## Peridinin is a Potent Antilipoperoxidant

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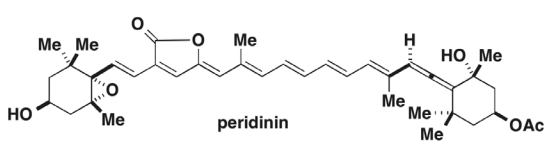
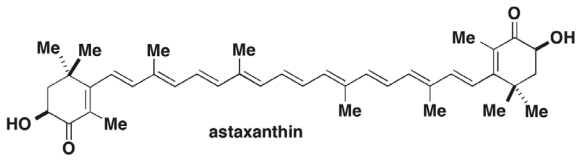
Polar carotenoids demonstrate the capacity to function as antilipoperoxidants, suggesting they may be able to act as small molecule surrogates for deficient human proteins that protect against lipid peroxidation. Astaxanthin is considered the "gold standard" carotenoid antilipoperoxidant, yet we have discovered that the structurally atypical carotenoid peridinin is an order of magnitude more potent. Three key mechanistic hypotheses which may explain the activity of peridinin have been investigated. While differential chemical reactivity and carotenoid-mediated alteration of lipid diffusion are unable to account for the divergent activity of peridinin and astaxanthin, we have found a striking difference in membrane localization for the two carotenoids. A series of solid state NMR experiments demonstrate that the majority of astaxanthin is localized extramembranously, while in contrast, peridinin is localized exclusively within the lipid bilayer, thereby allowing for its potent antilipoperoxidant activity.




## Genetic Incorporation of Non-Canonical Amino Acids into Lacticin 481: An Efficient Method to Enhance its Structural Diversity and Bioactivity

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Expansion of the genetic code has revolutionized the field of protein engineering and provided us with efficient probes to better understand and alter the properties of biological systems. Lacticin 481, a class II lantibiotic, is a ribosomally synthesized and post-translationally modified peptide. It exerts its bioactivity by inhibiting transglycosylation involved in the biosynthesis of peptidoglycan. Co-expressing lacticin 481 biomachinery with pyrrolysyl-tRNA synthetase mutant, PylRS-N346A/C348A, and its cognate tRNA gave us a phenomenal opportunity to install several phenylalanine derivatives at positions 19, 21, and 23 of lacticin 481 (where substitutions were previously identified to improve antimicrobial activity); expanding its structural diversity and allowing further structure activity relationship (SAR) studies.