

# CT-Perfusion + RAPID<sup>©</sup> software analysis of acute LVO stroke in a patient on VA-ECMO

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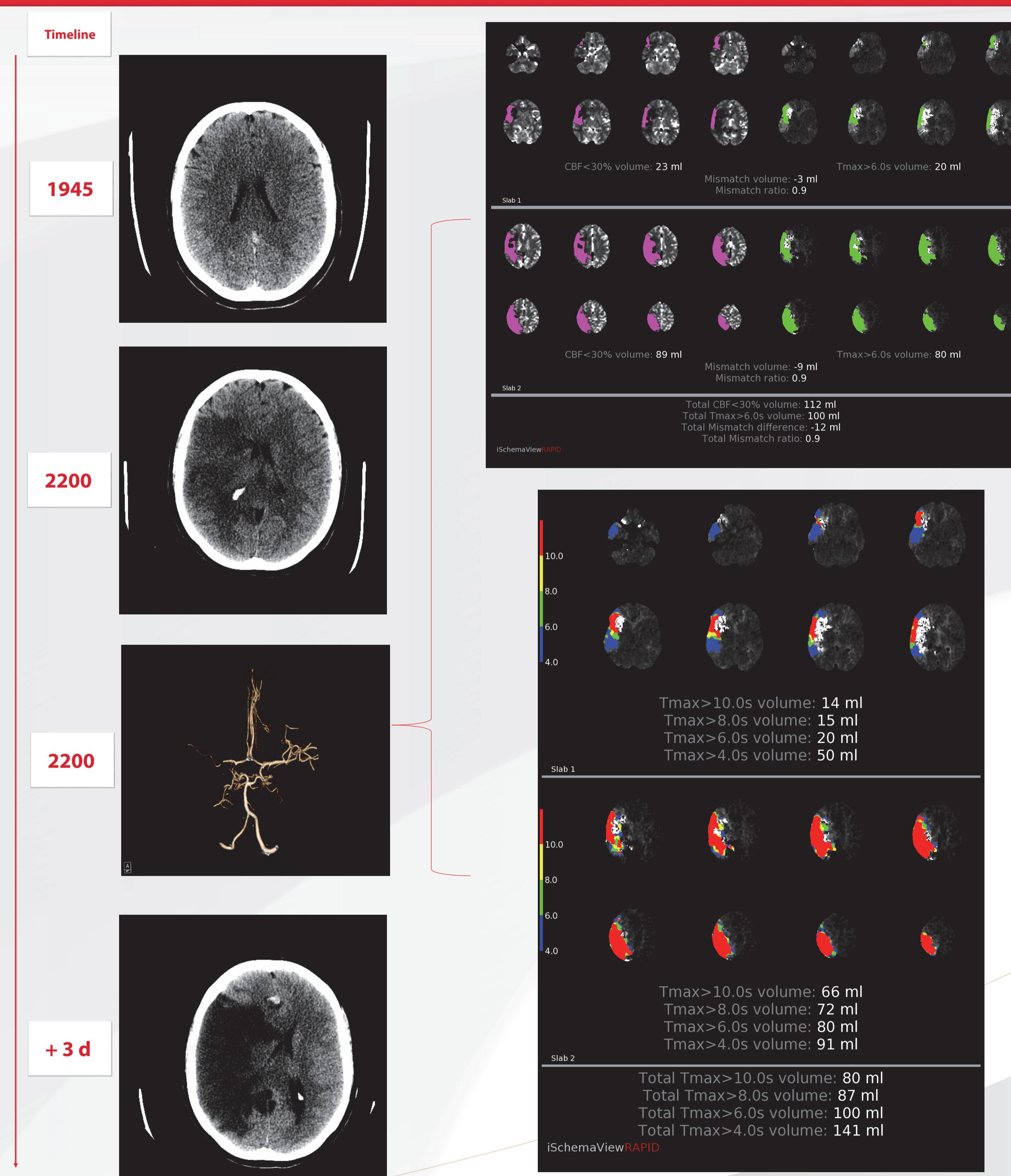
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### Introduction

CT-Perfusion (CTP) with RAPID<sup>©</sup> (CTP+RAPID) analysis has been successfully used in recent clinical trials to identify salvageable penumbra in acute stroke patients. We present a likely first-in-human experience with CTP+RAPID in a patient on venoarterial extracorporeal membrane oxygenation (VA-ECMO) with an acute stroke.

### Methods

A 30-year old female with remote Tetrology of Fallot repair suffered a witnessed VFib arrest. After 15-min without bystander CPR, return of spontaneous circulation (ROSC) was achieved by EMS. Post-ROSC echocardiogram showed an ejection fraction of 5% and diffuse biventricular hypokinesis. Patient underwent emergent cannulation for bi-femoral VA-ECMO, achieving circuit flows  $\geq 4$  L/m with a nearly non-pulsatile blood pressure (74/64 [MAP 67] mmHg) via arterial catheter. On ECMO day 2, she was found to have left hemiparesis with early ischemic changes in the right MCA territory on non-contrast CT (NCCT) head (ASPECTS 7). When the stroke team was consulted, CT-angiography was done and demonstrated a right M1 occlusion at which time CTP+RAPID was performed.



### Results

CTP+RAPID demonstrated a core infarct volume of 112 cc and penumbra of 100 cc by standard RAPID thresholds (cerebral blood flow <30% and  $T_{max} > 6$ s respectively) and a mismatch ratio of 0.9. These volumes did not differ significantly when using other RAPID thresholds despite continuous mechanical flow. The left hemisphere, despite likely having slow perfusion, was not counted as penumbra with adjusted  $T_{max}$  of <4s and mean transit time of 10s. The CTP time-density curves showed low arterial and venous peaks without truncation. Although the CTP+RAPID was diagnostic, there was underestimation of the ischemic core as the NCCT showed a larger area of ischemia.

### Conclusions

To our knowledge, this is a first-in-human experience with CTP+RAPID in a patient on VA-ECMO. Clear CTP+RAPID thresholds have yet to be defined in this group. Nonetheless, this technique holds promise and may be included in the diagnostic evaluation of continuous flow, non-pulsatile mechanical circulatory support patients in the setting of acute large vessel ischemic stroke.<sup>1</sup>

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