

**Title** Understanding texture changes of high pressure processed fresh carrots: A microstructural and biochemical approach

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### **Abstract**

The effects of high pressure processing on textural changes of fresh carrots were studied integrating microstructural and biochemical responses. For all conditions studied, a significant loss in hardness and increase in deformability during cutting was observed after 2 min of processing. Hardness losses of 5, 25 and 50% were found respectively for treatments at 100, 200 and 300 MPa (all at initial temperature of 20 °C). At higher pressure levels no further increase in texture losses occurred. There was limited evidence of recovery of hardness at 300 and 550 MPa.

Analysis of microscopy images provided insight into the mechanisms of textural changes, which included cell deformation related factors such as shape factor and elongation. Linear correlations between tissue hardness and the extent of cell wall breakage during cutting were observed. Textural changes of fresh carrot tissue due to high pressure processing were mainly associated with turgidity loss, a direct result of the applied hydraulic pressure. Changes in biochemical parameters (pectin methylesterase and degree of methylation) were limited and did not highly contribute to texture change at the studied conditions.