

The logo for the Engineering and Physical Sciences Research Council (EPSRC), featuring the acronym 'EPSRC' in a bold, purple, sans-serif font, underlined by two horizontal green lines.

Engineering and Physical Sciences  
Research Council



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# Novel Drug Delivery: National and international landscape

EPSRC healthcare technologies grand challenges:

***Need for OPTIMISING TREATMENT: right treatment at the right time***

***Need for DEVELOPING FUTURE THERAPIES: enhance efficacy, minimise costs and reduce risk to patients***

At present patients often receive inadequate amount of medication because of the inability to refine the exact dose and optimise dose timing.

The excess is dangerous in terms of drug toxicity and side effects and wasteful in terms of the costs involved in the treatment of side effects.

Other issue is wastage through unused, or partially used, prescription medication (costs the NHS over £300 million every year nationally).

It has been reported that up to half of elderly patients do not take their drugs correctly.

Need for multifunctional solution – sense the need, deliver medication, report outcome.

## Novel Drug Delivery: : Current Newcastle activities

### Numerous SAgE & FMS activities:

- Materials for drug delivery
- Materials for sensing and drug delivery
- Materials (e.g. scaffolds) for tissue engineering and drug delivery
- Crossing barrier/s (e.g. in the brain)
- Regenerative medicine

# Novel Drug Delivery: **Future Research Opportunities**

EPSRC

BBSRC

Innovative UK

Health KTN

Medicines Technology Catapult

Horizon2020

# Novel Drug Delivery: Future Research Opportunities

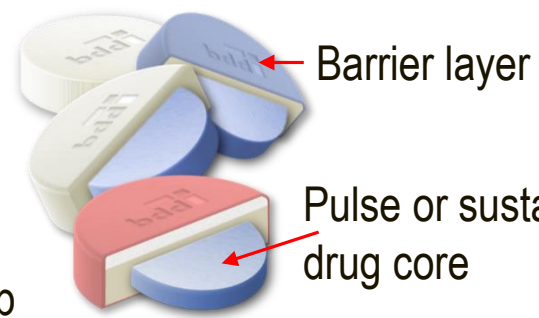
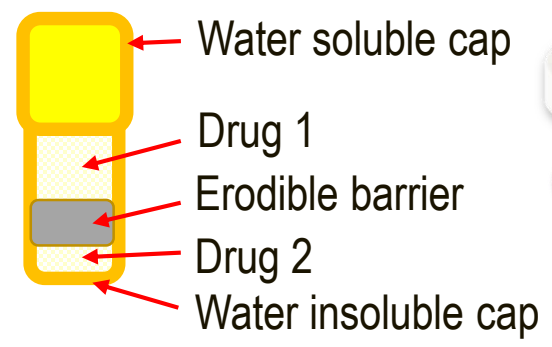
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# Chronopharmacotherapy

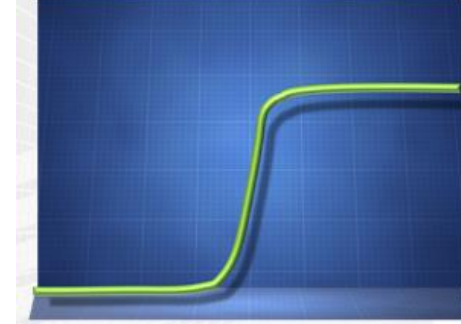
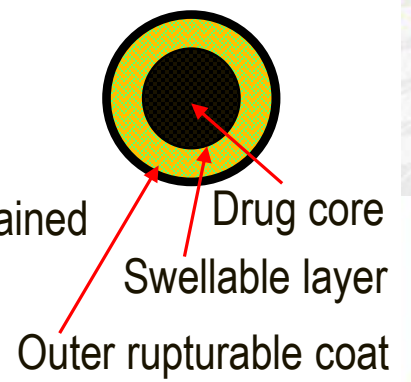
## What is out there and what are the limitations?

### Time controlled delivery systems

Pulsincap drug delivery system    OralogiK™



### Membrane rupture



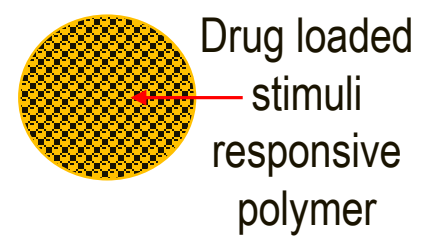
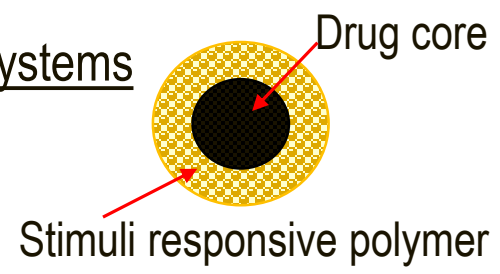
DELAY + PULSE  
eg. zaleplon for sleep maintenance



IR + DELAY + PULSE  
eg. diclofenac for pain and morning stiffness

### Stimuli induced delivery systems

- T
- pH
- Glucose
- Inflammation

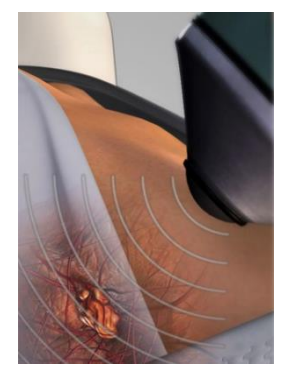


DELAY + SR  
eg. verapamil for circadian cardiovascular event

### Externally induced drug release



Magnetic



Ultrasound

**Breaking News**  
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**Technology for hands free rhythmic drug delivery does not exist!!!**

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