

CASE STUDY

UNIVERSITÄTSSPITAL ZÜRICH CHOOSES EPSON'S MOVERIO BT-100



EPSON[®]
EXCEED YOUR VISION

THE BT-100 HELPS PATIENTS DURING TREATMENT

The UniversitätsSpital Zürich is a key provider of primary health care for the population of the city and the district of Zurich, and is also the region's top provider of cutting-edge university-level medical training.

Every year, around 8,000 hospital staff treat over 130,000 individuals, both as inpatients and outpatients. Patients come from every region in Switzerland as well as from abroad. With over forty clinics and departments, the hospital guarantees comprehensive care for its patients and also offers highly specialised diagnostic procedures and therapies. In the radiation oncology clinic and outpatient department, patient care is facilitated by technological systems which represent a Europe-wide benchmark of excellence. Tumours are treated using ionising radiation. To apply the necessary dose directly to the tumour, its structure must first be accurately established via Computer Tomography (CT).

A look inside

Computer Tomography is an x-ray process used since 1974, where a specific area of the body is visualised layer by layer. CT technology has become an indispensable medical tool and is used on all areas of the body. A CT scan provides a three-dimensional density model of the patient for the oncology department's radiation treatment planning. A particular advantage of modern CT imaging is the high resolution that can be achieved in a short examination, even for large areas of the body. This is made possible by multi-slice technologies and rotation times of less than half a second. A rotating tube allows a single layer of the body to be recorded from a number of different angles. These CT datasets are used in radiotherapy for dose distribution calculations as well as in the digital reconstruction of virtual radiographs.

Because a CT scan can last for several breaths, depending on the resolution and area of the body examined, it is important when scanning the upper abdomen and lungs to record breathing-related movement. The same rules apply to the therapy session itself, which usually lasts several minutes.

During sessions in the hospital's radiation oncology clinic, the position of a sensor on the patient's chest is recorded by an infrared light source and a camera. The movements of this sensor – caused by the patient breathing – are fed into a computer to plot a time-resolved movement curve. From the two synchronised data streams, breath curve and CT scan, datasets can be created that reflect the respiratory movement of the internal organs and structures. The interference caused by respiratory movement can then be corrected with a high degree of precision. This technology makes it possible to eliminate the effects of motion in the region of the chest or stomach, for example, and to

UniversitätsSpital Zürich



**UniversitätsSpital
Zürich**

Key Facts

- With the BT-100 smart glasses, patients can see an image of their own breathing and are, therefore, in a position to easily monitor its depth, duration and regularity
- Thanks to the BT-100's semi-transparent display, patients do not feel cut-off from their surroundings
- Fastest possible processing and transmission of every image to the glasses with a delay not exceeding 0.2 seconds
- Battery-operated so fewer cables need to be introduced

“The Epson multimedia glasses have several advantages.... They take up very little space... and don't require any additional parts to be fitted to the therapy accelerator. Also wearing the glasses is much more comfortable for a patient....”

Dr Stephan Klöck

Leading medical physicist

increase the accuracy of the scan to within millimetres, even when the patient is breathing deeply, which can cause a shift of up to two centimetres.

“Even with our sophisticated systems we are still reliant on the assistance of the patient,” says Dr Stephan Klöck, the leading medical physicist in the hospital’s radiation oncology clinic and outpatient department. “Irregular breathing can have a negative impact on the accuracy of the scan. We therefore ask our patients to breathe smoothly and evenly because that’s the only way these movements can be accurately factored out of the CT scans.”

As the CT scans are used as reference data for radiotherapy treatment, it is extremely important to get as accurate an idea as possible of the position and extent of a tumour because only in this way can the tumour be targeted with precision and as much healthy tissue be protected as possible.

Observing breath patterns with Epson’s BT-100

With the BT-100 smart glasses, patients can see an image of their own breathing and are, therefore, in a position to easily monitor its depth, duration and regularity. The process of biofeedback was developed several years ago and implemented in various clinics around the world. In most cases, however, because of the lack of high-quality image projection technology, a small monitor was suspended in front of the patient’s eyes.

“The Epson multimedia glasses have several advantages over this monitor-based process,” explains Dr Klöck. “They take up very little space, compared to a monitor on a support arm and don’t require any additional parts to be fitted to the therapy accelerator. Also wearing the glasses is much more comfortable for a patient than looking at a monitor, because it means the patient can relax his or her eyes while looking at the image.”

An additional advantage of the glasses is that, thanks to their semi-transparent display, patients do not feel cut-off from their surroundings – in the unfamiliar situation of the CT scan they can see what is going on around them. One particular challenge was to ensure the fastest possible processing and transmission of data because every image transmitted to the glasses is the feedback for a respiratory movement, the delay must not exceed 0.2 seconds.

The fact that Epson’s Moverio is battery-operated also facilitates its use in the hospital because the fewer cables that need to be introduced into such a sensitive environment, the better. The next step will be to start using the acoustic components of the glasses, since: “an acoustic breath-feedback through earphones with an instantaneous breath curve in the field of vision are the best ways of helping patients assist us in the administration of their radiotherapy. And if the next version of Epson’s multimedia glasses has a fast WLAN connection, so that we don’t need to use a cable at all, it would be another big step towards providing optimal care for our patients,” concludes Dr Klöck.



Epson’s Moverio BT-100 multimedia glasses form part of the hospital’s core CT equipment



Dr Stephan Klöck, a leading medical physicist in the hospital's radiation oncology clinic and outpatient department, uses Epson’s BT-100 headset to help his patients



A patient wearing the BT-100 smart glasses, prior to a CT scan. The breath sensor (the small white box) is clearly visible on the patient’s chest



The position of the sensor can be clearly seen on the images (top left). Bottom left on the monitor: the breath curve of the patient, which is also projected in the glasses



A specially modified infrared light source connected to a camera scans the patient's chest

For more information
please visit:
www.epson.co.uk/moverio