



Editorial

microRNAs: Potential biomarkers of toxicity: A special issue of the journal *Toxicology Reports*

Application of microRNAs as biomarkers of toxicity is a 21st Century development. Towards the end of the 20th century the World Health Organization (WHO) defined biomarkers as “almost any measurement reflecting an interaction between a biological system and a potential hazard, which may be chemical, physical, or biological” [1]. The biomarkers predict exposure effects of toxic materials. They are sensitive and informative indicators of adverse effects at doses and exposure times preceding toxicity, tissue injury and disease. The microRNAs were discovered around the same time as the WHO definition of biomarkers when Lee et al. [2] published the results of their monumental study on *lin-4* in *Caenorhabditis elegans* and reported two small *lin-4* transcripts of approximately 22 and 61 nucleotides. Five years later Fire et al. [3] reported the potent and specific genetic interference by double-stranded RNA in *Caenorhabditis elegans*. Reinhart et al. [4] demonstrated that the 21-nucleotide *let-7* RNA regulated development timing in *Caenorhabditis elegans*. At the dawn of the 21st century it was recognized that microRNAs are a family of small non-coding RNA molecules which are conserved by evolution. They control many developmental and cellular processes in eukaryotic organisms. They play important role in cancer development [5]. They regulate gene expressions [6] and show epigenetic activity in cancer development [7]. The physiologic functions of the majority of microRNAs are not known.

Reports from independent laboratories published in last two decades have demonstrated that microRNAs can serve as sensitive diagnostic biomarkers of injury in specific tissues such as brain [8–11], heart [12–16], kidney [17–22], liver [10,23,24], muscle [10,25] and skin [26,27]. These studies strongly suggest that microRNAs play important roles in several human diseases. Therefore, they have attracted great interests of research scientists in medicine and in toxicology. They have become a focal point of a developing new field of science in recent years. They show promise as possible new biomarkers of disease and injury. They demonstrate a tremendous potential for serving as biomarkers of toxicity and disease.

Scientific interest in micro-RNAs has grown tremendously in last two decades. Our understanding of these small, non-coding transcripts continues to evolve.

The special interest and attention of scientists all over the world for microRNAs research led the Toxicology Reports to publish this Special Issue, “microRNAs: potential biomarkers of toxicity”, to provide up-to-date state-of-the-art information on these important bio-molecules for the benefit of its readers. It is my honor and privilege to serve as the guest editor of this Special Issue. Investigators of international recognition working in this new developing scientific discipline shared my enthusiasm and interest for this new area of research and contributed generously to this Special Issue for which I am deeply grateful to them. I sincerely hope that this Special Issue will provide an authoritative up-to-date source of current information in this important

new area of research and prove useful to the scientists interested in this developing scientific discipline throughout the world. I, encourage our readers to submit the exciting results of their studies to Toxicology Reports which in return promises to provide quick publication following expert peer review.

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