

The problem of amino acid complementarity and antisense peptides.

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The review presents three hypotheses concerning the amino acid complementarity: 1) the Mekler-Blalock antisense hypothesis; 2) the Root-Bernstein approach based on stereochemical complementarity of amino acids and anti-amino acids coded by anticodons read in parallel with the coding DNA strand; 3) Siemion hypothesis resulting from the periodicity of the genetic code. The current state of knowledge as well as the results of the implementations of these hypotheses are compared. A special attention is given to Root-Bernstein and Siemion hypotheses, which differ in only few points of the complementarity prediction. We describe methods of investigation of peptide - antipeptide pairing, including circular dichroism, mass spectrometry, affinity chromatography and other techniques. The biological applications of complementarity principle are considered, such as search for bioeffector - bioreceptor interaction systems, the influence of peptide - antipeptide pairing on the activity of peptide hormones, and the application of antipeptides in immunochemistry. The possible role of amino acid - anti-amino acid interactions in the formation of the spatial structures of peptides, proteins and protein complexes is discussed. Such problems as the pairing preferences of protein - protein interfaces, the role of the pairing in the creation of disulfide bonds and the possible appearance of such interactions in β -structure are also examined. The main intention of the paper is to bring the complementarity problem to the attention of the scientific community, as a possible tool in proteomics, molecular design and molecular recognition.

Słowa kluczowe

complementary peptides, antisense peptides, antipeptides, anti-idiotypic antibodies, hydrophobic complementarity

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