

**Title** Antioxidant levels in watercore tissue in 'Fuji' apples during storage  
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**Citation** Postharvest Biology and Technology, Volume 55, Issue 2, February 2010, Pages 103-107  
**Keywords** 'Fuji' apples (*Malus domestica* Borkh.); Watercore; Flesh browning disorder; Ascorbic acid; Ascorbate–glutathione cycle

### **Abstract**

Watercore usually spreads in mature 'Fuji' apples and may induce flesh browning disorders through unknown mechanisms. We analyzed H<sub>2</sub>O<sub>2</sub> and ascorbic acid (AA) contents and the activities of four enzymes involved in the AA–glutathione (AA–GSH) cycle in watercore and watercore-free tissues in 'Fuji' apple fruit during storage. H<sub>2</sub>O<sub>2</sub> levels always were higher in watercore than in watercore-free tissues. AA levels were lower in watercore tissues at harvest and decreased in both tissue types during the storage period. However, AA was completely absent from watercore tissue but not watercore-free tissue three months after harvest. Ascorbate peroxidase (APX) activities were always higher in watercore than in watercore-free tissues, and the activities of dehydroascorbate reductase (DHAR) decreased continuously after harvest in both tissue types. These results suggested that higher production of H<sub>2</sub>O<sub>2</sub> caused by anaerobic conditions in watercore activated APX which acted as a redox signal; the concomitant net consumption of AA was not balanced by the decline of DHAR activity, leading to decreased antioxidant levels. On the other hand, the gradual increases in monodehydroascorbate reductase (MDAR) and glutathione reductase (GR) activity observed during storage accompanied by low AA levels and DHAR activity might indicate a declining efficiency of the AA–GSH cycle.