

## MRI of carotid atherosclerosis to identify TIA and stroke patients who are at risk of a recurrence

Robert Kwee<sup>1</sup>, Robert van Oostenbrugge<sup>2</sup>, Werner Mess<sup>2</sup>, Rob van der Geest<sup>3</sup>, Jos van Engelshoven<sup>2</sup>, Joachim Wildberger<sup>2</sup>, and Eline Kooi<sup>2</sup>

<sup>1</sup>Maastricht University Medical Center, Maastricht, Limburg, Netherlands, <sup>2</sup>Maastricht University Medical Center, Netherlands, <sup>3</sup>Leiden University Medical Center, Netherlands

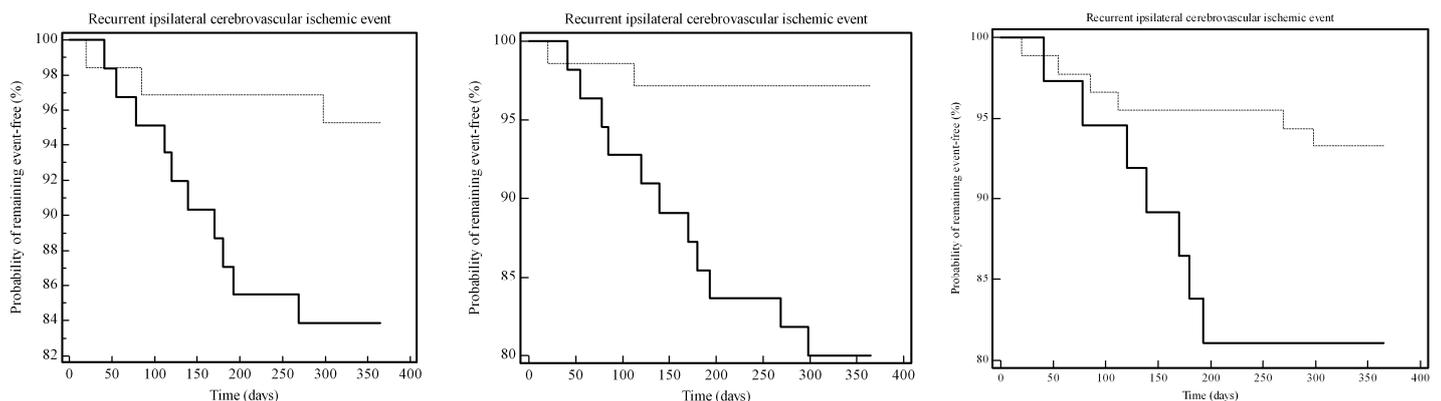
**Purpose.** Assessment of carotid plaque characteristics by MRI holds great promise to improve risk stratification for patients with carotid atherosclerosis.<sup>1-3</sup> In the present study, we report the results of our longitudinal MR carotid plaque imaging study.

**Materials and Methods.** One hundred and twenty-six TIA/stroke patients with ipsilateral 30-69% carotid stenosis underwent multisequence MRI, including contrast-enhanced images, of the carotid plaque within 31.5±18.8 days after the initial event. The protocol for carotid plaque MRI consisted of T1-weighted turbo field-echo (TFE), time-of-flight (TOF), T2-weighted turbo spin-echo (TSE), and pre- and post-gadopentetate dimeglumine-enhanced T1-weighted Double Inversion Recovery TSE images, performed at 1.5 T.<sup>4</sup> For each plaque, the presence of a lipid-rich necrotic core (LRNC), fibrous cap (FC) status, and the presence of intraplaque hemorrhage (IPH) (all are histopathologic features of plaque vulnerability) were assessed. Patients were followed by structured interviews and chart review to determine the recurrence of ipsilateral TIA and/or stroke within one year after inclusion.

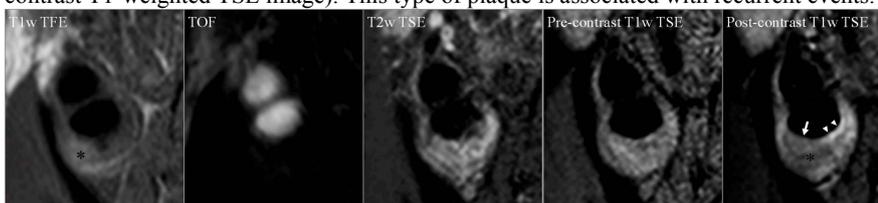
**Results.** Thirteen of hundred included patients suffered from recurrent ipsilateral clinical ischemic events (10 TIAs and 3 strokes) within one year. Carotid stenosis grade was not associated with recurrent events (HR for 50-69% vs. 30-49% stenosis=1.198; 95% CI 0.383 to 3.749,  $P=0.756$ ). The presence of a LRNC (hazard ratio [HR]=3.2001; 95% CI 1.078 to 9.504,  $P=0.036$ ), the presence of a thin and/or ruptured FC (HR=5.756; 95% CI 1.913 to 17.3238,  $P=0.002$ ), and the presence of IPH (HR=3.542; 95% CI 1.058 to 11.856,  $P=0.040$ ) were associated with recurrence.

**Conclusion.** The results of this study indicate that the presence of MRI-depicted LRNC, a thin and/or ruptured FC, and IPH (Figure 4) are associated with the recurrence of clinical cerebrovascular ischemic events in TIA and stroke patients with carotid atherosclerosis.

**Figures 1-3.** Kaplan-Meier curves showing the probability of remaining event-free for patients with (continuous line) vs. patients without (dashed line) a LRNC, for patients with a thin and/or ruptured FC (continuous line) vs. patients with a thick and intact FC (dashed line), and for patients with (continuous line) vs. patients without (dashed line) IPH, respectively.



**Figure 4.** Co-registered T1-weighted TFE, TOF, T2-weighted TSE, pre- and post-contrast T1-weighted TSE images of a transverse section of a plaque in the internal carotid artery. A LRNC (asterisk in post-contrast T1w TSE image) with IPH (asterisk in T1-weighted TFE image) are present. The FC (arrowheads) is thin and/or ruptured (arrow in post-contrast T1-weighted TSE image). This type of plaque is associated with recurrent events.



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### References

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