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Editorial

Probable Adverse Health Consequences through Alteration of Circulating Free Micro- and Small-RNAs Following Consumption of Genetically Modified Foods

R. Salehi

Department of Genetics and Molecular Biology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

(E-mail: r_salehi@med.mui.ac.ir)

MicroRNAs are small endogenous noncoding RNAs approximately 19-22 nucleotides in length that have been conserved among a vast array of species. They mediate posttranscriptional regulation of protein-coding genes by binding to the 3′ untranslated region (3′UTR) and sometimes to the 5′UTR or coding regions of target mRNAs. Their mode of action involve either by transcript degradation or translation inhibition depending on a complete or partial match between the microRNA's seed, a short segment of few critical nucleotides which is directing specific microRNA-mRNA binding, and its target site. Deregulation of microRNA expression has been implicated in many diseases including multifactorial complex one like cancers, neuro-degeneration and cardiovascular diseases. The findings indicate that exosomal secretory microRNAs, as a silence master of gene expression can make multi translation inhibitory leading to the creation of specific biological events (Carroll et al., 2013).

Since their discovery, microRNAs have become the focus of research and have been identified as key regulators of cellular physiological process and different biological functions such as differentiation, proliferation, apoptosis of cells, hormone secretion, etc.

Recently, it has been reported that exogenous plant microRNAs appear to enter the serum and plasma of humans and animals (Zhang et al., 2012). It has been also revealed that food-derived exogenous plant microRNAs can pass through the mouse gastrointestinal track and enter the circulation and various organs especially the liver where it cross-kingdomly regulates mouse genes and affecting physiological condition.

It was recently claimed that small double-stranded RNAs (dsRNAs) generated in Genetically Modified (GM) plants as the result of using gene silencing techniques can create bio-safety risks (Zhang et al., 2011). In conclusion, there is convincing evidence that microRNAs act as a post-transcriptional master regulator of gene expression in mammals. On the other hand, there is evidence that food-derived small RNAs and dsRNAs can enter to the circulation and this class of freely circulating RNAs contributes quite efficiently to the gene regulation of different host organs. GM foods are a source of small RNAs which differ from those of their unmodified counterparts. So, there is a fairly reasonable prediction of the higher risk of gene deregulation as a consequence of consuming GM foods. Of course, more experimental data are needed to confirm this hypothesis but based on the emerging scientific reports; it is advisable to avoid the hazards of GM food.

References

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