

The driving force behind all our bodily functions is our ability to breathe. This supplies our bodies with oxygen – an element vital for our survival.

AIR

OUR LUNGS CONTRACT MORE THAN 20,000 TIMES A DAY. WE BREATHE ON AVERAGE 15 TIMES A MINUTE, TAKING IN AROUND HALF A LITER OF AIR EVERY TIME. WE CAN GO FOR UP TO THREE WEEKS WITHOUT FOOD, THREE DAYS WITHOUT WATER, BUT ONLY THREE MINUTES WITHOUT AIR. IT IS VITAL THAT THE AIR WE BREATHE IS EVENLY DISTRIBUTED, ALLOWING US TO GAIN SUFFICIENT OXYGEN AND AVOID ANY DAMAGE TO OUR LUNGS.

BREATHING is one of our vital functions, along with the pulse, blood pressure and body temperature. Healthy, normal breathing is regular and even, quiet and odorless.

THE INTERIOR OF THE LUNGS contains a vacuum. If the lungs expand, they automatically suck in the surrounding air.

THE MOST IMPORTANT TASK that our breathing fulfills is supplying our body with enough oxygen. In addition to that, lungs extract oxygen and feed it into the blood for distribution to our tissue and cells.





16 electrodes

DRÄGER'S EIT DEVICE CAN BECOME THE DRIVING FORCE BEHIND FUTURE APPROACHES TO VENTILATION THERAPY. THIS TECHNOLOGY IS BASED ON THE ELECTRICAL IMPEDANCE TOMOGRAPHY (EIT) PROCESS AND IS GOING TO BE LAUNCHED IN THE MARKET IN 2010. THE DEVICE MAKES IT POSSIBLE TO LITERALLY LOOK INTO THE LUNGS DURING MECHANICAL VENTILATION. THE DEVICE'S SCREEN PROVIDES A CONTINUOUS, REAL-TIME VIEW OF HOW AIR IS BEING DISTRIBUTED IN THE LUNGS. THIS ALLOWS DOCTORS TO IMMEDIATELY ASSESS WHAT EFFECT CHANGES IN VENTILATION SETTINGS HAVE ON A PATIENT'S LUNGS.

DRÄGER'S EIT DEVICE ALLOWS US TO SEE HOW PEOPLE BREATHE. THIS OPENS UP COMPLETELY NEW WAYS FOR DOCTORS AND CARE PERSONNEL TO TAILOR VENTILATION THERAPY TO THE PERSONAL NEEDS OF INDIVIDUAL PATIENTS.

THE EIT DEVICE from Dräger is completely non-invasive. It is connected to the patient's upper body via 16 electrodes.

THE DEVICE sends tiny electrical currents into the body in order to gain an image of the lungs in action.

THE IMAGE ON THE MONITOR uses a color meter to show the distribution of air in the lungs.

A WINDOW INTO THE LUNGS



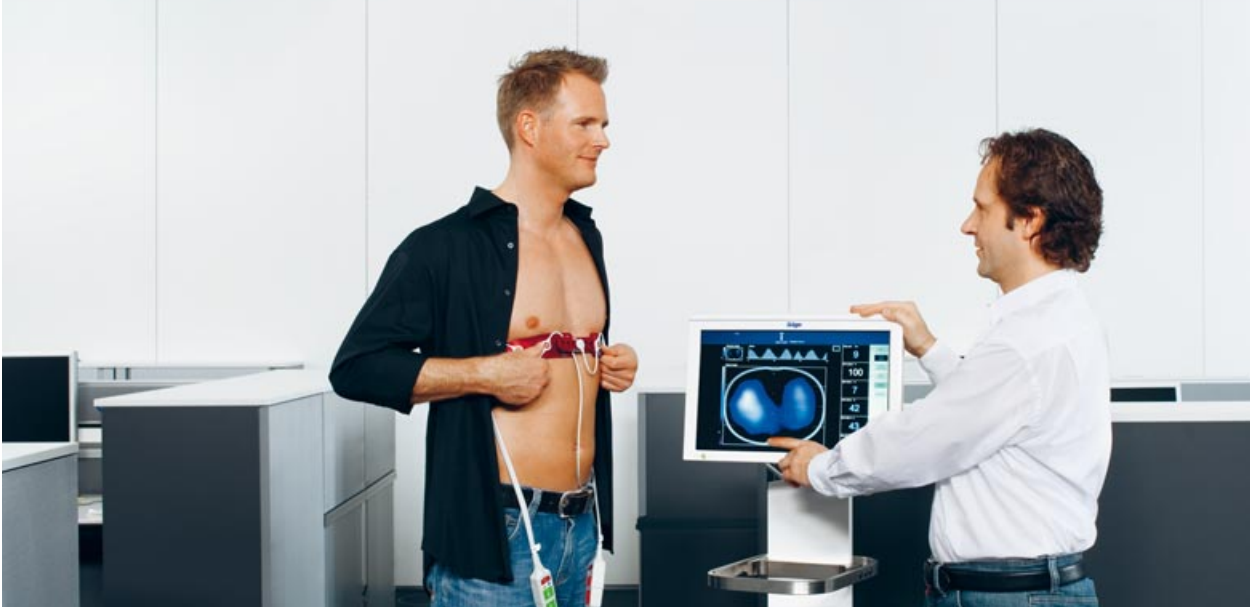
01 A graphical image shows how air is distributed around the lungs.

02 The specially developed belt contains all 16 electrodes and is easy to attach.

Breathe in, breathe out. Something that most of us perhaps take for granted is in fact a highly complex and sensitive process for our bodies: Breathing. Ventilators mimic this process and support the lungs when they are unable to breathe for themselves. However, it is vital that ventilators employ the right settings in this process. That's because during normal breathing, a vacuum exists in the lungs – a mechanism which allows air to be sucked in automatically. In the case of mechanical ventilation, air is pressed into the lungs. If this pressure is too high or too low, this can damage the organ and impact the body's oxygen supply. Dräger is going to launch a device in 2010 which offers medical professionals the chance to view how the lungs are working during breathing. "Our product supports doctors in finding the best possible ventilator settings for every individual patient. That encourages recovery and helps avoid any possible damage," explains Thomas Gallus. He works as a project manager for Dräger in R&D. He has headed the development team responsible for realizing the EIT device since 2003 and also oversees a cross-functional team dedicated to preparing the product launch.

NON-INTRUSIVE ANALYSIS

EIT stands for electrical impedance tomography (EIT) – a technology that has existed since the 1980s. Dräger is now adapting this technology into a clinically applicable product for intensive care units. But how does this technology work? EIT makes use of the fact that the electrical resistance in the body changes with the air content in the chest. This resistance is measured by attaching 16 electrodes around the patient's upper body. One electrode pair feeds a weak electrical current into the body. The resulting voltages are then measured by the other electrodes, allowing the electrical resistance to be calculated. The EIT device then transforms the data collected into an image and shows in real time how air is being distributed in the chest. The process is very gentle: It is non-invasive, which means that all of the device equipment remains external to the body. On top of that, in contrast to methods based on X-rays, EIT is harmless as weak electrical currents do not cause any damage. Another advantage of the approach is that doctors can use EIT directly at the patients' bedsides. This avoids moving patients and causing any extra unnecessary stress.



INTUITIVE CONTROLS

But there is more to a finished product than just the technology. It's also about how easy it is to use. The developers at Dräger believe this is the key to success. "Doctors don't have much time to get to know the product. That's why we have to make the device as easy to use as possible without the customer having to know all the sophisticated technical details," comments Gallus. In an effort to deliver on these aims, designers based the EIT device on modules from the existing "Infinity Acute Care System". This has the advantage that customers may already know the display and control unit from other Dräger products. Thomas Gallus explains: "If you are able to operate our ventilators, you will intuitively understand how to use the EIT device. That reduces peoples' reservations in learning how to use new products." One particularly practical feature is the electrode belt, which Dräger designed specifically for use with this EIT device. All 16 electrodes are located on this belt. It can be easily tied around the chest and only requires two plugs. Attaching each electrode indi-

vidually would require a lot of time and would involve a real tangle of cables. Instead, the electrode belt makes using the EIT device quick and convenient. The development team at Dräger is proud of its product. Thomas Gallus learnt one thing in particular from the project: "R&D can only be successful if you recognize opportunities ahead of time and believe in your visions for the future. You have to persevere to achieve your goals – even if it takes years. That requires an incredible amount of determination and patience. And that's what sets Dräger apart." All the persistence has paid off. It has opened something that doctors have never had access to before: A window into the lungs.

Find out more → www.draeger.com/ar09