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## 1.1 General Background

The focus of this book is on the practical use of neuroimaging in dementia in a clinical diagnostic setting. We felt that there are many publications that describe the imaging findings of a particular disease, but you first need to know what the diagnosis is in order to look up articles describing those findings. As well as offering a summary of the findings in the most relevant conditions causing cognitive decline we wished to provide a guide to interpreting a particular imaging finding. The organization of the book therefore takes as departure point the dominant imaging findings and incorporates the clinical features along the way. The topic of vascular dementia does not easily fit with this approach due to its heterogeneous appearance; however, it does form a natural bridge between primary white and grey matter disorders. The ‘route map’ aims to direct the reader towards additional tests (imaging and non-imaging) and clinical features in a practical way.

Etiological, pathogenetic and clinical information are given as a reference, mainly as a background to understand and interpret imaging findings, not to provide an encyclopaedic text on all aspects on dementia – the interested reader will easily find her/his way to dedicated textbooks on genetics, biochemistry, histopathology and others.

Structural MR imaging is the lead theme largely because of its central position in clinical practice in many countries. Each chapter contains suggestion about the imaging strategy (e.g. which sequences to apply) and interpretation (e.g. salient features to look for) within a given clinical context (e.g. young age at onset). When appropriate, suggestion are provided for non-conventional MR techniques, such as diffusion-weighted

MR, indications for nuclear medicine techniques (e.g. PET), or other diagnostic tests, such as CSF analysis.

## 1.2 Main Classification System

There are many ways to classify dementing disorders, e.g. sporadic/inherited, cortical/subcortical, all of which have their limitations. Classification according to histopathology (e.g. with or without certain type of inclusion bodies) is conceptually attractive, but clinically not very useful. By contrast, structural (MR) imaging is often performed in the work-up of a patient presenting with cognitive decline (even if only to exclude surgical pathology) and provides an increasingly useful angle of thought – or point of departure.

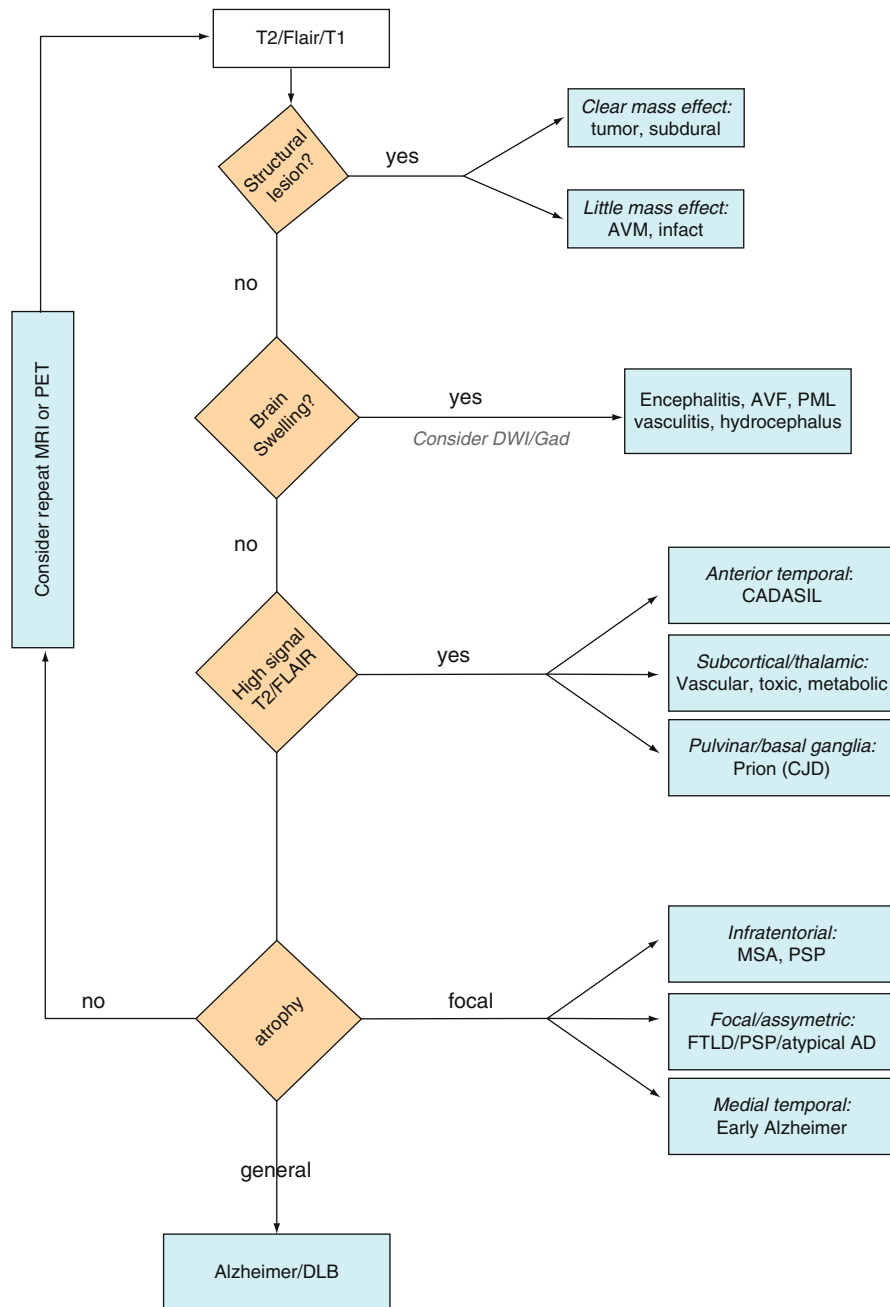
Our classification system is based roughly on four dominant imaging patterns:

- Primary grey matter loss – neurodegenerative diseases such as Alzheimer
- Vascular dementia – combined white and grey matter damage
- Primary white matter disorders – e.g. HIV encephalitis and metabolic disorders
- Disorders associated with brain swelling

While the lead theme of dominant neuroimaging finding may be useful in many circumstances, there are many patients in whom a clinical clue (e.g. visual hallucinations) can be more relevant than the non-specific imaging findings (diffuse cortical atrophy in case of Lewy body dementia). Other clinical settings, e.g. rapidly progressive cognitive decline, may lead to a differential diagnosis that may run across the disease clusters as reflected by the main chapters. Such alternative slicing patterns are presented throughout the book.

## 1.3 A Route-Map or Classification Tree

A key goal of imaging is to exclude a neurosurgically treatable cause of dementia (see e.g. Practice Parameter AAN); an MR scan performed for such an indication will include a T2-weighted sequence (e.g. FLAIR) which provides a useful starting point for our purpose.



The flow diagram above provides an example of how a series of assessments can be used to lead into the main diagnostic groups as represented in this book. It should be noted that although a ‘main finding’ may be a key pointer there can be considerable overlap of findings. Incidental white matter lesions

for example will present in many elderly subjects, and occur with increased frequency in patients with Alzheimer’s disease. Additionally, combinations of pathology are the rule rather than the exception in the very old, especially Alzheimer’s and Vascular dementia.