

## Nanoparticles for medical purposes – Technical, medical and ethical aspects

### Results from the ELSI work package of the NanoDiaRA project

PD Dr. Felix Thiele, Dr. Jan Mehlich,

Europäische Akademie Bad Neuenahr-Ahrweiler GmbH

contact: jan.mehlich@ea-aw.de

Ethical problems of nanomedical issues can be illustrated along the several stages of a nanoparticles lifetime. From the idea and design, followed by synthesis processes and investigations on the particles properties, to the industrial fabrication, marketing and application, finally ending in aspects of disposal and long term implications, each stage bears its own challenge.

#### Accompanying the entire process:

- Technology assessment
  - Risk assessment & evaluation
  - Ethical vision assessment
- Questions on mid term and long term implications of the nanomedical product/method should be addressed in advance and require detailed and clear regulation and policies in order to avoid an upcoming distrust in and rejection of nanomedicine due to uncertainty and worries.

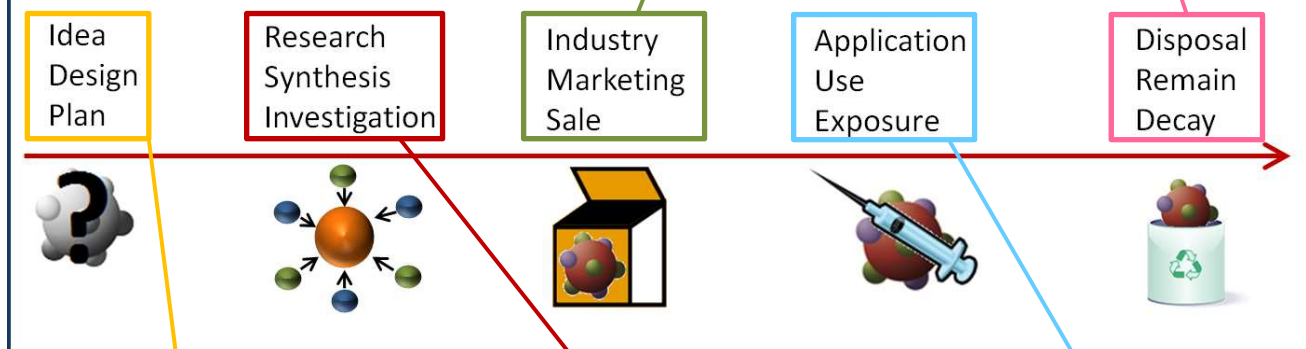
#### Business ethics

- Profit seeking vs. Product safety
- The goal to increase the profit can lead to a lack of facility safety and to a too quick market release of not enough investigated products.
- Responsibility of companies, CEOs
- Profit chase and economical thinking should have a lower priority than the patient's need for product safety and reliability.

#### Long term Implications

- Contamination of
- Body  
It must be studied where the particles remain, if they cause damage or - after solving an "old" problem – produce a new one.
- Environment  
Can the nanomaterials leave the organism and be set free into the environment where they endanger the natural balance or contaminate water and food?

### A Nanoparticle's lifetime



#### Generally valid concerns

(to be addressed before),  
e.g. **Naturalness**  
The unnaturalness reproach undeniably is a frequent ingredient of public moral debates. It is doubtful, however, whether making an argument from naturalness part of the attempt to master moral conflicts on nanomedicine is plausible.

#### Research phase

- Responsibility of researchers  
Researchers in nanomedicine should be able to follow and participate in the anticipative deliberation of moral problems caused by their research.
- Safety & Toxicology  
NPs often display different chemical, physical, and biological characteristics from those of the bulk form of the same substance, highlighting the need for specific nano-policies.

#### Application phase

- Medical ethics  
The critical philosophical reflection demands an accurate differentiation of the multiple scopes pursued with nanomedicine and should relate to a use- and purpose-centred structuring while addressing questions of justice.
- Strategies for dealing with public concerns  
Ignoring, Marketing, Educating, Engaging

Summary: Most ethical and social problems going along with Nanomedicine are not new. Special aspects mainly arise from the application-oriented nature of this emerging research field.