

# WOUNDMONITOR

## Mobile system for non-invasive wound state monitoring

**WOUNDMONITOR** project aims at producing a non-invasive system device which can monitor the state of a patient's wounds simply by detecting bad bacteria in the air emitted from the wound. Using state of art sensors we will be able to detect and diagnose the presence of an infection almost instantaneously.

### Objectives of the project

The treatment of critically ill patients suffering from burns, chronic skin ulcers or serious wounds, is often complicated by infection. Early detection of bacterial and/or fungal infections is a well identified problem in healthcare, where there are significant scientific and technical problems to be overcome.

**WOUNDMONITOR** will apply state of the art sensor technology for research and development on an

innovative diagnostic system that will enable:

- non-invasive sampling of volatiles emitted from burns, skin ulcers or gaping wounds
- rapid processing of such samples with a mobile laboratory-based multi-technology gas sensor array and pattern recognition system
- rapid diagnosis of changes in state of a patient
- assistance to medical personnel in decision-making in the treatment of such patients
- enhancement of patient safety and personalisation of healthcare and lifestyle management for patients.

***“will help in early and rapid diagnosis of changes in state of a patient, and aid decision making by medical personnel in the treatment of such patients”***

### Project Description

The systems of health care in the European Union and the New EU Countries face the challenge of attaining simultaneously the three-fold objective of access to care for everyone, a high level of quality in the care provided and the financial viability of health care systems. This project meets the challenge by aiming at the long-term objective to develop new medical instruments and/or intelligent diagnosis equipment for healthcare of

the future, using advanced sensing systems. The project intends to solve well-identified scientific/technical problems related to acquisition of accurate data for healthcare and to explore new concepts for the integrated systems for health.

The research project involves teams from 4 European Countries, namely UK, Germany, Italy and Lithuania. **WOUNDMONITOR** aims to combine a labora-

tory-based sensor module, pattern recognition subsystem and non-invasive sampling of volatiles emitted from such wounds into highly intelligent

system that allows the rapid processing of these samples and is capable of assisting in early and rapid diagnosis of changes in state of a patient, and aid decision making by medical personnel in the treatment of such patients.

### Scenario

A patient suffering from serious burns will have swabs taken for microbiological testing. These tests take typically three days to carry out. If the patient has a bacterial infection, then this may develop rapidly during the time taken for analysis. With **WOUNDMONITOR**, sampling of volatiles may take a few minutes, and the results will typically be available within half an hour to the clinician.

The main purposes of **WOUNDMONITOR** are:

- Adaptation of electronic nose technology to a personalised monitoring system capable of early detection and identification of the wound clinical infection.
- Definition of the relationship between the gas sensor outputs and the microbiological data and medical information on the tissue and person levels. Integration of the available information into a snapshot of the state of the patient's health.
- Combination of several gas sensor types in an integral sensor module.
- Implementing methods for the dynamic data recording and analysis in the electronic nose technology and adapting of the recognition algorithms to automate diagnosis.
- Development of a prototype system based on electronic nose technology.

The project consists of several work-packages that include:

- Investigation of the volatile compounds acceptable as markers of individual infectious agents in wounds.
- Research on development of non-invasive sampling of the volatile products of the infectious agents for presentation to a sensor system.
- Description of basic principles of multi-technology arrays of volatile chemical sensors optimised to key markers of clinical infections of wounds in specific medical applications.
- Implementing dynamic signal processing and pattern recognition algorithms to automate early diagnosis of clinical infections.
- Manufacture of portable prototype systems for demonstration and laboratory testing.
- Testing such systems in a clinical environment to evaluate acceptability and effectiveness of the diagnosis / prognosis.

## Expected Results & Impacts

The medical field and patients will benefit from better diagnostic procedures. Success in this challenging field and the utilisation of microsystems will give positive visibility to the field to the world-wide scientific community and also heighten the perception of average European citizens to new technological developments.

A non-invasive monitoring system for wound healing will be a new innovative tool to improve the quality of life and health of patients with serious wounds. The project will lead to low cost products of significant market horizon and social impact. The new sensor system will allow the implementation of EU and international policies, which refer to numerous societal and medical problems.

## WOUNDMONITOR

**Mobile system for non-invasive wound state monitoring**

**Website:** <http://www.ithealth.org>

**Project co-ordinator:**

The University of Manchester

**Contact person:**

Professor Krishna Persaud

Tel: +44 (0) 161 3064892

Fax: +44 (0) 161 306 4879

Email:

[Krishna.persaud@manchester.ac.uk](mailto:Krishna.persaud@manchester.ac.uk)

Website: [www.manchester.ac.uk/woundmonitor](http://www.manchester.ac.uk/woundmonitor)

[woundmonitor](http://www.manchester.ac.uk/woundmonitor)

**Partners:**

- The University of Manchester (School of Chemical)
- Engineering and Analytical Science) (UK)
- Puslaidininkiu Fizikos Institutas (LT)
- Kaunas Medical University Hospital (LT)
- CNR-Istituto Nazionale per la Fisica della Materia, Brescia (IT)
- Biodiversity SPA (IT)
- Umwelt-Systemtechnik GmbH (DE)
- Department of Burns and Plastic Surgery at South
- Manchester University Hospitals Trust (UK)

**Timetable:** from 01/06 – to 12/08

**Total cost:** € 2.242.496

**EC funding:** € 1.665.687

**Instrument:** STREP

**Project Identifier:**

IST-2004-027859

**Keywords:**

Gas Sensor Arrays,  
Bacterial volatiles,  
Detection of Infection,  
Non-invasive sampling,  
Diagnostic aid