

## More than a Case Study: Optimism in the Biology Classroom

A few weeks ago, our students organized an “orange out” in support of JD, a 10th grade student battling cancer. Orange is his favorite color. JD was diagnosed as an 8th grader. His illness and extensive treatments have unfortunately prevented him from physically attending the high school most of the time, but he has worked diligently through our district’s home & hospital accommodations. In spite of his absence from our building, JD has remained a presence in our community. His older sister, a two-year student of mine, graduated last year. His younger sister attends the neighborhood elementary school. JD’s parents have been active in our school community, supporting their oldest daughter through a variety of our extra-curricular offerings, always showing up informed to parent conferences, building and maintaining positive relationships with our teachers and administrators. Student and staff participation in the orange-out for JD was tremendously high, and the building was full of positive energy. Pictures were shared widely on social media, both officially and unofficially. The family let us know that they were genuinely touched by our students’ endeavor to stand in solidarity with JD and raise his spirits.

Recently, JD lost his fight, and our community lost a child. Although I did not know JD personally, as his sister’s teacher, I had been kept in the loop by the family. Many of my current students did know JD and knew his older sister. I am proud of our school’s crisis response resources; our guidance office is wide open to students and staff, with at least one counselor available at all times for walk-in support. As a teacher, it is comforting to know that if I have a student who is particularly upset or troubled, there is a place I can send them to receive support from trained professionals.

I’m a trained professional, too. In biology—in the mechanisms of cells and chromosomes, of genes and their mistakes. What does it mean to teach about cancer in the wake of this tragedy? For me, delving into the biology provides some catharsis, a glimpse of understanding. We can zoom in on a single cell, consider the proteins the cell is and is not making, investigate the conditions in which a cell might proliferate. We can take a look at the seemingly random circumstances that might generate benign or malignant tumors. I can use the phrase “genetic predisposition” and seize the opportunity to highlight the impact of environmental conditions on gene expression. Cancer is neither personal nor purposeful; rather, it emerges from the behavior of molecules. Is this all I can

offer my students?

In a couple of weeks, I will be teaching the biology of cancer to my AP Biology students. It's a high-interest lens for considering the importance of the cell cycle and mitosis—biological phenomena which, in isolation, do not typically motivate even the most eager of science students. Although I'm now in my third year of teaching AP Biology, I haven't yet developed a coherent narrative for teaching about cancer and problems of cell division. Students consider a case study or two, often just for homework, after we've gone over the cell cycle. The cell cycle always seems to land at a particularly busy and rushed part of the school year, after too many snow days and near spring break and not too far out from the AP exam. I'm sure I've never devoted as much class time to delving into cancer as my students would like.

JD is not a case study. He was a teenager with a loving and supportive family, with a close circle of friends, with a favorite color and enough motivation to tackle advanced coursework as a freshman and sophomore undergoing intensive cancer treatments. The treatments available for JD owe their existence to biologists who have worked relentlessly to unravel what Siddhartha Mukherjee calls the “**emperor of all maladies**.” If biology gives us insight into the molecular misbehavior underlying cancerous cells and tissues, it also allows us to pinpoint unanswered questions and unexplained observations. These gaps in our collective biological knowledge are not dead ends—they are gateways into the future of biology. Biologists who can ask and pursue the right questions can contribute to improving the kind of treatment available for people like JD. Biologists who wrestle with observations and data about cancerous cells and tissues can illuminate causes and mechanisms that might be exploitable for therapy. The more we know, the more hope we have.

And perhaps that's what I can offer my students—optimism by way of biology. JD and his family had hope, pursuing treatments and seeking some semblance of normalcy. My students offered up their hope through orange t-shirts and headbands. Biological understanding can bring its own measure of hope for the future. My students and I can appreciate how far we have come in understanding and battling cancer, and we can marvel together at the possibilities further biological research offers. By considering the power of scientific questions, data, and explanations, my students may be able to feel some hope that the biological

community will continue to improve the lives of those individuals and families struggling with cancer.

The study of biology can't ease the loss of a human life. However, the study of biology is surely the only path forward in the fight against the suffering caused by cancer. For my students this year, that will be the approach we take as we investigate cancer in my classroom.