**Expression of IL-22 and in the CNS of experimental autoimmune encephalomyelitis mice**

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### Introduction

**Background**  
Interleukin (IL)-22, a T-helper (Th)-17 linked cytokine, has been associated with several autoimmune diseases. However, the role of IL-22 in multiple sclerosis (MS) has still be elucidated.  
While IL-22 is believed to aid in lymphocyte infiltration² of the CNS and elevated levels were observed in serum and lesion of MS patients, studies have highlighted potentially protective functions² within MS and experimental autoimmune encephalomyelitis (EAE) – an animal model of MS.

**Aim**  
This study aims to characterise the expression of IL-22 and its receptor subunit IL-22R1 in normal and EAE CNS tissue, and examine any potential correlation between expression level and disease severity.

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### Methods

**EAE Induction**  
- CS7BL/6 female mice were immunised subcutaneously with MOG35-55 peptide or vehicle emulsified in complete Freund’s adjuvant.  
- Mice were weighed daily and scored based on tail/leg paralysis.  

**Immunohistochemistry**  
- Immunohistochemistry was used to determine IL-22 (Abcam; ab18499) and IL-22R1 (R&D; MAB4294) expression and co-localisation with CNS resident cells and infiltrating immune cells.

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### Results

**Figure 1** MOG induced EAE follows a monophasic disease course: Following immunisation, mice were scored daily. Clinical scores expressed as an average ± S.E.M. EAE, n=6-39; PBS, n=6-23. **P<0.001, ***P<0.001 versus PBS, *P<0.05 versus EAE onset, ***P<0.001 versus PBS and EAE peak.

**Figure 2** Serum expression of IL-22 correlates with EAE disease progression: Serum expression of IL-22 was determined by ELISA. EAE, n=6; PBS, n=5. **P<0.01, ***P<0.001 versus PBS, *P<0.05 versus EAE onset, ***P<0.001 versus EAE peak.

**Figure 3** IL-22 expression in spinal cords correlates with EAE disease progression: Spinal cord sections were stained for expression of IL-22. Expression quantified using ImageJ. n=6 for all groups. **P<0.01, ***P<0.001 versus PBS control.

**Figure 4** IL-22 co-localises with neurons and astrocytes: Double fluorescence staining was used to determine co-localisation of IL-22 with neurons and astrocytes. Expression quantified using ImageJ. n=6 for all groups. Scale bar= 100 μm. ***P<0.001 versus naive.

**Figure 5** IL-22 co-localises with several immune cells. Double fluorescence staining was used to determine co-localisation of IL-22 with various infiltrating immune cells. All sections used were peak EAE. Expression quantified using ImageJ. n=5 for each group. Scale bar= 50μm.

**Figure 6** IL-22R1 expression in spinal cord is elevated during EAE within white matter and lesion areas: Spinal cord sections were stained for expression of IL-22R1. Expression quantified using ImageJ. n=6 for all groups. **P<0.05, **P<0.01, ***P<0.001 versus PBS control.

**Figure 7** IL-22R1 co-localises with neurons and astrocytes: Double fluorescence staining was used to determine co-localisation of IL-22R1 with neurons and astrocytes. Expression quantified using ImageJ. n=3 for all groups. Scale bar= 100 μm.

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### Conclusion

Our data shows that:  
- Serum IL-22 elevated during EAE in a similar manner to MS patients during active disease.⁷  
- IL-22 and IL-22R1 expression elevated in EAE spinal cord tissue, particularly within proximity of inflammatory lesions.  
- Neurons express comparable levels of IL-22 and IL-22R1 in naive and EAE mice however astrocytic expression of both is elevated during EAE specifically within the inflammatory lesions.  
- Our data suggests IL-22 plays an important role in the development and progression of CNS inflammation however whether this function is mediated through astrocytes or other means has still to be determined.