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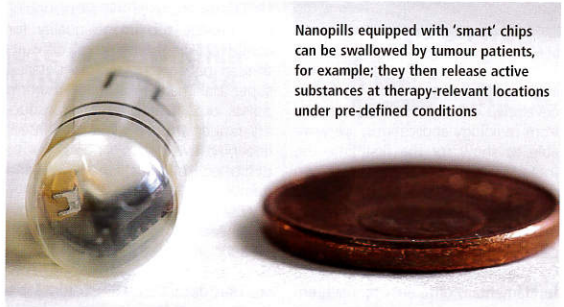
Medicine 4.0

New technological opportunities will revolutionise healthcare

In the world of technology the term Industry 4.0 is already well known. Dr Bernhard Wolf, Professor of Medical Electronics at the Technical University of Munich, has revealed a comparable development in medicine, and is convinced that smart systems and personalisation have enormous potential



Nanopills equipped with 'smart' chips can be swallowed by tumour patients, for example; they then release active substances at therapy-relevant locations under pre-defined conditions

Medicine 4.0 - The term obviously alludes to 'Industry 4.0', through which we could follow the development from pre-industrial times via the introduction of the steam engine and electricity to full automation and computer technology. There have been similar developments in the world of medicine.

Beginning with natural medicine, big advances arrived with the discovery of antibiotics and the introduction of X-ray technology.

Tuberculosis was almost eradicated thanks to X-ray technology, and the rate of complications during surgery was considerably reduced through the use of antibiotics. A further important step forward was made because of nuclear magnetic resonance and semi-conductor technology.

individualised and optimally dosed treatment. It is even conceivable for medication to be administered directly to the tumour from a tank located within the implant.

Personalised treatment appears particularly promising when it comes to the choice and dose of chemotherapeutics. As the metabolic condition of cells and tissues not only depends on genes but also on environmental conditions it is highly encouraging to characterise metabolic products and cell signals.

We have developed electronic sensors that can monitor the metabolic state of cells directly and without auxiliary reagents. The reaction of cells to medication can be followed through changes of the oxygen concentration or the pH of the tissue.

systems could supply these patients with their respective medication.

American research teams are even working on an implantable system that is for use to treat allergies. Our American colleagues are assuming that allergies are ultimately caused by electric malfunctions in the tissue structure. The treatment is not carried out with medication but through electrical signals.

How do people accept these technological developments?

Surveys show that the general public is usually a little sceptical towards technology in medicine. However, when it comes to the concrete application of technology for a specific medical problem the majority are actually in favour of technological innovations. The clinical tests for a complex telemedicine system that monitors blood pressure, diabetes and obesity, showed that almost all patients accepted the system.

It consists of a mobile telephone and sensors, which can measure blood pressure, breathing or blood glucose. The sensors transmit the data to the mobile telephone, which in turn is connected to a database. The patient can receive suggestions for treatment directly from the database, and the system also offers the opportunity to collate the data, so that doctors can keep a closer eye on high-risk patients.

I am convinced that these new technological opportunities will revolutionise the healthcare system.

Bernhard Wolf is Professor of Medical Electronics at the Technical University of Munich

FOR THE OPERATING THEATRE

The 43 LEDs shadow-less lamp

The Italian firm Acem Medical Company has a truly impressive range of medical lighting, sharing the firm's special LED optics to generate a shadow-less, clear and homogeneous light. The model StarLED5 NX is no exception, generating an IR-free light, excellent colour temperature and a practically endless life cycle at low consumptions, the manufacturer reports. 'The 43 LEDs that make the StarLED5 NX are circularly positioned and divided into five reflectors (with seven LEDs each) and other eight LEDs are radially placed around the handle. In this way, the lamp produces a high illumination level of 130,000 lux (160,000 lux optional) for a steady life cycle of about 50,000 hours.'

ACRIS ensures, by the use of a microprocessor, control of electrical curves typical of LEDs remain unaltered over time but maintain a long life cycle. The colour rendering index of this lighting is 95 and colour temperature 4,500°K. These two values allow the exact chromatic scale of the colours of the human body to be reproduced, the firm points out.

Focused and ambient light

To achieve the right illumination to meet different needs this model can produce either focused or ambient light: 'The light field focusing system adjusts the light spot diameter accurately, assuring an excellent sharpness of details in the operating area,' Acem adds. Ambient light is managed by the Endo function. This technology allows visual comfort as well as a correct vision of the surrounding environment thanks to its particular light beam coming from the upper part of the lamp. StarLED5 NX is particularly suitable for minimal invasive surgery and is ideal for preparation and treatment during the operation, monitoring the patient and microscope operations.'

A practical and functional design

Acem adds that the model's removable, sterilisable central handle can house a video camera for on demand shooting the surgical operations accurately (the video camera can be placed on a separate arm alternatively). 'The lamp shape assures visual comfort and is particularly suitable for laminar flows in the operating room. All the functions of StarLED5 NX are managed by the handy, digital and easy-to-read I-Sense control panel positioned on the cardanic structure.'

ACEM is at Medica Hall 10 / Stand E31

The sterile single-use

Paediatric cleft palate surgery

DTR Medical, the award-winning British manufacturer of high quality single-use surgical instruments, is demonstrating its new Bone Trephine at Medica this year.

The Bone Trephine is used for bone grafting, including taking circular bone graft biopsies for paediatric cleft palate surgery. The instrument is designed to harvest iliac crest bone (from the pelvis) for use in alveolar grafting (to add bone to the gum ridge) in children.

'The sterile single-use device has equivalent quality of a reusable instrument, but with the advantage of providing first time sharpness to enable a good harvest to be taken and without the risk of cross contamination,' the company reports.

'Designed for use with a T-bar and Jacob's chuck, the Bone Trephine has an 8mm internal diameter with a 9mm barrel depth and an overall length of 49mm, and is supplied in a procedure pack with a scalpel to aid bone removal.

'The procedure was reported in the British Journal of Oral and Maxillofacial Surgery and

DTR is at Medica Hall 16 / Stand F42