

Effects of Interferon-beta Therapy on Proteasome Gene Expression Levels in Patients with Multiple Sclerosis

Kristīne Ošina^{1,}, Natalia Paramonova¹, Jolanta Kalniņa¹, Nikolajs Sjakste^{1,2}*

¹Genomics and Bioinformatics, Institute of Biology of the University of Latvia, Miera str. 3, LV2169, Salaspils, Latvia;

²Faculty of Medicine, University of Latvia, Riga, Latvia

*E-mail: kristine.osina@lu.lv

Background

Multiple sclerosis (MS) affects around 2.3 million patients worldwide. It is a neurodegenerative and autoimmune inflammatory disease that damages central nervous system, causes breakdown of insulating layer of nerve fibers – myelin – and eventually leads to neurological disabilities [1]. Ubiquitin-proteasome system (UPS) is responsible for degradation of intracellular proteins and it is one of the key factors in regulation of the immune system. Accumulation of toxic protein aggregates can be observed in MS patients, indicating dysfunction of UPS [2]. Interferon β (IFN β) is the first class of disease modifying therapies for MS. As a member of a family of cytokines it possesses immunomodulatory properties and is associated with beneficial health effects in MS patients [3].

Aim

The aim of the current study was to investigate association of IFN β therapy with expression levels of several proteasomal genes in patients with MS.

Methods

Peripheral blood samples were acquired from 54 MS patients treated with IFN β therapy, 44 MS patients without the treatment (NT) and 17 control individuals. Isolation of RNA was followed by synthesis of cDNA. *PSMA3*, *PSMA6*, *PSMA7* and *PSMC6* gene expression levels were analysed with qPCR.

References

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Results

Expression of all four genes was not changed between NT and the control group (Fig. 1). IFN β therapy showed tendency to increase the expression of *PSMA3*, *PSMA6* and *PSMA7* genes compared both to the control and NT groups, reaching statistical significance in case of *PSMA6* gene ($p=2.14 \times 10^{-2}$ vs. control and $p=3.65 \times 10^{-2}$ vs. NT). Expression of *PSMC6* gene did not differ significantly among groups.

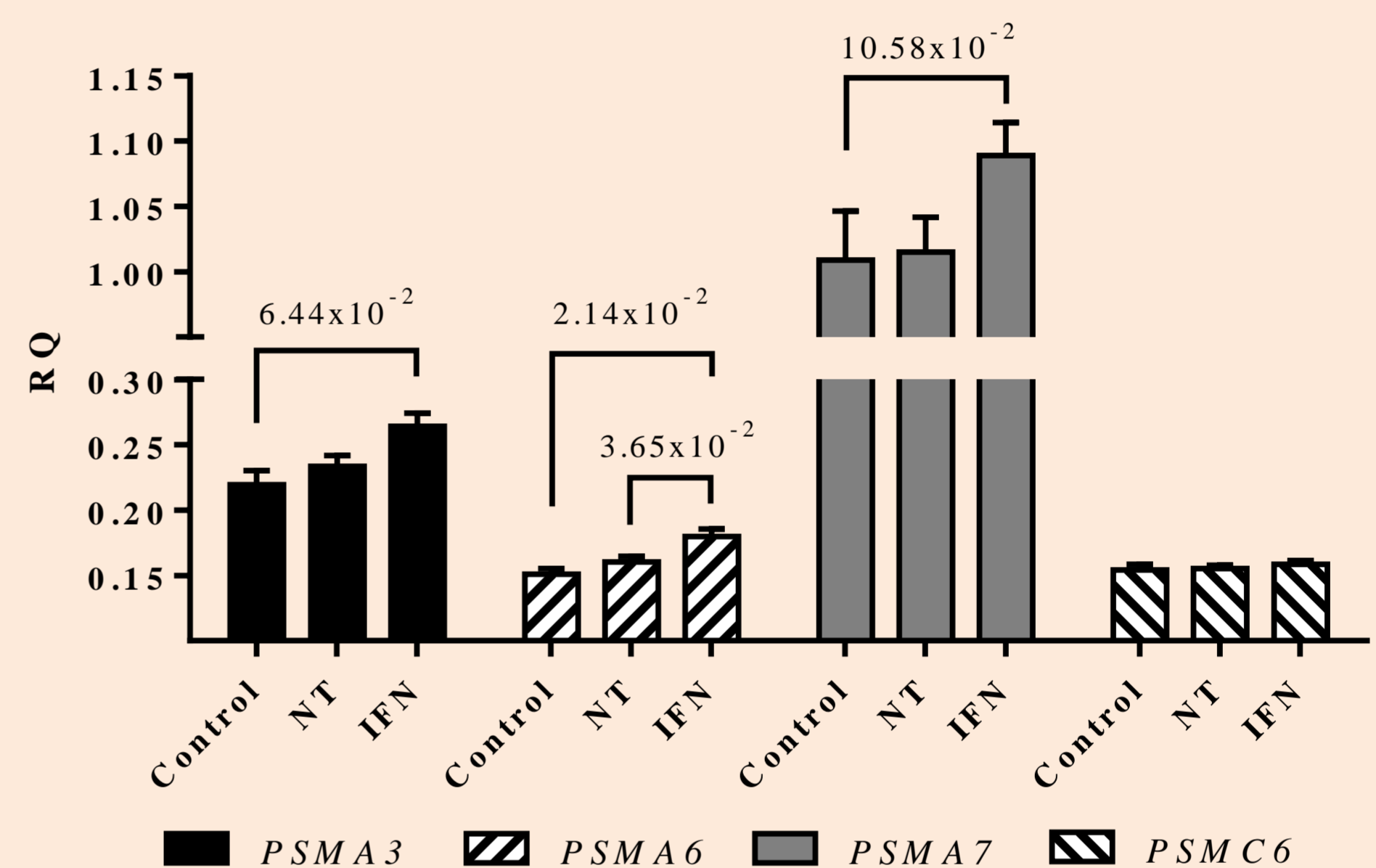


Figure 1. Expression levels of *PSMA3*, *PSMA6*, *PSMA7* and *PSMC6* genes. NT – group of multiple sclerosis (MS) patients without treatment; IFN – group of MS patients with interferon β treatment.

Conclusion

Results suggest that IFN β therapy increases transcription of genes of 20S proteasome α type subunits. This might indicate stimulation of proteasome *de novo* synthesis and it is in accordance with data of increased proteasome concentration after IFN β therapy, and improved clinical course of MS [4].