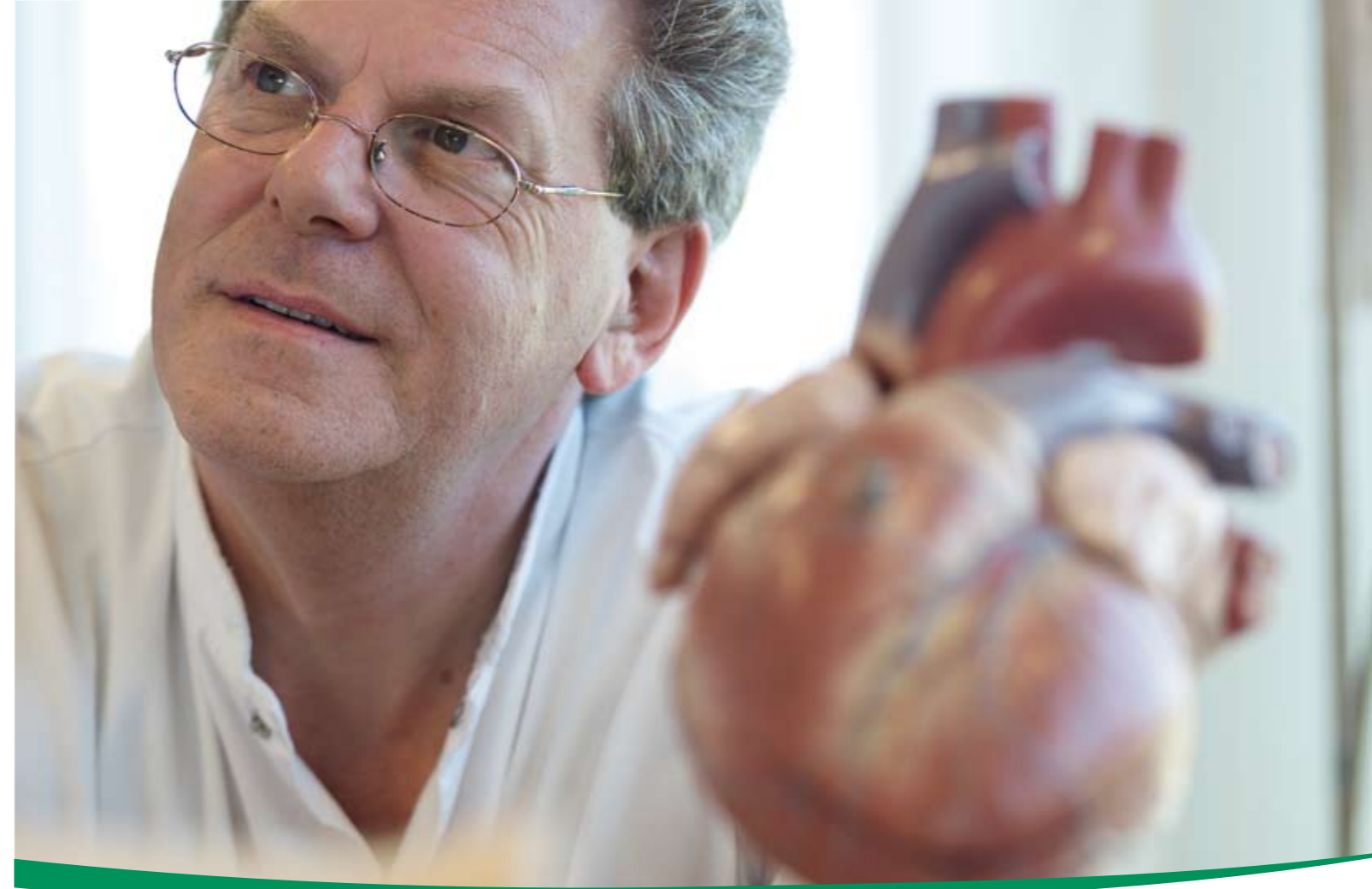


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### The challenge of differential diagnosis

Emergency departments (EDs) handle large numbers of unplanned presentations with patients often presenting with nonspecific symptoms like

- Dyspnea
- Tachypnea
- Chest pain

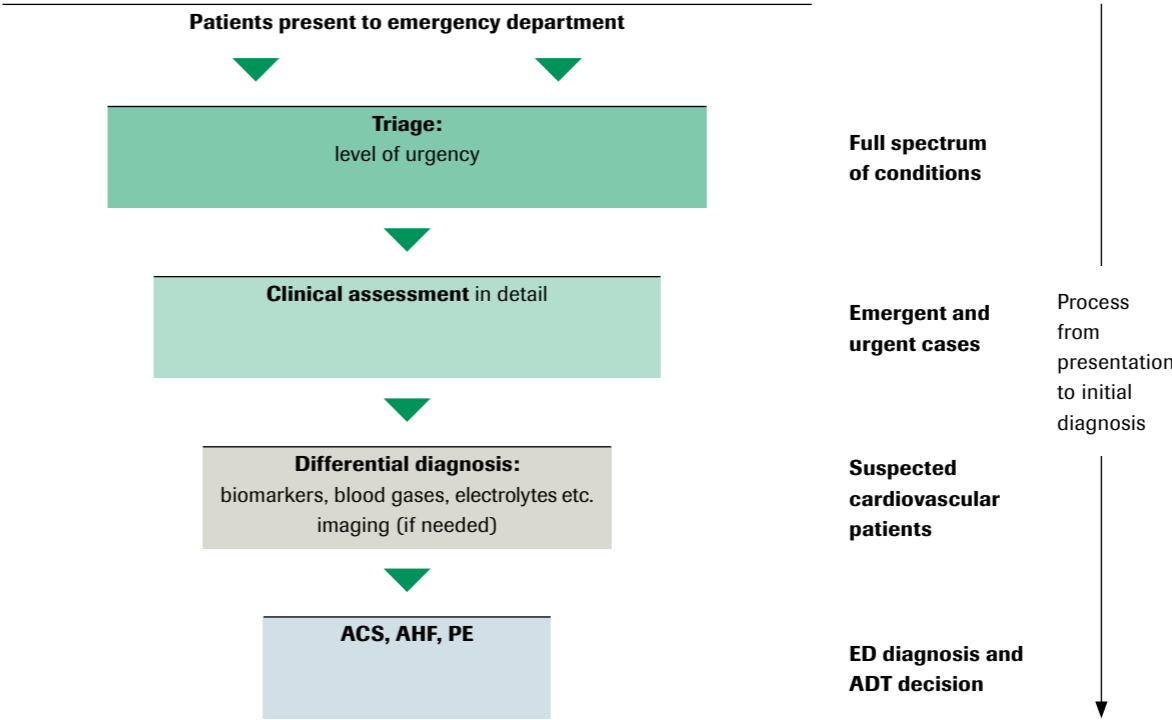
By narrowing down possible causes, physicians need to decide whether to admit, discharge or transfer a patient (ADT decision).

As a key step in the process, differential diagnosis relying on biomarker testing and other tools serves to exclude or rule-in critical conditions such as acute coronary syndrome (ACS), acute heart failure (AHF) and pulmonary embolism (PE) which share similar symptoms.

Because of the time-critical nature of these conditions and the need to efficiently handle patient flows, bedside testing using portable point-of-care devices can add significant benefits to clinical management.

*What the NACB Guidelines say:  
“The laboratory should perform cardiac marker testing with a turnaround time of 1 hour, optimally 30 minutes, or less.”<sup>1</sup>*

Differential diagnosis is essential for initial ED diagnosis in patients with suspected cardiovascular diseases.



# Roche CARDIAC D-Dimer

High sensitive assay to help rule-out Venous Thromboembolism available in 8 minutes



## Pulmonary embolism – an unsuspected killer<sup>2</sup>

PE ranks among the most common causes of unexpected hospital deaths – up to 70% of fatal PE cases were not suspected ante mortem.<sup>2</sup>

Conversely, of all the cases classified as PE, the condition was actually present in only 25 to 35%.<sup>3,4</sup>

## D-dimer and clinical probability

Because detecting PE in a CT scan is cost intensive, complex and exposes patients to radiation, the diagnostic process should begin with an estimation of the “clinical probability” of PE. Suitable aids are explicit scores as proposed by Wells<sup>5</sup> and others<sup>6</sup>. A low to moderate-probability risk for PE alongside a negative D-dimer has been shown to have a 100% negative predictive value. Equally, a 100% NPV was demonstrated with a negative D-dimer result alongside a Wells score indicating DVT was unlikely.<sup>7</sup> In these cases no additional ultrasound is needed<sup>5</sup>, resulting in a reduction of CT scans by 30%.<sup>8</sup>

*What the ESC Guidelines say:  
“D-dimer measurement combined with clinical probability assessment is the logical first step in patients admitted to the emergency department.”<sup>9</sup>*

## Is testing time-critical?

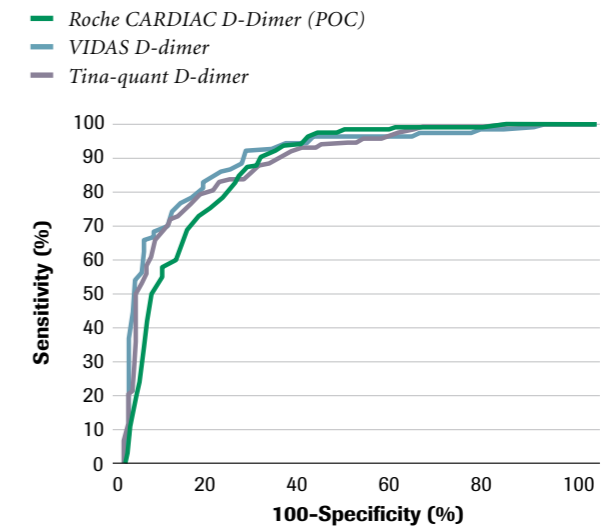
- 90% of all PE-related deaths occur within 1 to 2 hours of symptom onset.<sup>10,11</sup>
- Appropriate anticoagulation showed a 70% to 92% relative reduction in mortality linked to massive PE.<sup>12,13,14</sup>

## The benefits of point-of-care testing – redirecting resources to high risk patients

A protocol using a point-of-care D-dimer test safely ruled out pulmonary embolism and

- Allowed more patients to be assessed without requiring additional imaging resources.<sup>15</sup>
- The increased workflow efficiency resulted in shorter emergency department stays.

## Clinically proven performance<sup>16</sup>



*In clinical use for diagnosis of individuals suspected of having deep vein thrombosis, the Roche CARDIAC D-Dimer assay matches the diagnostic performance of the high sensitive D-dimer assays Tina-quant and Vidas as shown in receiver-operator characteristics (ROC) curves. Area under the curves: Roche CARDIAC D-Dimer (POC) = 0.88 (95% CI = 0.85-0.91), Tina-quant D-Dimer (lab) = 0.91 (95% Confidence interval 0.88-0.93), Vidas D-Dimer (lab) = 0.90 (95% CI = 0.86-0.92). POC = point of care. CI = confidence interval.*

# Roche CARDIAC NT-proBNP

Helping to improve “door to diuretic” time



## Acute heart failure – a diagnostic challenge

Acute heart failure is a complex syndrome and often difficult to identify: in a study with elderly (>65 years) patients with acute respiratory failure, 20% had a missed diagnosis in the ED and inappropriate initial treatment occurred in one-third of cases.<sup>17</sup> Inappropriate treatment for acute heart failure can, in some cases, triple mortality rates.<sup>18</sup>

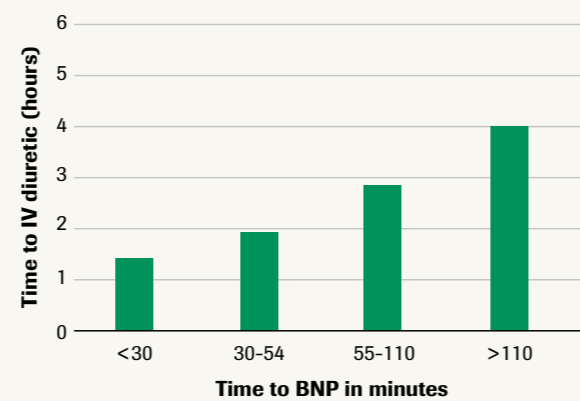
For this reason, the ESC guidelines recommend an extensive diagnostic work-up including blood gas analysis and specific biomarkers.<sup>19</sup> Among these, NT-proBNP can, due to its high negative predictive value, help to safely rule out acute heart failure.<sup>20,21</sup> Equally, NT-proBNP can improve the diagnostic accuracy of AHF and rule out pulmonary causes when added to standard clinical judgment.<sup>22</sup>

## Is testing time-critical?

Delayed measurement of natriuretic peptides levels and delay in treatment for acute decompensated HF has been shown to be strongly associated with increased in-hospital mortality.<sup>23,24</sup> Conversely, starting AHF therapy 30 minutes earlier was shown to significantly reduce mortality.<sup>18</sup>

## The benefits of point-of-care testing – improving «door to diuretic» time

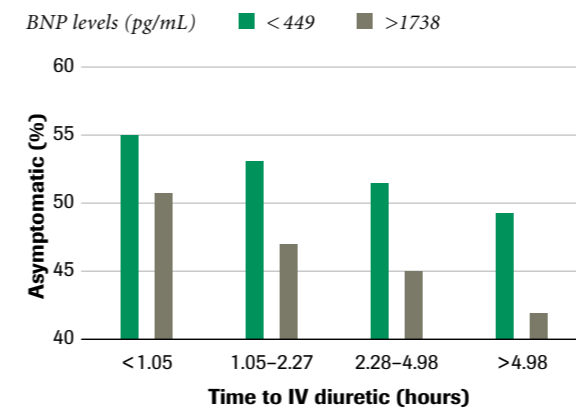
The availability of the natriuretic peptide result was shown to be linked to the time to diuretic treatment.<sup>24</sup>



Time to natriuretic peptide result versus time to treatment. The relationship between median time to natriuretic peptide level drawn by quartiles and median time to initial intravenous diuretic treatment is shown. IV = intravenous.

What the ESC Guidelines say: “NT-proBNP is useful for diagnosing and staging heart failure, as well as making hospitalization/discharge decisions and identifying patients at risk for clinical events.”<sup>19</sup>

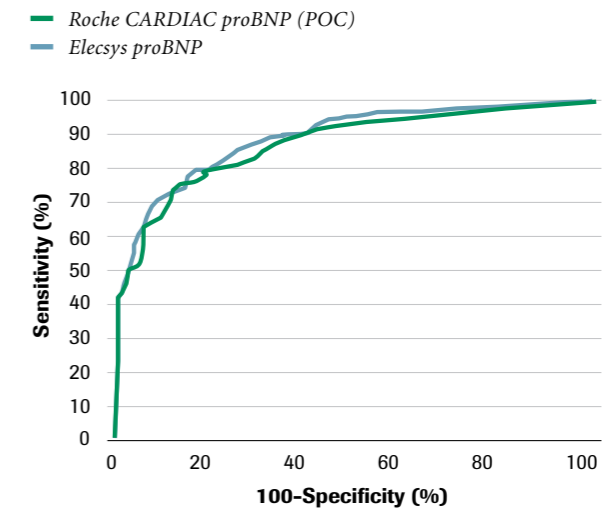
The shorter the time to treatment, the more patients were released without symptoms.<sup>24</sup>



An NT-proBNP guided strategy reduces the time spent in the ED and results in fewer rehospitalizations by day 60.<sup>25</sup> Another study revealed that NT-proBNP testing also reduces the time from ED admission to hospital discharge by half.<sup>26</sup>

The influence of time to initial treatment on the percentage of patients who are asymptomatic at hospital discharge is shown with time to initial diuretic treatment. BNP = B-type natriuretic peptide; IV = intravenous.

## Clinically proven performance<sup>27</sup>



In clinical use for diagnosis of individuals suspected of having heart failure, Roche CARDIAC proBNP matches the diagnostic performance of the Elecsys proBNP assay as shown in receiver-operator characteristics (ROC) curves. Area under the curves: Roche CARDIAC proBNP (POC) = 0.88 (95% CI = 0.85-0.92), Elecsys proBNP (lab) = 0.89 (95% CI = 0.86-0.92). POC = point of care, CI = confidence interval.