EDITORIAL

Contemporary Approaches Towards Production of Phytopharmaceuticals: Plant Biotechnology Meets Medicinal Chemistry

For centuries people have been highly dependent on plants as sources of proteins, fats, carbohydrates, vitamins, and minerals. Moreover plants accumulate a large spectrum of metabolites (over 100,000 compounds), some of which are used as medicines for treating a variety of illnesses and maladies. Currently more than a quarter of all prescribed medicines in the industrialized countries are derived either directly or indirectly from plants. It was recently estimated that over 60% of anticancer drugs and 75% of drugs for infectious diseases currently used originated from natural sources, and that annual sales of such drugs exceed several billion US dollars [1, 2].

Mass production of plant-derived molecules *via* classical approaches leads to several difficulties, resulting mainly from seasonal, geographical, soil features, and etc. Moreover the isolation of these compounds (often less than 1%) from huge plant biomass is time- and labor- consuming. Furthermore, the production of some bioactive molecules at commercial scales could create serious ecological problems. For example, for the production of 1 kg paclitaxel (the active ingredient of Taxol®) over three thousand 100-year-old yew trees should be killed.

These continuously increasing demands for therapeutic molecules, produced by ever greener processes, along with dramatic reductions in natural diversity, are driving efforts to find alternative ways to produce high value plant-derived metabolites. Plant biotechnology offers an attractive alternative for the supply of high-value molecules. Plant cell, tissue and organ cultures are an enormous source of metabolites that have considerable advantages over standard crops, since they can be mass produced totally independently of geographical and climatic factors, in sterile and eco-friendly conditions. Furthermore, the up-scaling in bioreactors allows the mass production of desired compounds at commercial scales. The over century progress in the field of plant biotechnology resulted in the commercial production of several important metabolites, such as Taxol®, berberine, shikonin, ginseng biomass and tuberose's polysaccharides by different companies [1, 2].

This hot topic issue has been prepared to highlight the current developments for the production of anticancer, anti-inflammatory and antioxidative molecules by artificially cultivated plant cell, tissue and organs. The issue consists of 4 excellent reviews, which were peer-reviewed by a number of outstanding scientists. The subject is introduced by Korkina *et al*. [3], highlighting the recent advances in the field of anti-inflammatory plant phenylpropanoids. Erdogan Orhan *et al*. [4] discuss on the progress of finding new and potent cholinesterase inhibitors. Potentially new drugs from plant origin for the treatment of cancer are covered by Ionkova [5]. Finally de Costa *et al*. [6] summarize the recent progress in the field of plant saponins with immunoadjuvant and anti-inflammatory activity.

I would like to thank the Editor of Mini-Reviews in Medicinal Chemistry for the kind invitation to prepare this hot topic issue as guest editor. I am thankful to all contributors and reviewers for their time and significant efforts. I hope that the readers of Mini-Reviews in Medicinal Chemistry will find this issue interesting, helpful and discussions provoking.

REFERENCES

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