A stereoselective total synthesis of aspergillide A, a cytotoxic 14-membered macrolide, was achieved. The \(cis\)-2,6-disubstituted tetrahydropyran ring was constructed via stereoselective reduction of an intermediate cyclic hemiacetal from a substituted lactone, which in turn was assembled in a single operation using our previously developed radical-ionic iodolactonization as the key step. The \(E\) olefin was created by means of a cross metathesis (CM). Finally, the macrocyclic lactone was constructed by a Yamaguchi lactonization.