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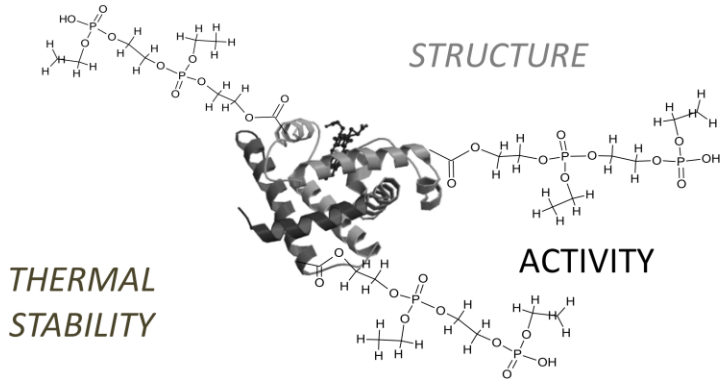
Evaluation of thermal stability of model protein-polymer conjugates.

Pelosi C.[a,b], Saitta F.[c], Wurm F. R.[b], Fessas, D.[c], Tiné M. R.[a], Duce C.[a].

[a] Dipartimento di Chimica e Chimica Industriale, Università di Pisa, Via Moruzzi, 56124, Pisa, Italy.
[b] Max-Planck-Institut für Polymerforschung, Ackermannweg 10, 55128 Mainz, Germany.
[c] Dipartimento di Scienze per gli Alimenti, la Nutrizione e l'Ambiente, DeFENS, Università degli Studi di Milano, Via Celoria 2, 20133, Milano, Italy.

chiara.pelosi@dcci.unipi.it

Protein-polymer conjugates are a new trend in biomedical chemistry for the treatment of several diseases [1]. The design of novel and efficient conjugates, as well a deeper understanding of the conjugate structure and its behaviour in solution has much academic and industry potential. Here, we present a calorimetric study on the role of the "gold standard" poly(ethylene glycol) (PEG) in some model bioconjugates, followed by the synthesis and evaluation of conjugates made with a new class of biocompatible and biodegradable polymers (PPE, poly(phosphoester)s), promising candidates in the biomedical field to substitute the polymer PEG [2]. The studies on the PEGylated proteins was carried out with nano and micro differential scanning calorimeters, and the evaluation of the thermograms obtained in different conditions have revealed the role of the polymer in preventing the drug aggregation, while at the same time its week interactions with the protein permit to preserve its biological activity. In the second part, after the test of the biocompatibility of the new polymers in simulated stomach fluid and in blood plasma, we have synthesised novel conjugates using PPEs of variable length, while the variation of the lateral group of the polymer is currently under investigation. Overall, the analyses conducted (including activity essay, calorimetry and fluorimetry measurements) show that the covalent attachment of the polymer does not irrevocably affect the protein's features under physiological conditions, suggesting the significant potentialities of this new class of polymers for the design of a new generation of conjugates classes.



References

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(2) T. Steinbach and F. R. Wurm *Angew. Chemie - Int. Ed.*, **2015**, 54, 6098.