

# NIA Open Webinar

## Nanomedicine: Diagnostics and therapeutics advancing through nanotechnology

7 March 2018  
1500 CET

The webinar will start at 1500 CET and we will keep  
participants on mute during the presentations

- Quarterly open webinar from NIA
- Focus on a key aspect of nanotechnology
- Combining science, business and regulatory aspects
- Today's focus on nanomedicine:
  - Diagnostics
  - Therapeutics

## **Agenda**

- Introduction to nanomedicine
- Endomag
- Senolytic Therapeutics
- Regulatory overview

## **Participation**

- Welcome to ask questions through chat function and we will unmute after each presentation for verbal questions, audio quality permitting

## NIA priorities and actions for 2018

- Global Regulatory Working Group
- Nanotechnology Innovation Council
- [New website](#)
- Annual symposium – April 10
- Expanded news – open newsletter, projects newsletter
- *However, always more fun as a Member.....*

## Devices:

- Any technology used to diagnose, investigate or monitor disease, handicap, injury, including non-pharmacological/immune contraception.
- Spans diverse technologies, plasters, MRI machines, lab-based diagnostics, injectable imaging materials.
- Can be mechanical or biological, implantable, *in vitro* etc.
- Very often used internally, giving strong focus on human interaction and crossing over into need to assess like a therapeutic.

## Therapeutics:

- Preventing or treating diseases in humans
- Substance or combination of substances which may be used in or administered to humans to restore, correct, maintain or modify physiological functions by exerting a pharmacological, immunological or metabolic action, or to making a medical diagnosis.

- Extremely broad applications, for same reason as nanomaterials are used everywhere
- Aim not to provide exhaustive list but look at examples of nanomaterials and their ability to advance medicine
- Healthcare is a good target sector for nanomaterials:
  - High cost of products/therapeutics, thus high early stage investment and long development times
  - Positive response to advanced technologies from patients
  - Complex regulatory pathways
  - Introduction of nanomaterials does not distort development pathway and actively adds value to evidence-based assessments
- Approved products still low – yet to reach full potential

Nanomaterial characteristics allow significant advances for products where improvements are often incremental for performance or clinical benefit:

Biological perspectives:

- Access through challenging biological barriers (blood brain)
- Altered characteristics of a therapeutic (reduced toxicity, increased solubility, faster and longer biological action)
- Smaller to interact with DNA/RNA levels
- Many therapeutics are large, complex molecules, slow to reach target, too fast/too slow for metabolism or excretion, nanotechnology can alter this
- Result – improved performance of existing technologies – very attractive for faster time to clinic, longer life for patent-end products, new value to off patent medicines - WINNER

Materials performance perspectives:

- Faster, improved, smaller device performances – as nanomaterials add in any sector

## **Paclitaxel** (1971) chemotherapy for breast, pancreas, lung

- Abraxane is approved product
- Paclitaxel delivered in spherical nanoform.
- Resolves solubility (insoluble in water), significant reduction in side effects over previous formulations

## **Doxorubicin** (1974) chemotherapy for breast, ovarian bladder, leukaemia, often in combination

- Caelyx is approved product
- Pegylated Liposomal delivery
- Liposomes with nanostructure allow better delivery and can be tagged to be tumour-specific. Better accumulation at tumour and reduced cardio-toxic side effects

**Sirolimus** (1999) Immunosuppressive agent for post transplant organs

- Rapamune is approved product
- Nanocrystal colloidal nanodispersion with reduced particle size
- Greater stability of product plus improved bioavailability



- Contrast reagents for imaging
- Materials for implants – smaller, more durable
- Improved delivery of insulin and protection of pancreatic islets
- Delivery to previously unreachable parts of the eye, potential clinical impact in retinitis pigmentosa
- Enhanced formulation of anti-bacterials to increase efficacy and reduce development of resistance
- Tissue engineering - nano-porous scaffolds for biologized implants

Healthcare is a significant target application for nanomaterials and nanotech:

- Many patent-end technologies can be re-invigorated without full development costs of novel therapeutics
- Better diagnostics has impact on therapeutics efficacy and clinical impact
- Successful products where clinical unmet need OR significant advances over current gold standards
- For human assessment, already processes in place
- Nanomaterials can advance where interventions can take place – diagnostics and treatments outside hospital setting
- Costs can be saved throughout healthcare pathway: earlier diagnosis, better disease management, fewer side effects, less invasive surgery, fewer sick days, less hospital time
- Many existing nanomaterials could be applied into healthcare – not about novel materials into novel medicines

- [European Medicines Agency](#)
- [US Food and Drug Administration](#)
- [EU Observatory for Nanomaterials](#)
- [European Technology Platform for Nanomedicine](#)

**Dr Claire Skentelbery**  
**Director General**  
[claire.skentelbery@nanotechia.org](mailto:claire.skentelbery@nanotechia.org)