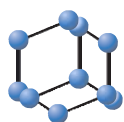


REVIEW ARTICLE

BENTHAM
SCIENCE

Tuftsin – Properties and Analogs



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Abstract: Background: Immunomodulation is one of the significant therapeutic strategies. It includes both stimulation and suppression of the immune system by a variety of substances called immunomodulators, designed to regulate the immune response of the organism against infections of varying etiology. An example of such a substance is tuftsin (TKPA) **3** (Fig. (1)). In this paper were included tuftsin derivatives, which were described over the years, their together with biological activity and clinical potential.

Methods: We reviewed a bibliographic database to gather all the important information about the tuftsin peptide. We have delineated the significant information on the activity of the tetrapeptide itself and its derivatives. Analogs were divided because of their anti-tumor, anti-inflammatory, antimicrobial and anti-viral activity.

Results: This paper describes eighty-six documents. Thirty-two of them concern on activity of tuftsin in the human organism. The remaining fifty-four describe peptide analogues and their properties, including eleven papers about the tuftsin-based peptides contained in the vaccines, nine papers representing anticancer activity of the tuftsin derivatives, twenty-six about anti-inflammatory compounds, and five papers describing the antitumor activity of the tuftsin analogs.

Conclusion: The findings of this review confirm the importance of the tuftsin and their derivatives. Most of these substances showed anti-tumor, anti-inflammatory or antibacterial activities. A large amount of the compounds may find use in vaccines. Tuftsin can also be used to prepare fusion proteins in the treatment of cancer and as carriers of many biologically active substances.

Keywords: Tuftsin, immunomodulator, biological activity, Selank, tuftsin analogs, regulatory peptides.

1. INTRODUCTION

The immune system is intended to protect the body against attack by microorganisms. In the case of the reduced activity, it can lead to pathogenic agents, therefore, immunomodulators play a key role in regulating the immune response to infections of varying etiology. Many low molecular weight peptides were characterized by properties regulating the immune response. The source of these compounds is the fragments of antibodies or peptidoglycans of bacterial cell wall. Until now well recognized peptides characterized by immunomodulatory properties include cyclosporin, muramyl dipeptide (MDP) **2** and tuftsin **3** (Fig. **1**). Cyclosporin **1**

(Fig. **1**) has been isolated from the fungus *Tolypocladium inflatum*. It is a cyclic peptide consisting of 11 amino acids (undecapeptide). This compound inhibits cellular and humoral immune responses and modifies the inflammatory reactions. Cyclosporin affects the process of activation of T_h lymphocytes, which indirectly inhibits the production of antibodies, activation of macrophages and inhibits B cells. MDP **2** induces the release of endogenous mediators, such as interleukin and cytokines, has antitumor properties and inhibits the replication of human immunodeficiency virus. Tuftsin **3** shows not only the immunostimulatory activity, but also antibacterial, antiviral, antimycotic or antitumor properties making it a promising subject of research [1].

Despite numerous advances in the use of immunosuppressive drugs in organ transplantation, it has failed so far to find the perfect drug which is characterized by

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