**P420**

**Evaluating the sensitivity of subtraction imaging for the detection of new T2 multiple sclerosis lesions when using visual analysis, semiautomatic and automatic approaches**

M. Cabezas[1], J.F. Corral[1], A. Oliver[2], X. Lladó[2], C. Auger[1], J. Sastre-Garriga[1], M. Tintoré[1], D. Pareto[1], X. Montalban[1], A. Rovira[1]

*[1]Section of Neuroradiology and MR Unit (Department of Radiology), Vall d'Hebron University Hospital, Barcelona, [2]VICOROB Group, Department of Computer Architecture and Technology, University of Girona, Girona, Spain*

**Background:** Lesion volume change assessment is crucial in monitoring multiple sclerosis (MS) progression. Subtraction imaging, which cancels stable disease, provides enhanced sensitivity to characterize lesions by separately identifying new, enlarging, and resolving MS lesions.

**Aim:** To evaluate the effect of employing subtraction imaging for the detection of new T2 lesions, using both semiautomatic and fully automatic approaches. We aim to demonstrate a higher sensitivity of subtraction imaging compared to visual analysis of the original images.

**Methods:** This study included 40 consecutive patients with a clinically isolated syndrome scanned with a 3T magnet at two different time points: the first within 3 months and the second 12 months after the onset of symptoms. Each scan included transverse T2-FLAIR, PD, T2 and T1 images. We evaluated and compared three different procedures to detect new T2 lesions:

1) expert visual analysis with semiautomatic segmentation to delineate lesions,
2) expert visual analysis with semiautomatic segmentation after applying subtraction and co-registration; and
3) fully automated segmentation based on deformable registration and subtraction imaging.

To assess the improvement of subtraction imaging, we compared approaches 2 and 3 with traditional visual analysis. Moreover, we also compared the results from both subtraction approaches.

**Results:** Using visual analysis on original images, 32 new lesions were found. Instead, 60 lesions were detected when employing subtraction imaging either with semiautomatic or automatic tools. Few lesions were missed when using subtraction imaging (7 and 4 for approaches 2 and 3). There was also a higher number of true detections when comparing both subtraction approaches (36 new lesions between approaches 2 and 3 against 26, and 29 when comparing both to visual analysis), a lower number of false detections (25 between approaches 2 and 3 against 34 when comparing both to visual analysis) and a highest overlap in terms of the Dice similarity coefficient (a value of 0.59 against 0.50, and 0.53 when compared to visual analysis), suggesting a higher correlation between subtraction imaging approaches. All three procedures completely agreed on 24 cases (2 of them presenting new T2 lesions).

**Conclusion:** The use of subtraction imaging increases MS lesion sensitivity detection by enhancing the contrast of new lesions when compared to stable disease. Moreover, it helps to better determine lesion growth.

## Disclosure

Mariano Cabezas has nothing to disclose.
Juan F. Corral has nothing to disclose.
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Cristina Auger has received speaking honoraria from Novartis and Genzyme.
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Xavier Montalban has received speaking honoraria and travel expenses for scientific meetings, has been a steering committee member of clinical trials or participated in advisory boards of clinical trials in the past with Bayer Schering Pharma, Biogen Idec, EMD Merck Serono, Genentech, Genzyme, Novartis, Sanofi-Aventis, Teva Pharmaceuticals and Almirall.
Alex Rovira serves on scientific advisory boards for Biogen Idec, Novartis, Genzyme, and OLEA Medical, and has received speaker honoraria from Bayer, Genzyme, Sanofi-Aventis, Bracco, Merck-Serono, Teva Pharmaceutical Industries Ltd, OLEA Medical, Stendhal, Novartis and Biogen Idec.