



Sample PBL Problem from Introductory Life Sciences Course

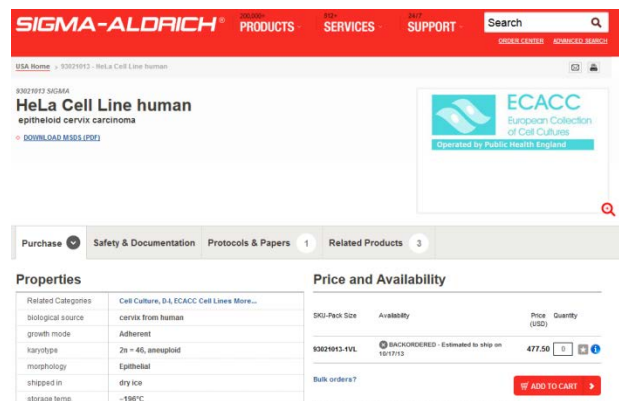
Note:

These sample materials were developed at UCF and are included in the CREATES Toolkit Co-creative Learning as a sample PBL problem. For more information and additional educational tools, visit: <http://europe-creates.eu>

Patient HeLa

In January, 1951 Henrietta Lacks was referred by her doctor to Johns Hopkins Hospital in Baltimore, because she suffered from abnormal bleedings between her regular menstrual cycles. The gynecologist Howard Jones, working at the hospital, discovered a small tumor of purple color on her cervix. Since the tumor was unknown to Jones, he performed a biopsy of it and sent a sample to George Gey, who had worked on cell growth for quite some time. He had tried to cultivate an immortal cell line, that is, a line of cells which would proliferate *in vitro* without eventually dying. This kind of cell line would allow prolonged and more accurate research on cells which usually die after a short time after having been removed from an organism. Mary Kubicek, a researcher in Gey's lab, was successful in establishing an immortal cell line using Henrietta Lacks' cells. Meanwhile, Lacks was fighting her cancer, and, although the doctors applied several therapies she passed away in October 1951 without knowing that it was her cells that had led to a breakthrough in cell biology.

Gey shared his cell culture with many labs all over the world, and, since the cell line grew larger, more and more labs were able to do research on them. Today's knowledge of fundamental processes in malignant and healthy cells was largely derived from HeLa cells, but they also played an important role in applied research, for example, in the development of a vaccine against poliomyelitis (Polio). Soon, Gey's method was used to establish other cell lines, including those from healthy humans and animals, which were collected and made available to researchers through cell banks. Private companies started growing HeLa cell lines and selling them. You can still order them online.



The screenshot shows the Sigma-Aldrich product page for HeLa Cell Line human. The page includes a navigation bar with 'PRODUCTS', 'SERVICES', and 'SUPPORT'. The main content area displays the product name 'HeLa Cell Line human' and its biological source 'epitheloid cervix carcinoma'. Below this, there are tabs for 'Purchase', 'Safety & Documentation', 'Protocols & Papers', and 'Related Products'. The 'Properties' section lists details such as 'biological source: cervix from human', 'growth mode: Adherent', 'karyotype: 2n = 46, aneuploid', 'morphology: Epithelial', 'shipped in: dry ice', and 'storage temp: -190°C'. The 'Price and Availability' section shows the product is 'BACKORDERED - Estimated to ship on 10/17/13' with a price of 477.50 USD. An 'ADD TO CART' button is visible at the bottom right of the product details.

Screenshot from a company selling HeLa cells online.

However, it soon came out that some of the cell lines, were not the ones the researchers thought. Stanley Gartler and Walter Nelson-Rees were among the first to call attention to the problem of inter- and intra-species cross-contamination in cell cultures. Nelson-Rees analyzed a number of cell lines and showed that they were actually HeLa cells. They had contaminated and subsequently overgrown the other cell lines, e.g. due to poor hygiene standards in the laboratories, leaving researchers with the false assumption of working with the original cell lines, leading to possibly false conclusions.

Literature

- Masters, J. R. (2002). HeLa cells 50 years on: the good, the bad and the ugly. *Nature Reviews Cancer*, 2(4), 315-319.
- Skloot, R., & Turpin, B. (2010). *The immortal life of Henrietta Lacks*. New York: Crown Publishers. (available in the reading room)