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The Role of the brassinosteroid associated kinase (BAK1) in plant cell defense

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Plants are able to resist bacterial and fungal infection by recognizing invading organisms outside the cell and then activating defense responses inside the cell. The first line of defense against invading organisms is known as the innate immune response. It is based on the recognition of pathogen-associated molecular patterns (PAMPs) found on pathogens (such as bacteria and fungi) by the plant cell. PAMPs induce defense responses through interaction with specific receptor proteins that are located on the membrane surface of the plant host cell. A well known PAMP is flg22, a 22-amino acid peptide derived from flagellum, the building block of bacterial flagellum which is important for the bacteria's mobility that enables it to move to the inside of the cell. In *A. thaliana*, the Flagellin Sensing 2 (FLS2) protein is the cell surface receptor that recognizes the bacterial PAMP flg22. Recognition of flg22 by FLS2 causes the plant to produce reactive oxygen molecules (ROS), which is an early defense response. Other plant defense responses include seedling growth inhibition and deposition of defense factors in the plant cell wall such as callose. In collaboration with Dr. Rathjen's lab, our lab has recently shown that the cell surface protein BAK1 (Brassinosteroid associated kinase 1) forms a complex with FLS2 after elicitation with flg22. The goal of this study was to characterize the role of BAK1 in innate immune responses to gain a better understanding in how BAK1 contributes to plant innate immunity against pathogen infections. In the future, we hope to use the knowledge gained from our studies and translate it into crop species such as tomato or rice to make these crop species more resistant against pathogen infection.