Treatment of Defects in Articular Cartilage

The ends of the bones that form the joints of the body are covered by a 4 mm-thick layer of non-vascular articular cartilage (Figs. 1a, b, and c). The articular cartilage is attached to underlying calcified cartilage which in turn is attached to the underlying (subchondral) bone (Fig. 1b and c). The chondrocytes in articular cartilage are fully contained by their dense extracellular matrix consisting of type II collagen and proteoglycan (aggrecan). Defects (down to the calcified cartilage) such as those seen in Fig. 1a can be due to traumatic injury.

1. Briefly describe one advantage and one disadvantage of both of the following approaches: 1) formation of a cartilaginous disc outside of the body for subsequent implantation; and 2) implantation of a construct to facilitate the regeneration of cartilage inside of the body.

2. What would you expect as the outcome of implanting a sponge-like scaffold (alone) into the articular cartilage defect? Explain.

3. If you were to incorporate cells or a regulator into the sponge-like scaffold prior to its implantation which one would you propose? Explain your choice.

4. In using the sponge-like scaffold alone, what benefits might there be in drilling small holes into the bone underlying the defect, prior to implanting the scaffold.
Fig. 1.