crystalline phases inhibit the ion exchange between the glass and aqueous solution (Farooq et al., 2012). More recently, melt-quenched glass scaffolds were produced through control of the sintering processing window by tailoring of the glass composition, which was achieved while maintaining bioactivity with new compositions (Farooq et al., 2012). However, no sol-gel or melt-derived scaffolds are currently being used by medical device companies, even though comparative in vivo studies show benefit over current commercial porous bioactive ceramics. This is because the improvements in performance do not warrant the significant investment required to obtain FDA approval and scale-up to industrial manufacturing (Farooq et al., 2012).

Another unmet challenge is the fundamental understanding regarding such properties as the in vivo drug release profile, degradation of the glass matrix, and cell metabolism, which have to be investigated before further clinical trials (Kaur, 2017a; Coelho et al., 2010). The development of new BGs with greater degradation rates is also suggested in order to degrade the material completely after its use as a therapeutic agent, avoiding immune reactions or the need for a second surgery for removal (Coelho et al., 2010; Kaur, 2017b). With further understanding of the mechanism of mesoporous BGs in vivo and the corresponding biological activity, it is expected that mesoporous BGs may be promising biomaterials for clinical applications in the coming decades.

Many new BG compositions have been suggested as suitable candidates for cancer treatment; however, currently, most of the research efforts are based on simulations rather than laboratory experiments. In this sense, new works involving in vitro and in vivo tests would be highly worthwhile and would provide a better understanding regarding the realistic parameters that lead to effective treatment. Meanwhile, simulation methods are reliable tools to evaluate compositions in advance, avoiding time-consuming experiments. Clinical trials will give us better feedback about the usage of BGs for cancer treatment in the near future.

10.5 CONCLUSION

The future of cancer treatment lies in providing patients with an even greater level of personalization. Various treatment options are starting to be offered based on the genetic changes occurring in a specific tumor. However, there are still many hurdles ahead to match clinical healthcare applications such as mechanical strength, controlled ion release, and porosity creation without crystallization of commercially available bioactive glass. Significant scientific and technological issues still remain unanswered. Trial-and-error approaches are frequently employed, particularly to probe and adjust the suitability of new compositions targeted for cancer treatment applications, but care must be taken in their interpretation in order to identify the correct trends. Rationalizing the behavior of these materials is not a straightforward task due to their complex (noncrystalline and multicomponent) nature. This will be a major advance in the