

**Background:** Anti-LINGO-1 is a monoclonal antibody antagonist of LINGO-1, an oligodendrocyte differentiation and myelination suppressor.

**Objective:** To determine the efficacy/safety of anti-LINGO-1 for CNS remyelination.

**Methods:** Subjects with a first unilateral acute optic neuritis episode were treated with high-dose steroids and randomized to 100mg/kg anti-LINGO-1 IV or placebo every 4 weeks (NCT01721161). Subject and IRB approval were obtained. Nerve conduction latency recovery using full-field visual evoked potential (FF-VEP) in the affected eye over time versus unaffected eye at baseline assessed remyelination (pre-specified primary endpoint). Between-treatment comparisons were evaluated by ANCOVA and mixed-effect model repeated measure (MMRM) in subjects who completed the study and did not miss >1 study dose or receive MS modifying therapy (pre-specified per-protocol population). Safety/tolerability was evaluated in those who received  $\geq 1$  study dose and included adverse event (AE) and clinical laboratory result assessments.

**Results:** Anti-LINGO-1-treated subjects ( $n = 33$ ) showed improved latency recovery versus placebo ( $n = 36$ ): mean (95% confidence interval)  $-7.55\text{ms}$  ( $-15.12$  to  $0.01$ ) at Week 24 ( $P = 0.05$ );  $-9.13\text{ms}$  ( $-16.11$  to  $-2.14$ ;  $P = 0.01$ ) at Week 32. 54% of anti-LINGO-1 subjects had no/mild latency delay at Week 24 (affected eye FF-VEP latency  $\leq 10\%$  worse than baseline fellow eye) versus 27% of the placebo group ( $P = 0.036$ ). Additional subgroup analyses will be presented. 34/41 in each group experienced any AE, serious AEs occurred in 2 placebo and 5 anti-LINGO-1 subjects, and there were 3 treatment-related serious AEs.

**Conclusions:** Improvement in FF-VEP latency is consistent with the first evidence of remyelination in a Phase 2 trial. Anti-LINGO-1 was generally well tolerated.

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#### WFN15-1015

##### Demyelinating Disorders 1

##### Granulocyte-macrophage colony-stimulating factor: Increased expression by immune cells of patients with multiple sclerosis

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**Background:** Recent evidence suggests that GM-CSF Granulocyte-Macrophage Colony-Stimulating Factor (GM-CSF), a proinflammatory cytokine with multiple roles in the immune system, has a role in MS pathogenesis. In the experimental model of MS, experimental autoimmune encephalomyelitis, expression of GM-CSF by T cells is essential for disease induction. Our aim was to evaluate the expression of GM-CSF by different peripheral blood mononuclear cells (PBMC) subtypes in MS patients and controls.

**Materials and methods:** PBMCS were isolated 21 MS and 14 control subjects and stimulated. NK cells were isolated and cultured with different stimuli for 3 days. Cells were phenotyped using flow cytometry.

**Results:** There was higher GM-CSF expression in Phorbol Myristate Acetate/Ionomycin (PMA/I)-stimulated monocyte-gated PBMCS, and natural killer T (NKT) cells in MS patients compared to healthy controls. Th17, NK, and cytotoxic T-gated cells expressed similar GM-CSF levels in MS and controls. In MS, 40–45% of gated CD4+ and CD8 cells expressing GM-CSF; 10–20% of these are also IFN- $\gamma$ +. About 50% of NKT cells are GM-CSF+, and 45% of these were IFN- $\gamma$ +. In controls, these proportions were lower. Isolated NK cells stimulated with IL-15+IL-18, and IL-15+IL-1 $\beta$  were noticed to have more GM-CSF expression than the unstimulated and mono-stimulated CD56+ NK cells (MS  $n = 6$ , controls  $n = 6$ ).

**Conclusion:** T cells (both CD4+ and CD8+), NK, and NKT cells are all high GM-CSF producers in MS. GM-CSF is a potential therapeutic target in MS. The recent safety and tolerability results of a phase I trial of a monoclonal antibody in MS are encouraging.

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#### WFN15-0291

##### Demyelinating Disorders 1

##### Enhancement dynamics of tumefactive demyelinating lesions on brain MRI associated with clinical course

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**Objectives:** The evolutionary characteristics of the lesions of tumefactive demyelinating lesions (TDL) on contrast-enhanced T<sub>1</sub>-weighted images, were evaluated and summarized to facilitate the diagnosis of TDL.

**Methods:** The brain MRI imagings of 60 patients pathologically diagnosed with TDL ( $\geq 20$  mm in diameter) were assessed. The course of the disorder was classified as acute phase ( $\leq 2$  weeks), subacute phase ( $> 2$  weeks, but  $\leq 6$  weeks), and chronic phase ( $\geq 7$  weeks) according to its clinical course.

**Results:** (1) The diameters of lesions ranged 21–85 mm, and the mean diameter was  $45 \pm 22$  mm. (2) We summarized the neuroimaging features of TDL on MRI in different clinical phases as the following: a) For acute phase ( $\leq 2$  weeks), the images of contrast enhancement brain MRI were available for 18 cases. In 17 of the 18 cases, their images showed variable degrees of contrast enhancement. The patterns of enhancement were patchy ( $n = 5$ ), nodular ( $n = 7$ ), complete ring ( $n = 3$ ), open ring ( $n = 4$ ), flame-like ( $n = 2$ ) and dilated venular ( $n = 3$ ). b) For subacute phase (3–6 weeks), contrast enhancement MRI images were available for 54 cases. 52 of the 54 cases showed marked contrast enhancement and patterns of enhancement were open ring-like ( $n = 18$ ), complete ring-like ( $n = 14$ ), irregular round ( $n = 18$ ), patchy ( $n = 21$ ), nodular ( $n = 8$ ), flame-like ( $n = 5$ ) and dilated venular in a dense array ( $n = 25$ ). c) For chronic phase ( $\geq 7$  weeks), contrast enhancement MRI were available for 28 cases. 13 of the 28 cases showed mild contrast enhancement, such as mild patchy ( $n = 8$ ), open ring-like ( $n = 4$ ), and complete ring-like ( $n = 4$ ).

**Conclusion:** Different manifestations of the lesions on contrast-enhanced MRI develop in different clinical stages of TDL. Dynamic evolution of the enhanced MRI may be more important to facilitate the diagnosis of TDL.

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#### WFN15-0323

##### Demyelinating Disorders 1

##### Comparison of the features of MRI of tumefactive demyelinating lesions and glioma

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**Objective:** To explore the imaging features of tumefactive demyelinating lesions (TDL) and Glioma.

**Methods:** The brain MRI and <sup>1</sup>H-MRS features in 60 TDLs and 65 Glioma (all patients pathologically diagnosed) were studied.

**Results:** (1) The occipital lobes were more rarely involved in Glioma than TDL. The mid line structures were involved in Glioma more frequently than in TDL (ratio of 44.6% in Glioma vs 5.0% in TDL). (2) The lesions of TDL exhibited appearances termed diffusely infiltrating (n = 31), ring-like (n = 24), Balolike (n = 11), megacystic (n = 2). (3) On T<sub>2</sub>WI the typical characteristics of TDL looked like cloud (n = 23), round with hypointense rim (n = 19). (4) The tissue necrosis were more frequently found in the lesions of Glioma than TDL, especially for higher grade Glioma. (5) On enhanced T<sub>1</sub>WI:21 of 44 Glioma in mass like enhancement, 14 in ring-shaped enhancement. (6) The features on DWI were as follows: in Glioma group, 33 of 65 showing high signal, 8 with low and 17 with mixed;58 TDLs appeared hyperintense in acute and subacute. (7) 19 of 65 Glioma showed mass effect on MRA, but none of TDL. (8) Most of the patients of the 2 groups showed NAA and increased Cho on MR spectroscopy, but the ratio of Cho/NAA in the Glioma group was far more than 2, and the increased β,γ-Glx was most frequently found in TDL.

**Conclusions:** Many characteristics of MRI imagings distinguish Glioma from TDLs, such as the mass effect, intralesional necrosis and sign of swelled callosum for Glioma, the increased β,γ-Glx of MRS, open-ring enhanced sign and the dilated venular structure for TDL.

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WFN15-0332

**Demyelinating Disorders 1**

**The suppression of experimental autoimmune encephalomyelitis by intraperitoneal administration of HuangQi Glycoprotein**

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**Background:** HuangQi Glycoprotein (HQGP) is a kind of natural plant glycoprotein derived from *Astragalus membranaceus*. In vitro experiments showed that HQGP can inhibit lymphocyte proliferation and immune responses and HuangQi has been applied in the treatment of multiple sclerosis (MS).

**Objective:** To explore the therapeutic potential of HQGP in the experimental autoimmune encephalomyelitis (EAE), and elucidate its possible mechanism.

**Material and methods:** Mouse EAE was induced by MOG<sub>35-55</sub> immunization and treated intraperitoneally with HQGP once every day from day 3 post-immunization (p.i.) to day 27p.i. Mice that received the same volume of saline served as untreated EAE controls. The study was approved by the Ethics Committee of Shanxi University of Traditional Chinese Medicine.

**Results:** The administration of HQGP delayed the onset of EAE, attenuated the clinical symptoms and inhibited inflammatory infiltration into the CNS. HQGP can inhibit the proliferation of mononuclear cells, suppress the secretion of TNF-α, IL-6, NO and promote the secretion of IFN-γ. The results further demonstrated that HQGP treatment effectively induced CD4<sup>+</sup>CD25<sup>+</sup> T cell, CD4<sup>+</sup>IL-10<sup>+</sup> T cell and CD4<sup>+</sup>IFN-γ<sup>+</sup> T cell.

**Conclusions:** The administration of HQGP exhibits therapeutic effect on the development of EAE and significantly reduces the inflammatory foci of CNS, possibly through regulating reactive T-cell homeostasis, suppressing the secretion of inflammatory cytokines and inhibiting neuroinflammation in the CNS. (Grant: National Natural Science Foundation of China, 81473577; Shanxi Scholarship Council of China, 2014-00023; The 2011 Cultivation Project of Shanxi University of Traditional Chinese Medicine, 2011PY-1).

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