Iron Overload
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Thalassaemia is one of the most common genetic disease and patients require regular transfusion. Iron deposition unfortunately takes place in almost all organs in the body. To monitor the iron load in the liver, different MRI techniques have been documented in the literature for assessment of liver iron load. These methods include using the T2 internal signal ratio and T2* internal signal ratio. The commonly used internal signal ratio include the liver to muscle ratio, liver to fat ratio and liver to noise ratio. Other techniques such as T2 relaxation time; T2 relaxation rate (R2), known as the St Pierre’s method; T2* relaxation time and T2* relaxation rate (R2*) have also been used by different authors for liver iron load assessment. These methods have their own pros and cons. Generally speaking, signal intensity, unlike attenuation number in CT, is not an absolute measurement. There are limitations in using internal signal ratio as iron might also deposit in muscle and fat and there are also pathological and physiological changes of these tissues such as fatty change of the muscle, which might affect the internal ratio. When liver to noise ratio is used, any changes in the imaging parameters, such as slice thickness, field of view and change in repetition time, would affect the level of noise. With T2 technique, whole liver is coverage is possible but the total scanning time might easily go up to 20-30 minutes if 5-6 TEs are used. With T2* technique, the scanning time is short as breath hold techniques can be employed but total coverage of liver would be difficult.

For the assessment of iron load in the heart, MRI is the ideal imaging modality for non invasive and serial monitoring of the iron load. Similar to assessment of liver iron load, different MRI techniques have been employed. Multi breath-hold versus single breath hold technique and different imaging sequences such as flash 2D, natural logarithms of signal to air ratio have been explored by different authors. Recently, T2* measurement of the myocardium has become widely used. Its high reproducibility in different centres; the documentation of good association of T2* values and the function of left ventricles; the documentation of serial changes of T2* values of the myocardium related to chelation therapy and the relatively simplicity of the imaging methods have contributed to its popularity.

Iron loading in the endocrine organs causing endocrine failure has also been a major complication in these patients. The application of MRI technique in assessment of iron load in the pituitary gland and pancreas have been investigated recently and preliminary results show cardiac T2* values have association with diabetes mellitus, hypogonadism, hypoparathyroidism and hypothyroidism. Abnormal cardiac T2* result is therefore a good surrogate for endocrine iron overload and is relevant in prediction of endocrine complication.