HYMEDPOLY

EXTENDING
THE SCIENTIFIC UNDERSTANDING
&
PRACTICAL APPLICATION
OF NEWLY DEVELOPED ANTI-BAC MATERIALS

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3rd May 2017

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Highlights

- The challenge is ***to develop new medical materials that have an intrinsic antibacterial functionality*** to achieve clinical effectiveness.
- To develop ***a new generation of industrial professionals*** is needed who will firstly understand ***new concept of innovation from concept to commercialisation***, and can implement new strategies to combat bacteria.
- The best way to achieve the goals of science and technology in HyMedPoly project is:

a. ***ORANIC*** - through synthetic pathway: develop ***new hybrid polymers*** synthetic and natural "equipped" with antibacterial functionality,

b. ***INORGANIC*** – through design ***new molecular structure of inorganic nature*** to make them naturally processing antibacterial functionality

c. ***LEARN FROM NATURE*** – build new materials with *natural inhibitors* that can permanently deactivate bacteriological proteases

d. ***In combination*** of ***(a),*** and/or ***(b),*** and/or ***(c)***

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How can we - HyMedPoly

Extending the Scientific Understanding

&

Practical Application

of Newly developed Antibac Materials

Innovation - Innovation - Innovation

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Technologies commonly used to date

Materials …….

For example: Indwelling Catheter

- ✓ Bacteria colonise the bladder at 5% per day After
- ✓ 30 days chronic bacteriuria established;
- ✓ Urease-producing bacteria cause stone formation

- ➢ Complications : Long-term catheterisation of the Bladder in Multiple Sclerosis

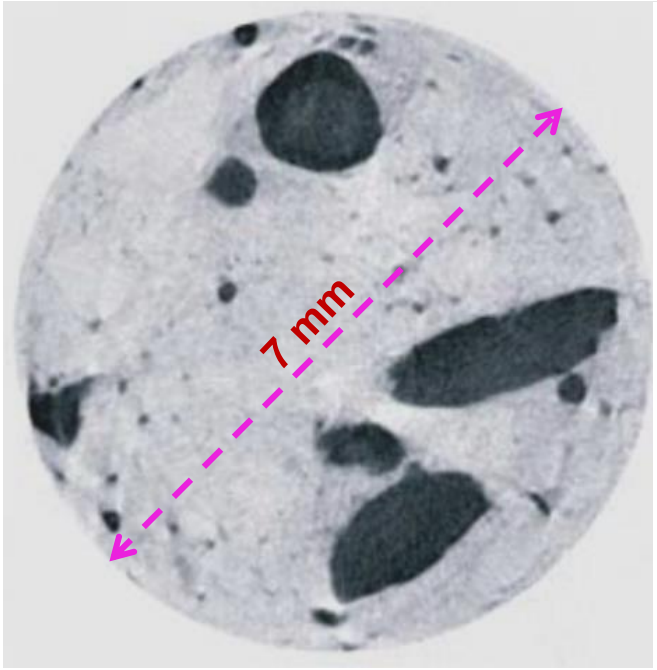
??? Solution???: Need for a Urine Collection System

Organic drugs …….

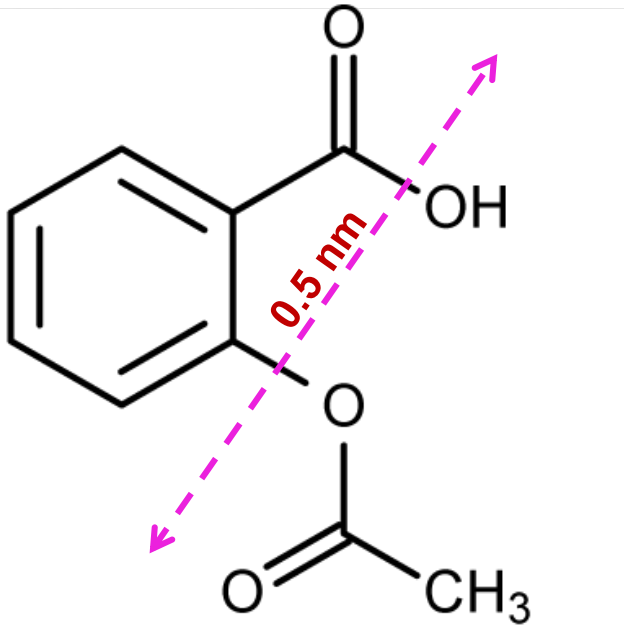
Current practice of API distribution within matrix – example of aspirin tablet

ex: aspirin

tablet



aspirin molecule



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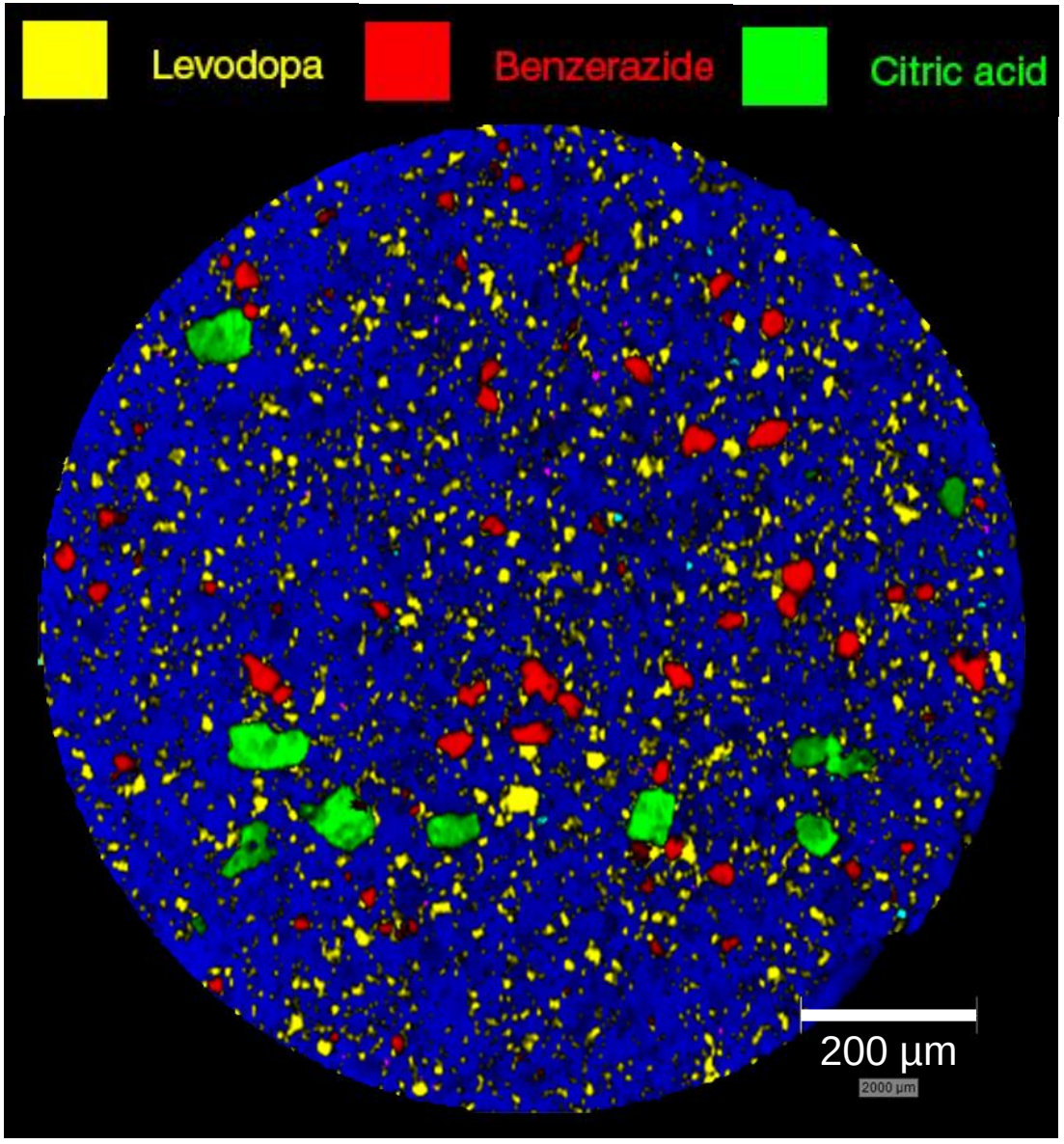
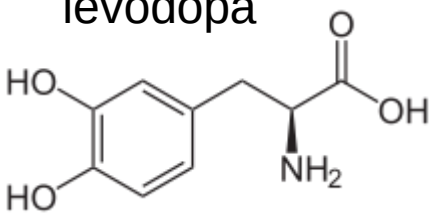
Organic drugs …….

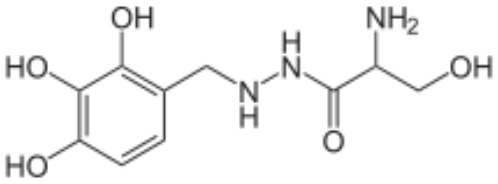
Multi API distribution– example of tablet used for the treatment of Parkinson's disease



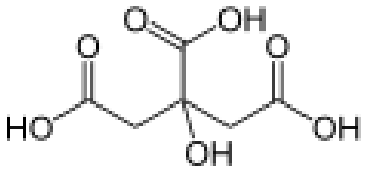
levodopa



benserazide



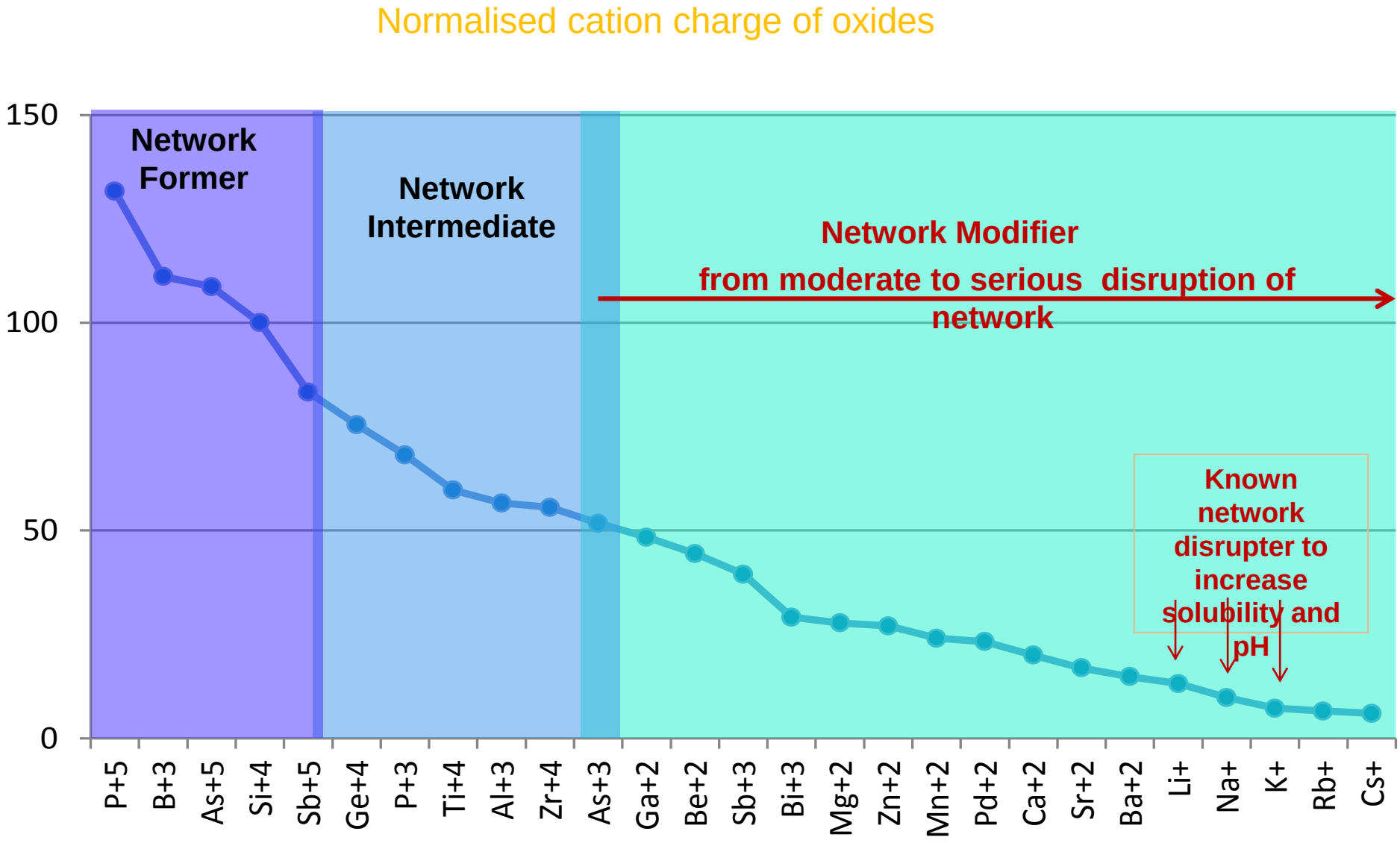
citric acid



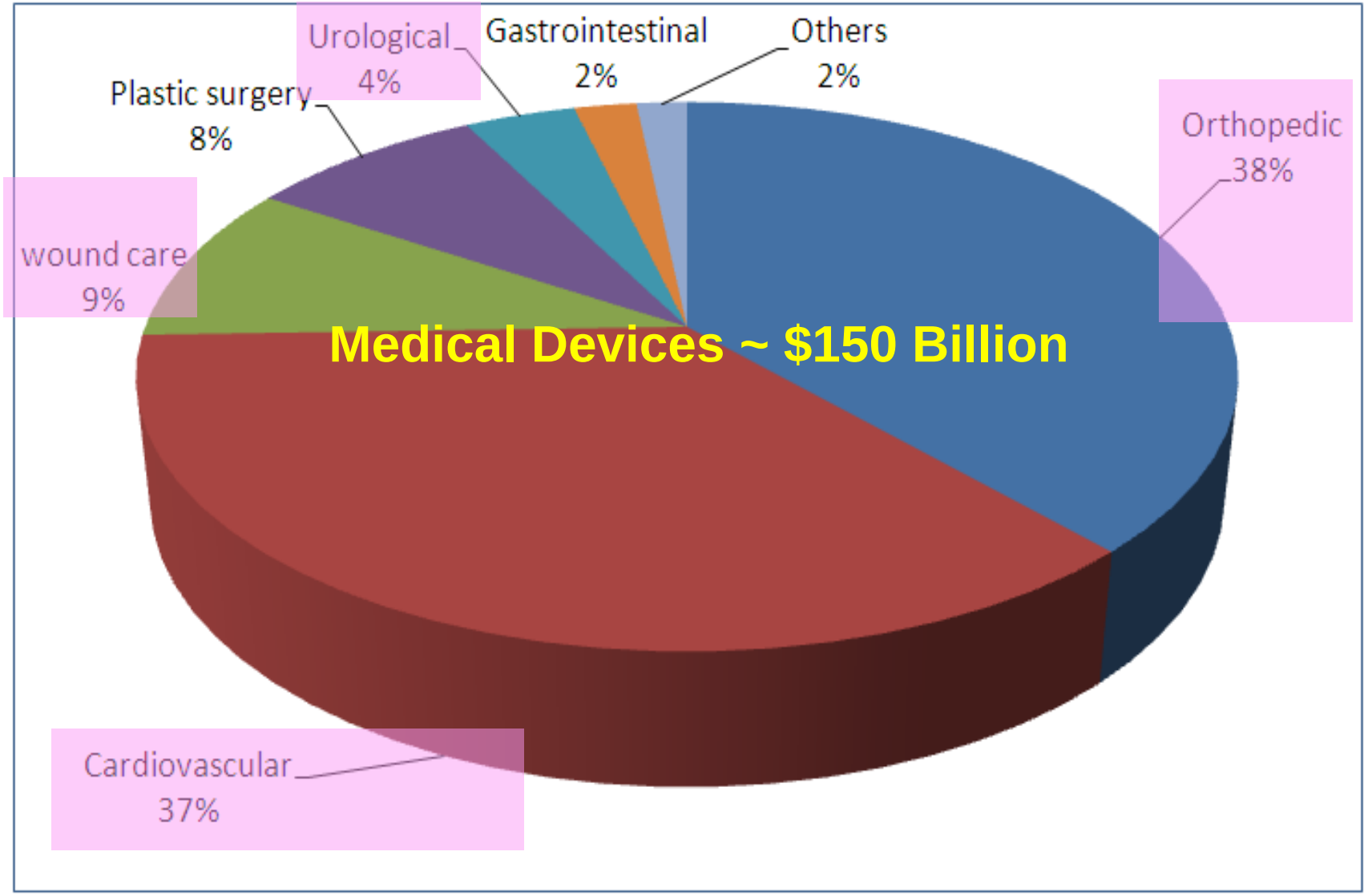
Inorganic …..


Inorganic Controlled
Release Technology
Materials and Concepts for
Advanced Drug Formulation
Xiang Zhang and Mark Cresswell
B
H

Inorganic – for example ion strength or glass solubility



In General - Technologies commonly used to date



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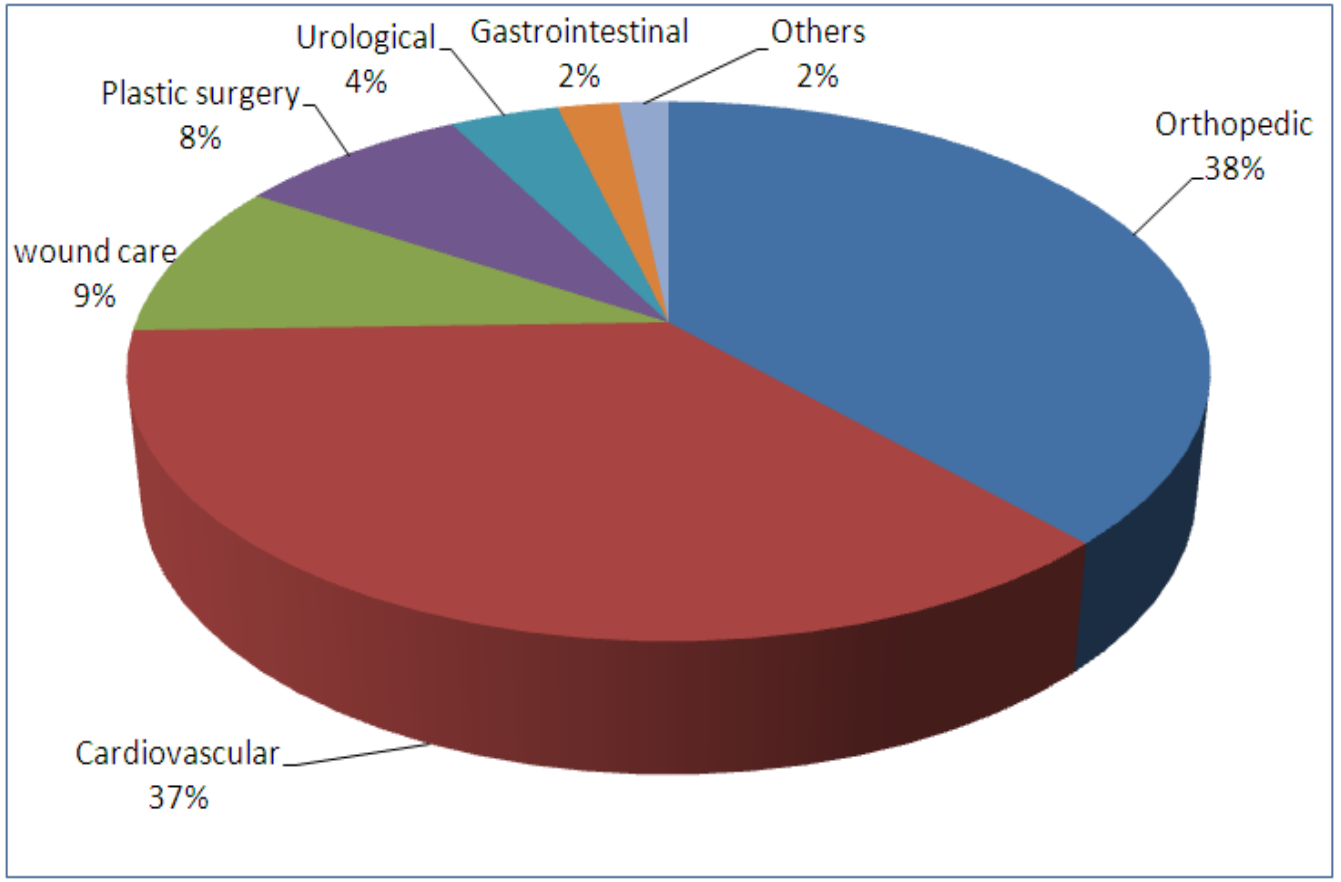
Technologies we can use? taking medical devices as examples

➢ ***Surface nano/micro structure*** – *bacterial love or hate it?*



➢ ***ORANIC*** - through synthetic pathway:

➢ ***Natural inhibitors*** that can permanently deactivate bacteriological proteases

➢ ***INORGANIC – new molecular structure of inorganic nature***

naturally processing antibacterial functionality

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➢ ***ORANIC*** - through synthetic pathway: develop ***new*** synthetic polymers "equipped" with antibacterial functionality

- ✓ PHAs: with natural inhibitors & new designed S-containing natural polymers
- ✓ Bacterial Cellulose: adding "a, b, c …" working !
- ✓ Anti-biofouling
- ✓ Polymers – mimic antibacterial peptides; selectivity
- ✓ Issue around hydro-phobic/phlic properties
- ✓ Molecular imprinting strategies
- ✓ More will being presented …..

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➢ ***INORGANIC*** – through design ***new molecular structure of inorganic nature*** to make them naturally processing antibacterial functionality

- ✓ X-HA
- ✓ Bioglass
- ✓ Bioglass
- ✓ Mesoporous Si – based ceramic

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Innovation - Innovation - Innovation

Design – Development – Production

New molecules

Not a mixture of new antibac materials

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THANK YOU
&
QUESTIONS