Epilepsy is not a single disease and has many different etiologies. It may be secondary to a malformation, tumour or other lesions in the brain. To rule out an obvious structural cause for epilepsy imaging is useful. With excellent soft-tissue differentiation and no ionizing radiation, MRI is the modality of choice when imaging children with epilepsy.

If the epilepsy is drug resistant, and there is focal start of the seizures, brain surgery is a treatment option. In the pre-surgical work-up, a great deal of attention and effort is required to make a sufficiently good scan, and to make a good report. A dedicated study protocol and a dedicated reader are very important. The detection of a lesion, tumour or malformation can make a huge difference for the patient.

This lecture will cover MRI-protocol suggestions in the standard and presurgical structural work-up, with special emphasis on the paediatric population. In addition to different structural sequences, the value of more advanced MRI techniques such as functional MRI and DTI/tractography will be discussed. Interpretation guidelines will be provided and some pitfalls and hints presented. In addition, common structural causes of epilepsy depicted by MRI will be reviewed and demonstrated.

If a lesion is detected and there is concordance between lesion, seizure semiology and EEG-data, further pre-surgical work-up may not be required. However, if MRI (performed with optimal technique and read by a devoted radiologist!) does not reveal any significant pathology, other imaging and physiological methods (e.g. SPECT, PET advanced EEG-analyses etc.) may prove useful in the pre-surgical work-up. Multi-modal co-registration with structural MRI makes it easier to interpret the findings, and may even guide the radiologist to the detection of a previously unidentified lesion. This lecture will also contain a short review of the value of the multi-modal approach in imaging in epilepsy.