

CHAPTER B4

Imaging Concepts

INTRODUCTION

The first unit in this chapter (*UNIT B4.1*), addresses how echoes, including both spin and gradient echoes, are formed in an MR imaging experiment. After the application of an rf pulse, the longitudinal magnetization will be rotated from the direction parallel to the external magnetic field to the transverse plane. Because of the interaction among spins, as well as the potential field variation across the sample of interest, the spins will start to precess at different resonance frequencies, resulting in a signal reduction in MR images. This phenomenon is referred to as dephasing, one of the main topics addressed in this unit. Therefore, in order to obtain the maximal available MR signal, an echo will need to be formed so that all spins will again have the same phase. The basic concept of an echo is introduced and the characteristics as well as the pros and cons of the two different echoes, namely gradient and spin echoes, are also discussed.

One of the major differences between MRI and MRS experiments is that spatially resolved information is available in MRI but not in MRS. Therefore, in *UNIT B4.2*, the means by which spatial information can be obtained through the application of gradient magnetic fields are addressed. In addition, the concepts of k -space are introduced and the relationship between the applied gradient and k -space is described. Finally, examples on how to obtain spatially resolved information are given for a gradient echo experiment.

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