including vitamins, minerals and herbal products, that provide additional nutritional value and health benefits, including disease prevention.[1,3] In 1989, Dr Stephen DeFelice coined the term "nutraceutical" and it is now applied to products including herbal formulations, nutrients and dietary supplements.[4] The idea of functional food was first used in 1984 by Japanese researchers who studied the relationship between nutritional quality, sensory satisfaction and fortification of foods for advantageous physiological effects.[5] Similar to nutraceuticals, functional foods tend to improve general health, and have prophylactic and therapeutic effects.

In this chapter, we discuss the use of nanotechnology in the development of various nutraceuticals and functional foods in anti-aging medicine.

6.2 Nutraceuticals and Nanodevelopments

Nutraceuticals and functional foods encompass a large group of compounds including polyphenols, flavonoids, carotenoids, vitamins, minerals and probiotics, and all of these improve and enhance health and wellbeing.[6–8] An increasing number of bioactive compounds are now used in the food industry as supplements and the number of patents relating to the development and use of bioactive compounds has also increased. Two reviews that list recent patents on bioactive compounds used in food industry were published recently.[9,10] The identification, isolation and use of bioactives in food and related applications have increased dramatically in recent years, and one reason for this is the developments in the field of nanotechnology. Nanotechnology can help in overcoming many limitations of using bioactive compounds in food-related applications, such as solubility, color, flavor, texture, bioavailability and absorption.[9,11–14]

Many nutraceuticals are rich in antioxidants and anti-inflammatory bioactive compounds, and may be either phenolic compounds, phytosterols, carotenoids, polyunsaturated fatty acids, flavonoids or probiotics. Polyphenols are a large group of plant secondary metabolites that have high nutritive value and have recently attracted interest as a source of functional foods and nutraceuticals.[15] Unpleasant flavor, reactive nature and low bioavailability are issues that are important while considering the use of polyphenolics in food. Spray drying, entrapping in liposomes, nanoencapsulation and nanoemulsions are some methods of polyphenol delivery. Fang and Bhandari have discussed various methods by which polyphenols can be encapsulated.[16] A review discussing the unique potential of nano-antioxidants against neurodegenerative diseases was published recently.[17] Oxidative stress is a serious issue in neurodegenerative diseases and it is believed that nano-antioxidants have the capacity to offer effective preventive and therapeutic functions.[17] Liposomes are versatile carriers capable of delivering hydrophilic, hydrophobic and amphiphilic compounds, and are even capable of encapsulating multiple antioxidants. Liposomes are excellent carriers of antioxidants and facilitate prophylactic and therapeutic effects against oxidative stress.[18] Various nutraceuticals isolated from fruits, vegetables