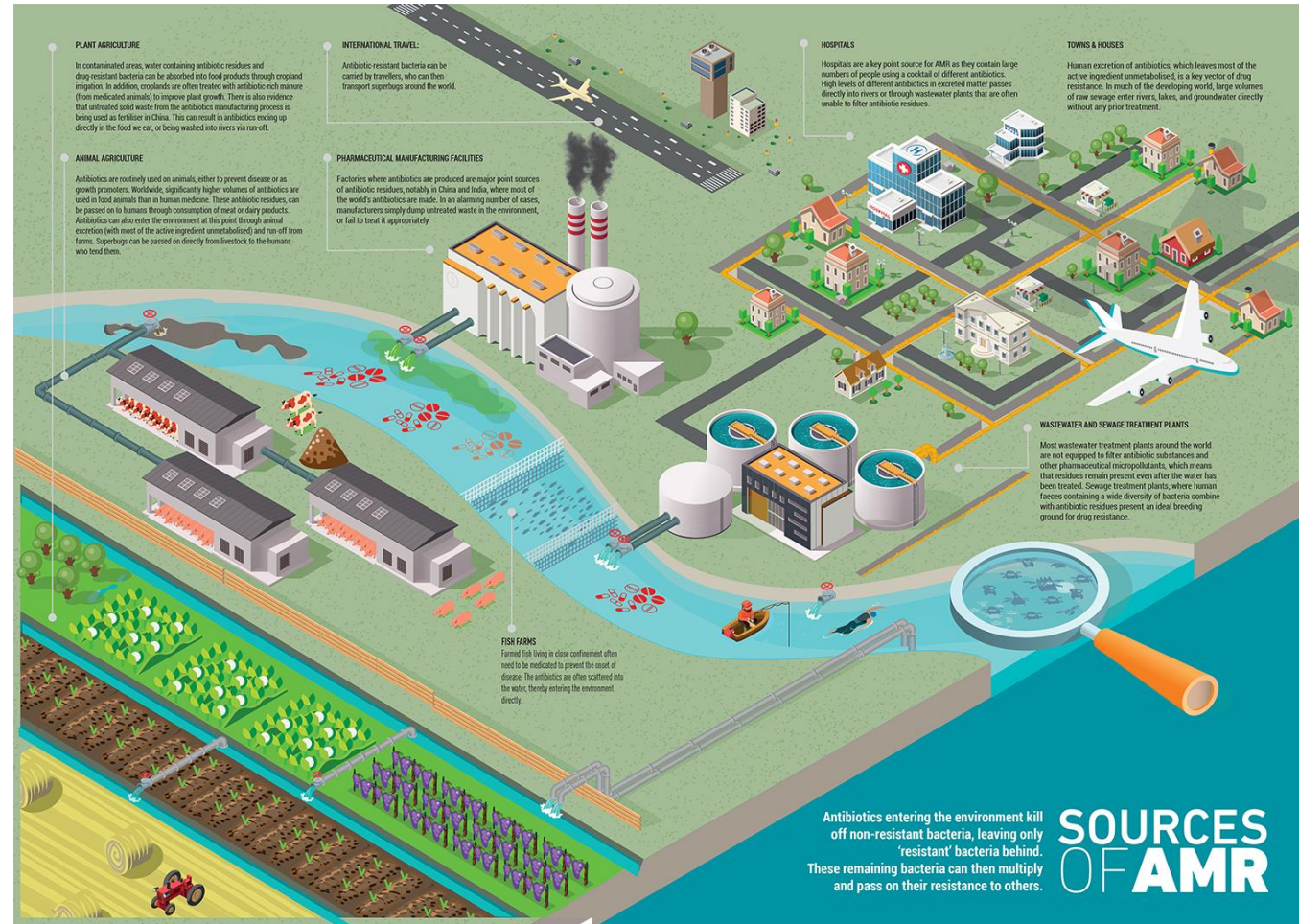
Isolation of seven distinct carbapenemase-producing Gram-negative organisms from a single patient

Julie Creighton ✉, Helen Heffernan, Julia Howard

J Antimicrob Chemother (2017) 72 (1): 317-319.

DOI: <https://doi.org/10.1093/jac/dkw378>

Published: 12 September 2016





Woman dies of superbug no antibiotic could treat

Rob Quinn, Newser staff

Published 9:16 a.m. ET Jan. 15, 2017



(Photo: David Goldman, AP)

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(NEWSER) – This is the kind of case researchers warned about for years: A Nevada woman in her 70s died months ago from an infection that no antibiotic in America could have defeated, according to a [Centers for Disease Control and Prevention](#) report released Thursday. The woman was hospitalized in

August last year after she returned from an extended trip to India. Doctors discovered that she was suffering from a carbapenem-resistant Enterobacteriaceae (CRE) infection, which she had apparently contracted after being treated for a broken right hip in India, the [Las Vegas Review-Journal](#) reports. She died of septic shock, and testing showed the bacteria was resistant to all 14 kinds of antibiotics the hospital had on hand, per the medical website [Stat](#). Even more alarmingly, later tests revealed that none of the 26 antibiotics in America would have worked.

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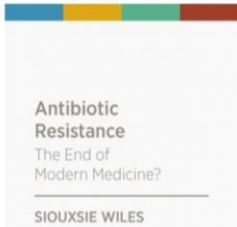
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Antibiotic Resistance

The End of Modern Medicine?

Siouxsie Wiles



Antibiotic Resistance
The End of Modern Medicine?
SIOUXSIE WILES

BWB Texts
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This is an important new book on the pressing issue of anti-microbial resistance. Engagingly written, well informed and provocative, it is a clear call to action for New Zealanders on one of the most critical issues we face.
Professor Kurt L Krause, Webster Centre for Infectious Diseases, University of Otago

In ten years' time, will antibiotics still work? Have we let bacteria get the upper hand in the evolutionary arms race?

In the 1920s the discovery of the antibiotic penicillin started a golden age of medicine. However, experts warn that the end of that age may be just a decade away. In this BWB Text, microbiologist Siouxsie Wiles explores the looming crisis of antibiotic resistance and its threat to New Zealand. Wiles concludes that New Zealand must

Media

'The looming crisis of antimicrobial resistance', Alison Ballance, *RNZ*, 1 June 2017.

'Could superbug 'Kryptonite' be in NZ forests?', Jamie Morton, *NZ Herald*, 8 May 2017.

'Dr. Siouxsie Wiles on antibiotic resistance in New Zealand', 95b FM, 28 April 2017.

Sarah-Jane O'Connor, 'Book review: Antibiotic Resistance – the end of modern medicine?' Sciblogs, 21 April 2017.

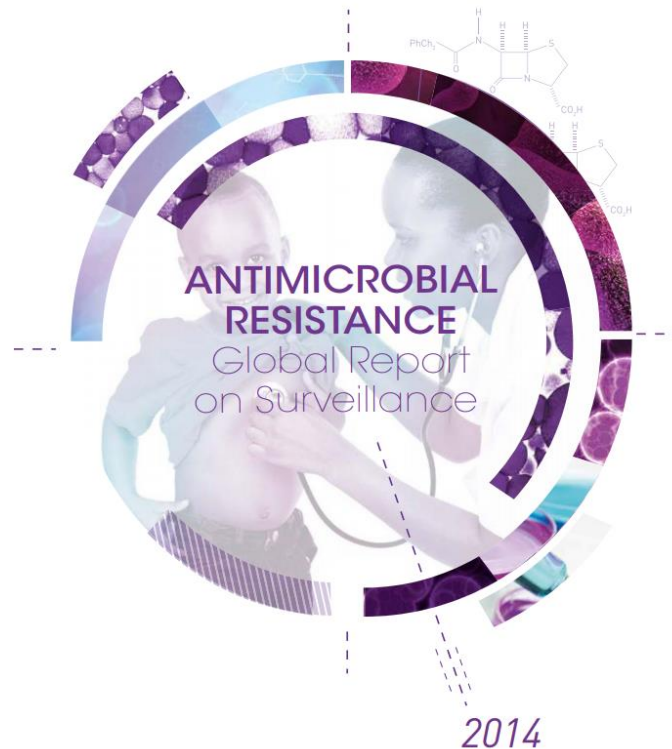
Siouxsie Wiles on The Project NZ, 20 April 2017.

'Microbiologist warns of 'pre-antibiotic era' and urges action on resistance', Rachel Thomas, *Stuff*, 16 April 2017.

'Siouxsie Wiles on the end of antibiotics', *Antibiotic Resistance*, 16 April 2017.

<http://bwb.co.nz/books/antibiotic-resistance>

Solutions?



**GLOBAL ACTION PLAN
ON ANTIMICROBIAL
RESISTANCE**

Wise use of
existing
antibiotics

Vaccines
& other
preventative
measures

Tackle
infectious
diseases
rates

New
antibiotics &
vaccines

 @SiouxsieW



**MEDICAL AND
HEALTH SCIENCES**



<https://www.health.govt.nz/system/files/documents/publications/new-zealand-antimicrobial-resistance-action-plan.pdf>



**DEPARTMENT OF MOLECULAR
MEDICINE AND PATHOLOGY**
Understanding molecular mechanisms of human disease

**Medical
professionals**

Consumers

Citizens