

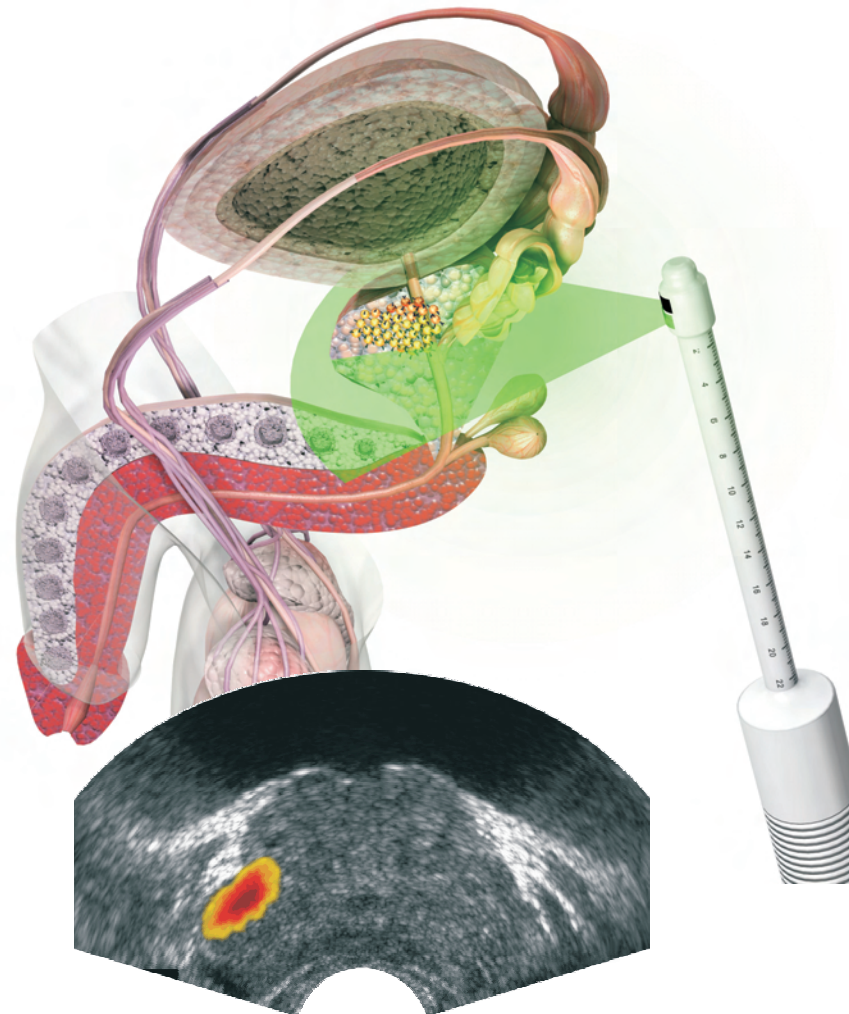
## Prostate cancer

is the most common male malignancy diagnosed in the European Union with an incidence of 78.9 per 100,000 men per year. Mortality is 30.6 per 100,000 per year. Early diagnosis of disease has markedly increased with the introduction of prostate specific antigen (PSA) testing and an increasingly high proportion of men are now diagnosed with early localised disease. Sub-clinical prostate cancer may be discovered pathologically in the majority of men over 50 years. PSA testing has led to considerable over-diagnosis.

A major challenge in current prostate cancer oncology is to develop more accurate imaging assessments. Firstly, they could help select appropriate curative treatments for men diagnosed with prostate cancer. Secondly, there is an urgent need to have more refined tests to enable identification of precise areas of prostate cancer within the prostate gland and to predict outcome. This would allow selection of curative treatment for men who require therapy but many men could be managed with active surveillance or monitoring programmes.

Current imaging techniques have limited value. Ultrasound is used to guide prostate biopsies but is otherwise not a generally useful staging investigation. Standard CT and MR are valuable in determining lymph node involvement but do not reliably identify disease within the prostate. Newer MRI techniques (contrast enhanced MRI, diffusion weighted MRI, MR spectroscopy) may have some role in this regard. An efficient imaging technique which significantly improves the sensitivity and specificity of diagnosing, staging and predicting the behaviour of prostate cancer would be extremely valuable.

# ADONIS Optoacoustic Imaging Concept



## ADONIS

intends to prove the concept of using optoacoustic imaging of gold labelled antibodies as an integrated biosensor based imaging system for the production of specific and sensitive data for prostate cancer diagnoses. The achievement of this objective requires excellent know-how in several fields:

### Laser Technologies

A specialised laser excitation method for generating sound from gold nanoparticles allows the penetration of tissue segments of several centimeters thickness by infrared laser light.

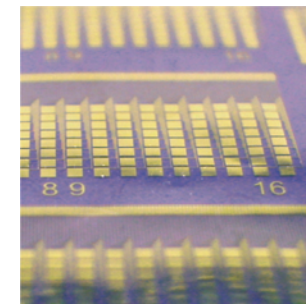
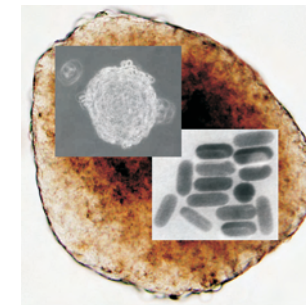
### Bio-Functionalisation of Nano-Sized Gold Particles

for specifically and selectively binding pathological tissue as well as providing targeted delivery of these particles to the region of interest in the body.

### Ultrasound Technologies and Image Reconstruction

capable of detecting the location and quantity of nano sized particles using the sound signals they generate following laser light excitation. Data processing and presentation of images for accurate visualisation of pathological regions.

The necessary skills required for this project are completed by system integration capabilities and the expertise to experimentally evaluate the effectiveness of the developments during the course of the project for feed back and optimisation. ADONIS partners from five European countries combine the necessary know how in a jointly defined work program.



# ADONIS

For further information on ADONIS,  
please contact the project co-ordinator



**Fraunhofer** Institut  
Biomedizinische  
Technik

#### Ultrasound components and image reconstruction

Fraunhofer-Institut fuer  
Biomedizinische Technik (IBMT)  
Biomedical Ultrasound Research  
Dr. Robert LEMOR  
Ensheimer Str. 48  
D-66386 St. Ingbert  
Tel: +49 (0)6894 980 225  
robert.lemor@ibmt.fraunhofer.de

and visit

**www.fp6-adonis.net**



**Laser components**  
University Berne  
Institute of Applied Physics  
Prof. Martin FRENZ  
CH-3012 Berne  
martin.frenz@iap.unibe.ch  
www.iapbp.unibe.ch



**Functionalised nanoparticles**  
Liège University  
Mass Spectrometry Laboratory  
Center for Trace Analysis  
Prof. Edwin DE PAUW  
B-4000 Liège  
e.depauw@ulg.ac.be  
www.cartulg.be



**System integration**  
El.En. S. P. A.  
Prof. Leonardo MASOTTI  
I-50041 Calenzano (FI)  
udrlaser@elen.it  
www.elen.it



**System evaluation**  
The Institute of Cancer Research  
Dr. Jeffrey C. BAMBER  
Sutton Surrey Sm2 5NG (UK)  
jeff.bamber@icr.ac.uk  
www.icr.ac.uk



**Project management**  
tp21 GmbH  
Dr. Hanno WITTIG  
D-66111 Saarbruecken  
wittig@tp21.de  
www.tp21.de

**Disclaimer:** The information in this document is provided as is and no guarantee or warranty is given that the information is fit for a particular purpose. The user thereof uses the information at its sole risk and liability. The Specific Targeted Research Project no NMP4-CT-2005-016880 ADONIS has received research funding from the 6<sup>th</sup> RTD Framework Programme of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this information.

Published by the ADONIS project consortium. All rights reserved. Reproduction only with permission of the publishers.

# ADONIS

Accurate **D**iagnosis of prostate cancer  
using **O**ptoacoustic detection of  
biologically functionalised gold **N**anoparticles -  
A new **I**ntegrated Biosensor **S**ystem



Specific Targeted Research Project no NMP4-CT-2005-016880  
supported by the 6th Framework Programme of the European Commission

