

Endorphins – A Novel Hidden Magic Holistic Healer

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Abstract

Endorphins are endogenous morphine, neuropeptide, produced from pituitary gland in response to stress and pain. There are three types of endorphins are beta-endorphins, dynorphins, enkephalins binds to mu, kappa, and delta receptors found on immune cells and nervous system. Beta-endorphins is a most abundant endorphins synthesized and stored in the anterior pituitary gland. It has got various activities such as immune stimulatory, anti-inflammatory, analgesic activity, delay aging, stress buster activity involved in preventive, promotive, therapeutic and palliative treatment of various diseases such as cancer, auto-immune diseases, infectious disease without any adverse effects. This article briefs about the novel roles of endorphins especially beta-endorphins and its action in holistic treatment of diseases.

Keywords NF-KB; Stress; IL-1; IL-6; TNF- α ; Inflammation; Cortisol; Nor-epinephrine; HPA-axis

Introduction

Endorphins are endogenous opioids, more potent than morphine, neuropeptide, synthesized by pituitary gland in response to stress and pain. Chronic stress mediated releasing of CRH (Corticotrophic releasing hormone) from hypothalamus activates HPA axis through sympathetic nervous system of ANS release cortisol and norepinephrine mediated inflammatory mediators IL-1, TNF- α , IL-6 activates key transcription factors NF-KB, STAT-3 involved in tumor progression and auto-immunity by converting Th1 to Th2 lymphocytic type, Tregs formation induced immunosuppression, chronic inflammation, activation of proteolytic enzymes such as mmps 2,9 (matrix metalloproteases-2,9), results in tissue damage, immunomodulation, cellular changes leads to autoimmunity [1-4].

Novel mechanism of actions of Beta-endorphins in treatment of diseases

Endorphins are of three types, there are β -endorphins, dynorphins, enkephalins. Beta-endorphins are abundant, widely studies endorphins is a precursor of POMC (Pro-opiomelanocortin), synthesized and stored in anterior pituitary gland bind to mu, kappa, gamma receptors involved in reduction of stress, analgesic activity, anti-inflammatory activity, antiviral activity, euphoria, prolong aging, alters gene expression in tumor microenvironment [5-8].

Beta-endorphins binds to mu receptors present throughout the peripheral nerves of peripheral nervous system, inhibits substance P, a neurotransmitter of pain by presynaptic binding involved in analgesic activity. When it binds to mu receptors in CNS at presynaptic nerve terminals inhibits GABA inhibitory neurotransmitter and stimulates dopamine from dopaminergic neurons involved in self reward effect, addiction, inhibiting cortisol secretion results in stress reduction, euphoria, tranquility of mind, analgesic activity [5,9-15].

Beta-endorphins binds to mu receptors present on immune cells such as macrophages, NK cells, T and B lymphocytes produce IFN- γ , opsonin, granzyme-b involved in anti-viral and antitumor activity (Figure 1). It is also involved in anti-inflammatory activity by stimulating parasympathetic activity and inhibiting sympathetic activity mediated inhibiting IL-1, TNF- α , IL-6 proinflammatory cytokines and activating IL-10, IL-18, IFN- γ , suppression of NF-KB, STAT-3 key transcription factors and inhibiting free radical release from cytokines TNF- α , IL-1 and immune cells such as macrophages, DCs, neutrophils.

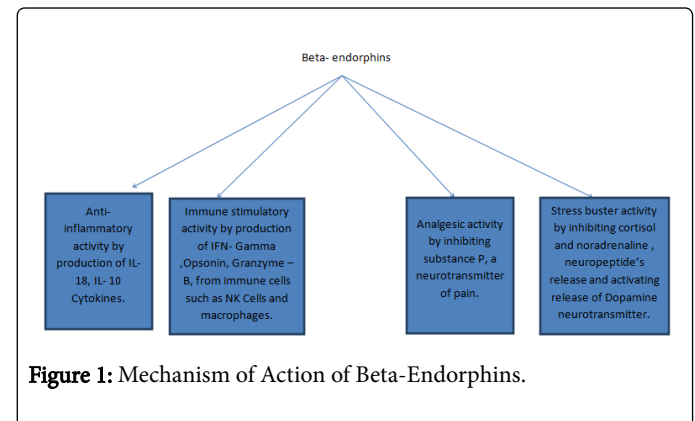


Figure 1: Mechanism of Action of Beta-Endorphins.

These are involved in cell damage, cell aging, cell death, genetic mutation and alters gene expression. P53 is a tumor suppressor gene is mutated in about more than 50% of all cancers by free radicals (ROS,RNS) and NO (nitric oxide) inflammatory mediators released by tumor associated macrophages, tumor associated neutrophils in tumor microenvironment. P53 tumor suppressor gene is antagonized by NF-KB, a key transcription factor in inflammatory tumor microenvironment induce chronic inflammation, immune-suppression, and tumor progression.

Beta-endorphins involved in inhibiting alteration of P53 tumor suppressor gene and its expression in tumor microenvironment by suppressing the antagonistic effect of NF-KB on P53. Suppressing the

inflammatory mediators such as free radicals (ROS, RNS) and NO released from tumor associated macrophages, tumor associated neutrophils, DCs involved in mutation of P53 in inflammatory tumor microenvironment and tumor progression [16-21].

Beta-endorphins involved in anti-inflammatory activity by stimulating parasympathetic nervous system activity and inhibiting sympathetic nervous system activity by inhibiting IL-1 β , TNF- α , IL-6 pro-inflammatory cytokines and COX-2, activating IL-10, IL-18, IFN- γ anti-inflammatory cytokines and suppression of NF-KB, STAT-3 key transcription factors involved in auto-immunity, chronic inflammation, cancer and immune modulation. Free radicals released from cytokines TNF- α , IL-1 and macrophages alter P53 tumor suppressor gene and mutation [22].

Beta-endorphins prolong aging by lengthening telomeres which otherwise shorten with age and also by suppression of free radical release involved in cell damage, cell aging and cell death [1].

Factors responsible for production of endorphins

Meditation, pranayama, intense physical exercise, acupuncture, music therapy release endorphins. Vigorous physical activity release endorphins creates psychological relaxed state known as runners high due to release of dopamine neurotransmitter involved in self reward, euphoria, cognition and addiction [23,10,14,15,4]. Endorphins are produced in our body in response to stress and pain acts as a holistic preventive, promotive, therapeutic and palliative treatment of choice in autoimmune diseases, cancer, infectious diseases, without adverse effects and inexpensive [24,25].

Conclusion and Future Perspective

Endorphins are neuropeptides produced from pituitary gland in response to pain and stress release CRH from hypothalamus activate HPA axis release cortisol and nor-adrenaline mediated activation of inflammatory mediators IL-1 β , TNF- α , IL-6 from inflammatory cells activate NF-KB, STAT-3 transcription factors involved in tumor progression, auto-immune diseases, infectious diseases. Beta-endorphins are abundant endorphins synthesized and stored in pituitary gland involved in immune stimulatory, anti-inflammatory, stress buster, analgesic activity in treatment of various diseases. It acts as a future preventive, promotive, therapeutic and palliative treatment of diseases and dose dependent action on prognosis of disease need to be known.

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