Introduction

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Tissue engineering and regenerative medicine are relatively new but rapidly expanding multidisciplinary fields relevant to surgery that have the potential to transform the treatment of a wide range of human diseases. The ability of tissues to undergo spontaneous repair and regeneration is highly variable and, in most cases, limited. This has driven the devel opment of approaches that harness the biology at the site of tissue damage to mediate regeneration through the localised delivery of cells, materials and molecules. The continuing impro vement in our understanding of how tissues are formed and how they heal underpins the continuous development of novel approaches. As these technologies improve, translate and build up clinical evidence of e ff ectiveness, the prospect of actual tissue regeneration, not just repair, will establish clinical utility . In this chapter, we explore the development of the tissue engineering paradigm (Figure 4.1) and the constituent processes that have been used to enhance tissue healing by considering cells, materials and molecules and the interplay between them, alongside key exemplars. We further highlight the opportunities, challenges and likely future directions for the field.

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