

## Foreword

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Magnetic resonance imaging (MRI) of the head and neck has evolved a great deal during the past two decades, which has resulted in the achievement of high-resolution images of all head and neck regions. In more recent years, diffusion weighted MRI (DW-MRI) techniques have been increasingly used in head and neck studies, adding functional information to the anatomical data. Initially, the feasibility of DW-MRI was tested in several head and neck regions. However, in the past few years, some of these DW-MRI applications have proved their clinical value and the diffusion sequence became a “standard sequence” for several head and neck studies.

The application of DW-MRI in neuroradiology to make the diagnosis of epidermoid tumors was a real eye opener and allowed head and neck radiologists to dream of a new technique for detecting cholesteatomas. The initial EPI-DW sequences, however, did not fulfill the expectations and we had to wait for the arrival of non-EPI-DW sequences. These sequences are no longer prone to susceptibility artifacts and have gradually become more reliable in the diagnosis of new middle ear cholesteatomas and later in the diagnosis of residual cholesteatoma and recurrent cholesteatoma. Today, the non-EPI-DW sequence is the most sensitive and specific imaging technique in the cholesteatoma diagnosis

and can even be used as the sole sequence. The best proof of the technique’s value is that several renowned ear surgeons throughout Europe use DW-MRI not only to make the final diagnosis of cholesteatoma but also to replace second-look surgery. Thus, this new imaging technique has led to a massive decrease in the number of negative second-look interventions, which has greatly benefited both ear surgeons and patients. It has also significantly decreased the cost of “cholesteatoma follow-up”.

During these same years, DW-MRI progressively found its way into oncologic imaging and the head and neck region was no exception. DW-MRI has been proven to visualize lymph nodes in a more reliable way than the other MR sequences and is also used to visualize primary tumors that typically remain invisible on the routine sequence. Again, radiologists started to dream about “a non-irradiating” MR technique which might 1 day challenge PET-CT. It is obvious that we are not there yet; nonetheless, the technique continues to evolve. The use of several *b*-values and ADC calculation is currently helpful in the differential diagnosis between malignant and benign tumoral lesions and lymph nodes. Moreover, DW-MRI is also valuable in the prediction of treatment outcome and is therefore more commonly used to monitor treatment response. Here, again, DW-MRI is challenging PET-CT, but more and larger studies are needed to confirm the eventual value of DW-MRI.

It is clear that the combination of “DW-MRI” and “head and neck imaging” is very promising. Nevertheless, some problems must be controlled in the future in order to prolong the clinicians’ trust in DWI-MRI. The non-EPI sequences used in the diagnosis of cholesteatoma should be of the same quality on all MR systems, regardless of field strength or vendor. Unfortunately, this

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is not the case today. The same goes for oncologic imaging. ADC thresholds used to separate malignant from benign lesions seem to vary and remain dependent on several sequence parameters and probably also system differences. Therefore, in practice, it is not possible to use values from published data and apply them in another clinical environment. In other words, standardization of the techniques and confirmation of the results in larger studies is mandatory.

In conclusion, head and neck DW-MRI is a “hot” topic and a state-of-the-art overview of the currently used DW sequences and applications is desirable. Two young colleagues, Dr Bert De Foer (St. Augustinus Hospital, Antwerpen, Belgium) and

Vincent Vandecaveye (University Hospital Gasthuisberg, Leuven, Belgium), have been working on DW-MRI in the head and neck region for several years and have already (Dr. Vandecaveye) or will shortly (Dr. De Foer) finalize their PhD theses on this subject. Hence, I was very honored when both of them accepted the invitation to submit a paper on the current value of DW-MRI in the head and neck region. I hope you will enjoy this overview and that you will also become an ally in the endeavor to accomplish the DWI dream.

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