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Stem cells and neurons: New targets for SCN control?

Nathan Schroeder, Department of Crop Sciences, University of Illinois, Illinois, USA

The soybean cyst nematode (SCN) is one of the most destructive pathogens of soybean worldwide. SCN is primarily controlled through a combination of rotation and resistant soybean cultivars. Crop rotation is limited in its ability to reduce SCN populations. Similarly, SCN populations are adapting to the most common source of resistance. My laboratory is investigating previously unexplored aspects of SCN biology for potential novel controls targets. Specifically, we are examining the cellular bases of SCN immobility and its atypical growth pattern. Following infection of the soybean by second-stage juveniles (J2s), SCN establishes a feeding site where it becomes immobile. Following the molt into the reproductive adult stage, males regain their mobility while females remain immobile. Using a combination of light and electron microscopy, we found that females show a complete degeneration of body wall muscle while males only show structural abnormalities in body wall muscle. During development, females increase their volume by 400% and grow from a vermiform-shaped J2 into a lemon-shaped adult. We hypothesized that a set of stem cell-like “seam cells” along the lateral sides of the nematode contribute to this growth. Using synchronized infection and subsequent recovery of post-infection SCN from soybean plants, we found that the seam cells divide multiple times during a single juvenile stage thereby contributing hundreds of epidermal nuclei to the growing nematode. Interestingly, seam cells in the model nematode *C. elegans* also contribute to growth, but typically only divide once per juvenile stage contributing only 98 nuclei to the growing epidermis. This difference in cell division may account for the remarkable morphological changes seen in SCN. An understanding of the mechanisms regulating these processes in SCN may allow for the development of more targeted control strategies.