

EDITORIAL

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The expanding functions of thyroid hormone

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Thyroid hormone (TH) exerts a pleiotropic action on most, if not all, cell types, ranging from the regulation of development, metabolism, and neuronal signaling [1–3]. More than 50 years ago Jamshed Tata first reported that the response to TH involved transcriptional changes in the cell [4]. It is clear now that this transcriptional effect, also termed genomic action, is primarily mediated by the nuclear thyroid hormone receptor (TR) [5]. Accumulative studies indicate that TR regulates target gene expression through a diverse group of accessory proteins collectively termed corepressors and coactivators.

Besides the genomic actions through TR, TH can also act through non-genomic pathways [6]. The non-genomic actions have been shown to involve binding of TH to membrane receptors, to membrane bound protein kinases, or to extranuclear TRs. For example, the rapid TH effect on cardiac cells appears to involve TR-mediated activation of phosphoinositide 3-kinase in the cytosol and binding of TH to the membrane receptor, integrin $\alpha V\beta 3$, which in turn activates a MAPK signaling cascade [6].

Within the general themes of genomic and non-genomic actions of TH, the recent progresses in three new areas for TH actions are reviewed in this thematic series. First, Ying et al. sum up how TH regulates microRNA expression and how microRNAs can fine tune TH function in cardiac and skeletal muscle [7]. Second, Yen et al. focus on the function and molecular mechanisms by which TH regulates autophagy and mitochondrial turnover and the implications for non-alcoholic fatty liver disease (NAFLD) [8]. Third, Hsia et al. provides new insights on TH-mediated regulation of herpes virus infections

through non-genomic action [9]. It is our sincere hope that this thematic series brings our readers some of the new breakthroughs and developments in the field of TH action.

Authors' contributions

JH and SVH discussed and wrote the editorial together. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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