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Yulong Bao, Sjef Boeren, Per Ertbjerg



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Myofibrillar protein oxidation affects filament charges, aggregation and water-holding

Yulong Bao^a, Sjeff Boeren^b, Per Ertbjerg^{a*}

^a Department of Food and Environmental Sciences, University of Helsinki, 00014, Helsinki, Finland

^b Laboratory of Biochemistry, Wageningen University, 6708WE, Wageningen, The Netherlands

*Corresponding author: Tel.: +358 503183909; E-mail address: per.ertbjerg@helsinki.fi

Abstract: Hypochlorous acid (HClO) is a strong oxidant that is able to mediate protein oxidation. In order to study the effect of oxidation on charges, aggregation and water-holding of myofibrillar proteins, extracted myofibrils were oxidized by incubation with different concentrations of HClO (0, 1, 5, and 10 mM). Loss of free thiols, **loss of histidine** and formation of carbonyls were greater with increasing oxidation level and the particle size increased. Water-holding in the 5 and 10 mM HClO groups were greater than in the non-oxidized control. Isoelectric focusing (IEF) showed that the isoelectric point (pI) of oxidized proteins were lower compared to non-oxidized ones. The lower pI values of oxidized proteins suggests that oxidation increased the overall net negative charge of myofibrillar proteins solubilized for IEF. Here we propose a hypothesis that oxidation-induced increase in net negative charges is the driving force for improved water-holding in myofibrils, whereas protein cross-linking and aggregation have an opposing effect by decreasing the water-holding.

Keywords: carbonyls, free thiols, isoelectric point, particle size, **histidine**

1. Introduction

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