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THE IMPORTANCE OF RIBONUCLEASE PROTEINS IN IMMUNOPATHOLOGY: AN OVERVIEW

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Ribonucleases (RNases) are special enzyme group that are important as genome realization regulator and defense mechanism against infective pathogens. Over the past few years, many of the ribonuclease proteins have been studied and new knowledge has been obtained that can be used in many areas of molecular biology medicine.

Members of the RNase A family control number of immune reactions, as antiviral, antibacterial, and antifungal activities in innate immunity; the same is true for neurotoxicity. Antimicrobial activity for all human RNase A family is tissue-specific and selective. In addition, RNases 2, 3, 5 and 7 are involved in the regulation of allergy, as well as immunopathologic processes in the respiratory system and intestine.

Treatment of laboratory animals in an experimental study of thromboembolic disease resulted in the release of eRNA because of coagulation, inhibiting thromboembolism and reducing blood clotting. ECP not only has antibacterial activity, but is also a member of the RNASE A family with EDN. This two proteins had reviled to have RNase activity and potentially may be effective against ssRNA viruses.

Recent studies found that RNase 1 is considered a promising drug for the treatment of tumors. Because of RNase 1 high catalytic activity it`s may cause increasing of normal levels for inflammation and blood clotting.

RNase 5 or angiogenin (ANG) as inducer of new blood vessels responsible for the progression of cancer and amyotrophic lateral sclerosis. As with the cellular response to stress, RNase 1 and angiogenin have demonstrated a wide range of novel functions in different environments of the human body - from vascular homeostasis and inflammation to cell growth. ANG (RNase that is expressed only in vertebrates) is characterized of decreased ribonuclease activity but hight angiogenic potential and neuroprotective properties. Overexpression of ANG in PC12 cells occur in the generation of tiRNAs only in case of cell stress. This cells, overexpressing RNASE dependent tiRNAs even under small stress. This means that stress is important causative factor in RNASE-mediated tiRNA synthesis and inhibition of protein translation.

Endothelial RNase 1 characterized by atherosclerotic protective factor. During vascular injury and inflammation it activates by damage-associated eRNA. It is released when blood vessels are damaged, but long-term inflammation can stope RNase-1 expression and function through a mechanism in which high levels of eRNA and inflammatory cytokines activate transmission. Recent studies have shown that RNase 1 provoke breast tumorigenesis by activating process of transduction. Increased levels of EphA4 receptor tyrosine kinase expression and RNase 1 signaling are associated with poor clinical outcomes in breast cancer patients.

Also human Pol III and RNase P are involved in the innate immune response to DNA and RNA viruses. In general, it is reviled, that cells invaded by RNA viruses through a signaling pathway of the Pol III/RNase P axis initiate reaction of innate immune system. The rice RNase P subunit homolog Rpp30 may be important in non-specific protection against some fungi and bacteria.

Therefore, RNases realize number of immune functions like protection against infective pathogens, regulating genome realization and angiogenesis processes. Understanding new mechanisms of action and functions of RNASEs is important for practical medical research, developing novel methods of treatment.