

RBR modulates JKD–SCR–SHR complex assembly to regulate cell division in the root meristem

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Asymmetric cell division (ACD) is fundamental to root tissue patterning and stem cell maintenance, yet how the assembly and dynamics of regulatory protein complexes control ACD in a cell-type-specific manner remains poorly understood. RETINOBLASTOMA-RELATED (RBR) and JACKDAW (JKD) are key regulators of ACD in the Arabidopsis root meristem and both associate with the SHR–SCR transcriptional complex. Here, we show that RBR physically interacts with JKD and, together with SHORTROOT (SHR) and SCARECROW (SCR), forms a quaternary protein complex. Genetic analyses demonstrate that RBR and JKD act cooperatively to control ACD in the ground tissue. Using cell-type-specific FRET-FLIM analyses, we reveal distinct spatial dynamics of RBR interactions with JKD and SCR, with particularly strong associations in the quiescent center and cortex/endodermal initial. Strikingly, reducing RBR levels disrupts the characteristic spatial distribution of SHR–SCR, SCR–JKD, and SHR–JKD interactions, indicating that RBR modulates the assembly and binding dynamics of the SHR–SCR–JKD complex. We further show that auxin antagonizes these RBR-dependent protein interactions, linking hormonal signaling to the dynamic assembly of the ACD regulatory machinery. Together, our findings establish RBR as a key modulator of the SHR–SCR–JKD complex and reveal a mechanism by which RBR and auxin-dependent signaling control cell-type-specific protein

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