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A new method to verify of the triplet code based on the interaction of the dipeptide - homologous oligomeric nucleotides under the UV radiation

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In the field of the origin of life, one of the theory suggests that the fraction of organic compound on Earth is from exogenous deliveries via comets or meteorites. While the another theory proposal is that life meteorial formed just on the Earth. However, wherever this matter come from, it must be accompanied with ultraviolet light (UV) radiation¹. The study of the photo stability of organic matters is an important task. There has been several reports on the destruction rate of amino acids or nucleic acid when irradiated with UV respectively. It's unknown whether there is the synergistic effect between the DNA and the amino acid, both of which are relative to the RNA.

There are many theories about the origin of the genetic code. The most popular theory is that certain amino acid was assigned to a certain triplet on the chain of RNA². Reported methods to confirm genetic code theory focused directly on small molecules by building a reasonable model. They were usually based on the interaction between the amino acid and the corresponding genetic code or anticodon to support their hypothesis³. Whereas, RNA chain is transcribed from a DNA chain and the amino is dependent on the sequence of coresponding RNA to synthesis peptide chain. So it's reasonable to believe that there is a relationship between DNA chain and the peptide chain. In order to make clear of the conjecture above, this work designed a research mode based on the interaction between the homology dipeptide and the homology DNA under the UV radiation. Phenylalanine dipeptide (PP) and the single strand poly (dA)₂₀ (sspA), poly (dT)₂₀ (sspT) or double strand poly (dA:dT)₂₀ (dspAT) were selected as standard material. The preliminary results (figure 1) showed that when the sspA, sspT or dspAT was added to PP solution, the remain amount increased greatly especially by adding dspAT. It also demonstrated that PP solution adding sspA exhibited more tolerant to UV radiation than that adding sspT. This result corresponds to the fact that the genetic code of phenylalanine is uracil which is complimentary to adenine. Compared with reported method from the perspective of biosynthetic pathways using small molecule mode, this protocol in turn chose the DNA chain and dipeptide to prove the genetic code reflected by the synergistic effect between the oligonucleotide and dipeptide under the UV radiation. The proposed method showed a new insight to research the genetic code.

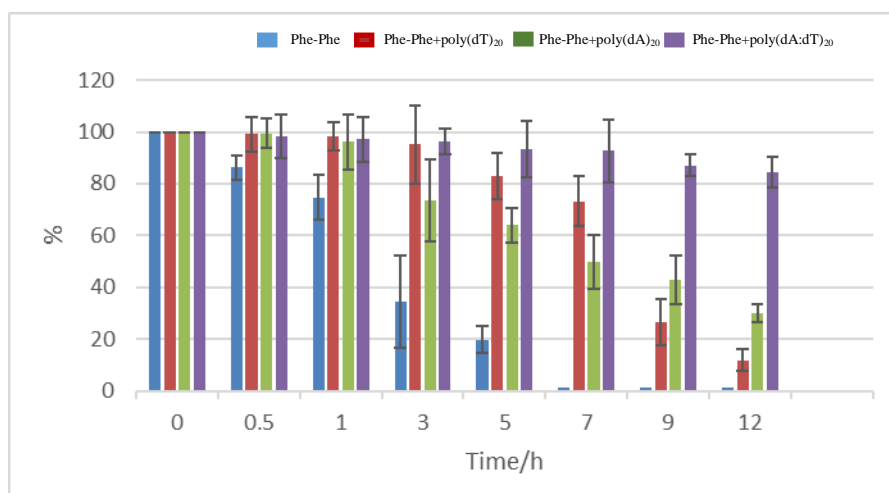


Figure 1. Rate of remaining compounds measured after the samples exposed to UV

Reference

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- [2] Brian K. Davis* (1999) *Progress in Biophysics & Molecular Biology* 72:157-243.
- [3] Gary L. Nelsestuen* (1978) *Journal of Molecular Evolution* 11:109-120.