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Effect of temperature on photochemical and thermal changes in calf skin collagen solutions ± hyaluronan at physiological pH

Mammalian collagens contain several age-related fluorescent chromophores that are unstable to solar UV wavelengths. The consequences of the resulting collagen photo-degradation are not well known, since the direct collagen–UV interactions are poorly described at best. We are studying these interactions by following UV–induced changes in collagen fluorescence as functions of time, temperature, and oxygen content. We postulate that UVC (254 nm) causes formation of dityrosine and the disappearance of a DOPA - oxidation product. The formation of dityrosine does not directly require oxygen and at T <50 o C is relatively insensitive to changes in temperature and age of sample. The DOPA - oxidation product accumulates with age and destabilizes the overall collagen supramolecular structure. Little is known about the ECM–collagen interactions. In preliminary experiments, we found that added hyaluronan (HA) stabilizes helical collagen at T <30o C and destabilizes it above Tm (~35o C). At T >50o C activation parameters seem to dominate, and added HA has little or no effect on collagen stability. Future studies will expand the scope of the UV excitation to longer (UVA) wavelengths, and assess the effect of the surrounding extra-cellular matrix with a model system.

Biography

Julian M Menter received his PhD degree in Chemistry from the George Washington University in 1969. He completed a postdoctoral fellowship with Prof. Dr. Theodor Foerster at the Institut fuer physikalische Chemie der Universtiaet Stuttgart, Germany. Subsequently, he was at the University of Alabama, Birmingham, and the VA Medical Center (Atlanta) He currently serves as Research Professor of Biochemistry at Morehouse School of Medicine. Dr. Menter is recognized internationally for his work in the areas of collagen photochemistry and melanin photobiology as pertaining to redox reactivity.

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