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Roles of MSH2 and MSH6 in Cadmium-induced G2/M checkpoint arrest in Arabidopsis roots

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ABSTRACT

DNA mismatch repair (MMR) proteins have been implicated in sensing and correcting DNA damage, and in governing cell cycle progression in the presence of structurally anomalous nucleotide lesions induced by different stresses in mammalian cells. Here, Arabidopsis seedlings were grown hydroponically on 0.5×MS media containing cadmium (Cd) at 0-4.0 mg L^{-1} for 5 d. Flow cytometry results indicated that Cd stress induced a G2/M cell cycle arrest both in *MLH1*-, *MSH2*-, *MSH6*-deficient, and in WT roots, associated with marked changes of G2/M regulatory genes, including *ATM, ATR*, *SOG*1, *BRCA*1, *WEE*1, *CYCD*4;1, *MAD*2, *CDKA*;1, *CYCB*1;2 and *CYCB*1;1. However, the Cd-induced G2/M phase arrest was markedly diminished in the *MSH2*- and *MSH6*-deficient roots, while a lack of *MLH1* had no effect on Cd-induced G2 phase arrest relative to that in the wild type roots under the corresponding Cd stress. Expression of the above G2/M