Antibiotic Replacement

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CHD-FA, Bacterial and Fungal MIC 50's

***M**inimum **I**nhibitory **C**oncentration **(MIC)** is the lowest concentration of an antimicrobial (like an antifungal, antibiotic or bacteriostatic) drug that will inhibit the visible growth of a microorganism after overnight incubation.*

*CHD-FA is presently produced as a **CHD-FA Solution**. The CHD-FA Solution contains 4% active matter (4g CHD-FA per 100ml water, or 40g per litre).*

All of the MIC's on the next few slides relate to serial dilutions of the ***CHD-FA Solution*** *i.e.*

- *2% (20 g per litre)*
- *1% (10 g per litre)*
- *0.5% (5g per litre)*
- *0.25% (2.5 g per litre)*
- *0.125% (1.25 g per litre)*
- *0.0625% (625 mg per litre)*
- *0.03125% (312,5 mg per litre)*

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*Each of the **Bacteria, Fungi** or **Yeast** listed on the following slides is generally treated by a **specific** antibiotic . . .*

CHD-FA kills each of them at the listed MIC solution.

(. . . most of these are antibiotic resistant . . .)

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Bacterial MIC's	% CHD-FA Solution
Vibrio cholerae	*0.0625%*
Clostridium difficile spores	0.06%
Streptococcus sanguinis	0.0625%
S.salivarius	0.0625%
S.mutans	0.125%
S.pyogenes	0.06%
Enterococcus faecalis	0.125%
Fusobacterium nucleatum	0.125%
Porphyromonas gingivitis	0.03125%
Klebsiella pneumoniae (NDM1)	0.12%
K.pneumoniae (ESBL)	0.06%
*EMRSA16 (*Methicillin Resistant Staph aureus)	0.06%

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Fungi & Yeasts MIC's	% CHD-FA Solution
Candida albicans	0.125%
C. glabrata	**0.125%**
C. tropicalis	0.03125%
Mucor circinelloides	0.03125%
Rhizopus oryzae	0.5%
Rhizomucor pusillus	1%
Arthromyces ramosus	0.25%
Fusarium. verticilloides	0.25%
F. incarnatum	0.5%
F. solani	1%
Scedosporium prolificans	0.25%
S. apiospermum	0.5%
Trichsporon asahii	1%
Geotrichum capitatum	0.5%

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Fungi & Yeasts MIC's	% CHD-FA Solution
Rhodoturula mucilaginosa	1%
Malassezia dermatitis	0.06%
Mal. furfur	0.125%
Mal. globosa	0.031%
Mal. pachydermis	0.06%
Trichophyton rubrum	0.25%
T. mentagrophytes	0.25%
T. interdigitale	0.25%
Epidermophyton floccosum	0.25%
Microsporum canis	0.025%
Aspergillus fumigatus	0.5%
A. terreus	0.5%
A. flavus	0.5%
Absidia corymbufera	0.25%

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Efficacy of CHD-FA with Methicillin Resistant Staphylococcus Aureus (EMRSA 16) *
(Resistance Patterning Exercise)

- *CHD-FA is effective against EMRSA16 in vitro whether examined at buffered pH's of 3, 5 or 7.*
- *CHD-FA plus oxacillin is effective against MRSA16 in vitro whether examined at buffered pH's of 3, 5 or 7.*
- *Sequential passages of EMRSA16 in the presence of just subinhibitory levels of CHD-FA had* ***no effect on the MIC****.*
- *Sequential passages of EMRSA16 in the presence of just subinhibitory levels of CHD-FA plus oxacillin had* ***no effect on the MIC.***
- ***The MIC of CHD-FA against EMRSA16 was stable following >20 days exposure*** *to the compound in serial passage.*
- *There was* ***no development of resistance*** *observed with CHD-FA monotherapy or CHD-FA on combination with oxacillin against MRSA16.*

(* Summary of Euprotec report – 25 February 2009)

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Extract from Quarterly Technical Report – April 9, 2013

"Evaluation of Carbohydrate-Derived Fulvic Acid (CHD-FA) as a Topical Broad-Spectrum Antimicrobial for Drug-Resistant Wound Infections".

Principle Investigator : David S. Perlin Ph.D.
Public Health Research Institute
New Jersey Medical School – UMDNJ
225 Warren Street
Newark, NJ

"In this second 90 day period, we established the minimum inhibitory concentrations (MIC_{50} and MIC_{90}) for CHD-FA against a collection of over 300 clinically important, multidrug-resistant Gram-negative, Gram-positive, and fungal clinical isolates."

Antibiotic resistance

The grim prospect

The evolution of pathogens is making many medical problems worse. Time to take drug resistance seriously

May 21st 2016

(The Economist)

" . . . Alexander Fleming, who first noticed penicillin's effects, warned of the dangers of resistance almost as soon as the drug had been shown to be a success. But the fact that these are old worries does not mean that they are not serious ones, nor that they cannot get worse. This week sees the publication of the final recommendations of a review on resistance to antimicrobial drugs led by Jim O'Neill, formerly chief economist at Goldman Sachs, on behalf of the British government and the Wellcome Trust, a medical charity. According to Lord O'Neill and his colleagues 700,000 people die each year from infection by drug-resistant pathogens and parasites. And they say that if things carry on as they are that figure will rise to 10m by 2050, knocking 2-3.5% off global GDP. Already the cost to the American health-care system of dealing with infections resistant to one or more antibiotics is $20 billion a year. . . . "

" . . . Some of the gap might be plugged by reviving old drugs that have fallen out of use; drugs bugs have not recently seen are drugs they are less likely to be resistant to. Another possibility is to revamp the incentives, rewarding the development of antibiotics destined to sit behind "use only in emergency" glass. The O'Neill report suggests one-off payments of between $800m and $1.3 billion to firms that develop drugs which meet predefined criteria of unmet need, to be paid on top of sales revenue. At this year's meeting of the World Economic Forum in Davos, 85 companies said that if governments offered them money with such conditions attached they would do everything they could to earn it. . . . "

Public enemies 1

Top 15 drug-resistant threats*, 2013

Threat	Selected effects
URGENT	
Clostridium difficile	diarrhoea, colitis
Carbapenem-resistant Enterobacteriaceae	multiple enteric problems
Neisseria gonorrhoeae	gonorrhoea
SERIOUS	
Multidrug-resistant *Acinetobacter*	hospital-acquired pneumonia
Drug-resistant *Campylobacter*	diarrhoea, dysentery
Fluconazole-resistant *Candida**	oral and vaginal thrush
Extended-spectrum Enterobacteriaceae	multiple enteric problems
Vancomycin-resistant *Enterococcus*	urinary tract infection, meningitis
Multidrug-resistant *Pseudomonas aeruginosa*	sepsis
Drug-resistant non-typhoidal *Salmonella*	food poisoning
Drug-resistant *Salmonella* serotype Typhi	typhoid fever
Drug-resistant *Shigella*	dysentery
Methicillin-resistant *Staphylococcus aureus* (MRSA)	bacteremia (blood poisoning), sepsis
Drug-resistant *Streptococcus pneumoniae*	bacteremia, meningitis, pneumonia, sepsis
Drug-resistant *Mycobacterium tuberculosis* (MDR & XDR)	tuberculosis
CONCERNING	
Vancomycin-resistant *Staphylococcus aureus*	bacteremia, sepsis
Erythromycin-resistant Group A *Streptococcus*	bacteremia, pneumonia, sepsis
Clindamycin-resistant Group B *Streptococcus*	neonatal infections

Sources: CDC; *The Economist*

*All bacterial except *Candida*, which is a fungus

Economist.com