Extended Abstract
Volume 5:4, 2021

Journal of Genetics and DNA Research

Open Access

CXCL9 and CXCL10 chemokines secretion by vanadium pentoxide in primary thyroid cells

Silvia Martina Ferrari

University of Pisa, Italy, E-mail: sm.ferrari@int.med.unipi.it

Abstract

Vanadium is a grey metal, with different states of oxidation (-1, 0, +2, +3, +4, and +5), and its most common form in commercial products is vanadium pentoxide (V2O5). All vanadium compounds have been considered toxic. The exposure to a 35 mg/m3 dose of vanadium is considered life-threatening and it could provoke serious health issues, and even death, as it has been shown by The National Institute for Occupational Safety and Health. Recently it has been hypothesized a carcinogenic role of vanadium on the thyroid. However, no in vivo or in vitro studies have evaluated thyroid disruption in humans and/or animals after exposure to vanadium. Methodology & Theoretical Orientation: Here, we evaluate the effect of V2O5 on proliferation, and chemokine secretion in normal thyrocytes. Findings: The results of this study demonstrate that V2O5 can promote interferon-gamma dependent chemokines secretion by thyroid follicular cells, synergistically increasing the effect of Th1 important cytokines, as interferon-gamma and tumor necrosis factor-alpha, without altering their viability and proliferation. In this way, V2O5 could lead to the induction and perpetuation of an inflammatory reaction into the thyroid. Conclusion & Significance: Further studies will be required to evaluate thyroid function, and nodules, in subjects occupationally exposed, or living in polluted areas.

In papillary thyroid carcinomas (PTCs), oncogenes activate a transcriptional program including the upregulation of CXCL10 chemokine, which stimulates proliferation and invasion. Furthermore, peroxisome proliferator-activated receptor-gamma (PPARgamma) activators thiazolidinediones (TZDs) modulate CXCL10 secretion in normal thyroid follicular cells (TFC), and inhibit PTC growth. Until now, no study has evaluated the effect of cytokines on CXCL10 secretion in PTCs, nor the effect of PPARgamma activation.

The combined effects of interferon gamma (IFNgamma) and tumor necrosis factor alpha (TNFalpha) stimulation on CXCL10 secretion in primary cells from PTCs and TFC were tested. Furthermore, the effect of PPARgamma activation by TZDs, on CXCL10 secretion and proliferation in these cell types was studied. In primary cultures of TFC and PTCs CXCL10 production was absent under basal conditions; a similar dose-dependent secretion of CXCL10 was induced by IFNgamma in both cell types. TNFalpha alone induced a slight but significant CXCL10 secretion only in PTCs. The stimulation with IFNgamma+TNFalpha induced a synergistic CXCL10 release in both cell types; however, a secretion more than ten times higher was induced in PTCs. Treatment of TFC with TZDs dose-dependently suppressed IFNgamma+TNFalpha-induced CXCL10 release, while TZDs stimulated CXCL10 secretion in PTCs. A significant antiproliferative effect by TZDs was observed only in PTCs. In conclusion, a dysregulation of CXCL10 secretion has been shown in PTCs. In fact, a CXCL10 secretion more than ten times higher has been induced by IFNgamma+TNFalpha in PTCs with respect to TFC. Moreover, TZDs inhibited CXCL10 secretion in TFC and stimulated it in PTCs. The effect of TZDs on CXCL10 was unrelated to the significant antiproliferative effect in PTCs.

This work is partly presented at 9th Molecular Immunology & Immunogenetics Congress