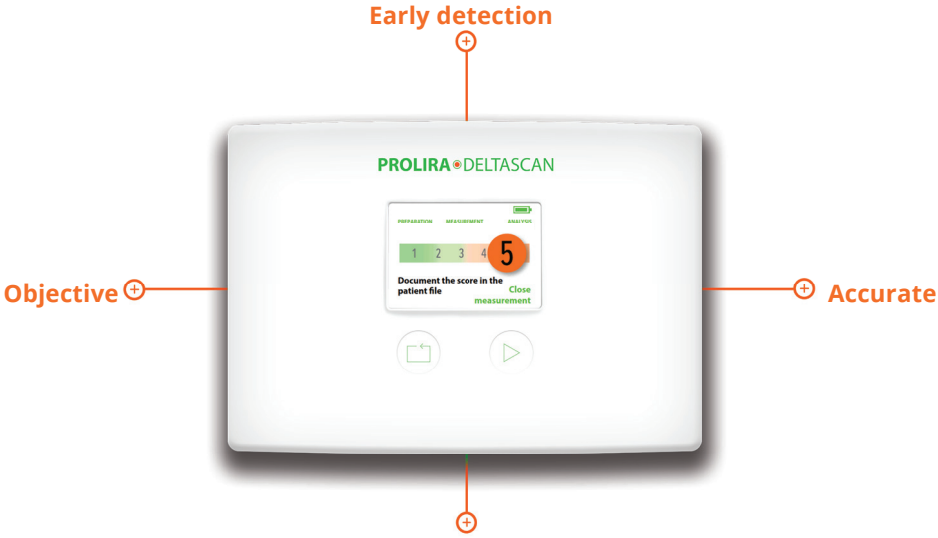
PROLIRA DELTASCAN

revolutionizing detection & monitoring for delirium



**The longer a delirium lasts,
the worse the outcome for the patient.**

**Rapid diagnosis and timely treatment
are important.**

WHAT IS DELIRIUM AND WHY IS OBJECTIVE DETECTION & MONITORING ESSENTIAL?

75% of delirious patients have a hypoactive or silent delirium.

This group of patients is not detected by the current screening instruments[1].

Delirium (also called acute confusion or acute brain failure) is a complication that occurs in 19%-82% of patients in the intensive care unit, depending on the population[1,2]. This confusion develops over a short period of time (usually within several hours or days), can fluctuate in severity during the course of the day and always has an underlying physical cause[2]. Delirium can cause a lot of suffering and increases the risk of a poor outcome for the patient. This is particularly the case for people suffering from a hypoactive (or "silent") delirium, because this subtype of delirium is diagnosed less frequently. Delirium is stressful and can cause terrifying thoughts or hallucinations, for example a person can feel that he is being held captive or may see things that are not really there. It can also cause stress and fear in family members and carers.
Patients suffering from delirium have a higher risk of a longer spell in hospital, higher mortality, a higher risk of cognitive damage during and after hospitalisation and higher healthcare costs[4]. The current screening instruments, such as the CAM-ICU, are subjective and appear to be inadequate in daily practice.
Only 12% to 35% of the delirious patients are detected[1].

WHAT ARE THE PROVEN EFFECTS OF DELIRIUM IN THE INTENSIVE CARE UNIT?

Intensive care experts and guidelines worldwide state that detection and monitoring of delirium in the intensive care unit is essential:

- it enables the healthcare professional to detect any secondary deterioration in a patient quickly. If a patient suddenly develops a new delirium, then there is an underlying reason for this, which requires rapid intervention.
- delirium is a type of organ failure: just like all other vital signs, the brain also requires monitoring.
- delirium can be a cause of delayed recovery during admission to the intensive care unit, for example when the patient does not understand instructions properly or cannot follow instructions.

The effects of delirium in the intensive care unit are significant. Recent research has demonstrated the following:

- failure to detect a delirium and consequently being delirious for a longer period, is associated with worse outcomes for the patient[1,2,5].
- delirium can be a warning sign for the development of sepsis[6,7].
- deceleration on the EEG (Delta waves) is associated with worse outcomes for the patient[8].

Suffering from delirium in the intensive care unit is associated with:

- a high risk of cognitive problems one year after hospitalisation, similar to the cognition of patients with mild traumatic brain injury (34%) or mild Alzheimer's disease (24%)[9].
- a 2-fold to 4-fold higher risk of death during and after hospitalisation[2].
- a doubling of the time spent in hospital[10].
- a deterioration in daily functioning[2]. In particular, elderly and vulnerable patients who were able to function independently before hospitalisation in the intensive care unit have a high risk of admission to a nursing home following a delirium. Younger patients are often unable to return to the work they performed prior to their admission to the intensive care unit.

EEG: A PROVEN BIOMARKER FOR DELIRIUM

We have developed Prolira-DeltaScan to detect delirium more frequently and at an earlier stage. DeltaScan is an objective medical instrument based on a single-channel EEG signal (Electro-encephalography). EEG is a proven biomarker for delirium[11]. EEG is increasingly cited as a reliable tool for delirium detection[12].

The result of the DeltaScan is a parameter for delirium. A DeltaScan Patch is applied to the patient's head to perform the measurement and removed again after the measurement. The result is visible immediately after the measurement, which takes a few minutes and is presented on a scale of 1 to 5, with 1 being "very unlikely" and 5 being "very likely" delirium. This allows for improved (>90% accuracy) and earlier (average 1-1.5 days) detection of delirium in comparison to the current practice in which questionnaires are used[13].

The single-channel EEG, produced using the DeltaScan, shows a clear difference between a delirious and non-delirious patients[11]. Delirium is characterised by strong and strongly decelerated waves in an EEG[8,11,14]. These waves are called polymorphic Delta waves (see Figure 1). These waves are not present if there is no delirium (see Figure 2).

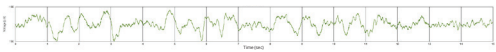


Figure 1: Not healthy / Delirium *EEG produced using DeltaScan*

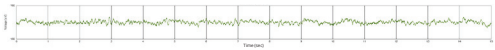


Figure 2: Healthy / No delirium *EEG produced using DeltaScan*

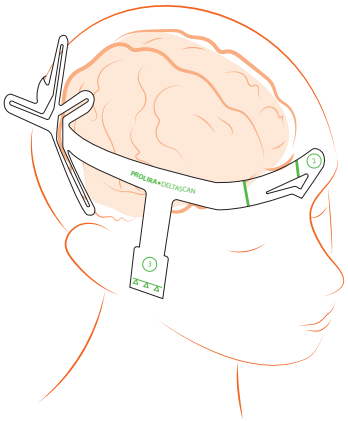
Publications

Previous studies reveal that implementation of a complete delirium prevention and treatment programme not only results in a shorter duration of a delirium, but also results in a shorter duration of mechanical ventilation by up to three days, lower use of sedative medication and earlier mobilisation of the patient.

Improved Guideline Adherence and Reduced Brain Dysfunction After a Multicenter Multifaceted Implementation of ICU Delirium Guidelines in 3,930 Patients
Trogrlic et al.,
Critical Care Medicine,
2019, 47(3): 419-27

Effectiveness and Safety of the Awakening and Breathing Coordination, Delirium Monitoring/ Management, and Early Exercise/Mobility Bundle
Balas et al.,
Critical Care Medicine,
2014, 42(5):1024-36

Caring for Critically Ill Patients With the ABCDEF Bundle: Results of the ICU Liberation Collaborative in Over 15,000 Adults
Pun et al.,
Critical Care Medicine,
2019, 47(1): 3-14



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