PHOTO-OXIDATION INDUCED MOLECULAR CHANGES IN DAIRY PROTEINS AND THEIR IMPACT ON THEIR ACE INHIBITORY ACTIVITY

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The importance of dairy proteins in the human diet is already recognized for many years because of their high nutritional quality, their versatile functionalities and their different bioactivities. One of these physiological activities is the ACE inhibitory activity of milk peptides. Many research is done in order to identify these specific peptides, however less is known about their presence after processing and storage of milk products. Since dairy products contain the photosensitizer riboflavin, photo-oxidation will result in oxidative deterioration during storage. Both proteins and lipids may be affected, resulting in a loss of nutritional quality and bio-activity. This study focuses on the molecular changes of dairy proteins during light induced oxidation. These molecular changes were correlated with alterations of the ACE inhibitory activity as determined by an in vitro ACE inhibition assay after gastrointestinal hydrolysis of the protein. Buffer solutions of whey and casein isolates containing different concentrations of riboflavin were stored for one month at 4°C under light. An increase in protein carbonyls and a decrease in the free thiol content and tryptophan content was seen for both whey and casein proteins for as long as riboflavin was present in the sample. Once the riboflavin was depleted no further oxidative changes were seen. The changes on amino acid level were more severe in casein isolate compared to whey isolate resulting in aggregation of the caseins after 15 days of storage, while no secondary changes were seen for the whey proteins. A loss of ACE inhibitory activity was seen for the caseins after storage, however no changes were seen for the whey proteins.