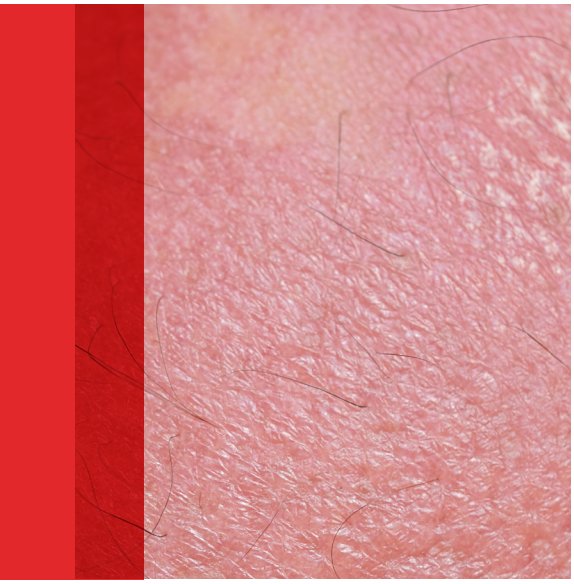
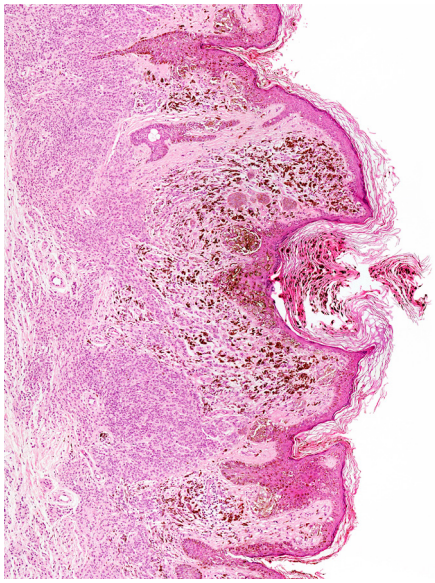
Argonne NATIONAL LABORATORY

U.S. DOE X-RAY LIGHT SOURCES HELP DESIGN DRUG THAT HALTS SKIN CANCER PROGRESSION





Frequently or severely sunburned skin (left) can cause skin cancer, as seen in the microscope image on the right. Zelboraf®, a drug developed with the help of x-ray light sources, can limit the cancer's growth.

To help design the drug Zelboraf®, which can halt the progression of malignant and inoperable skin cancer, scientists used x-rays from three U.S. Department of Energy (DOE) Office of Science research facilities including the Advanced Photon Source (APS) at Argonne National Laboratory.

The x-ray beams and an experimental technique called "macromolecular crystallography" allowed the researchers to determine (image) the structure of a cancer-causing mutated protein.

They used macromolecular crystallography to search through hundreds of molecules and determine the structure of the one molecule that could halt the cancer's spread in order to develop a drug that would prevent the enzyme from multiplying.

The molecule the scientists selected to use in the drug functions like a lock-and-key mechanism, binding tightly to the mutated protein and blocking signals from it that tell cancer cells to multiply.

IMPACT

Melanoma is the leading cause of death from skin disease. The American Cancer Society's estimates for melanoma in the United States for 2016 are:

- About 76,380 new melanomas will be diagnosed (about 46,870 in men and 29,510 in women).
- About 10,130 of these people are expected to die of melanoma (about 6,750 men and 3,380 women).

The rates of melanoma have been rising for the last 30 years.

Zelboraf® is the first drug to treat advanced melanoma by targeting a specific gene mutation. Zelboraf® was extremely successful during clinical trials in disrupting the disease and extending the lives of those who were diagnosed with it.

As of July 2012, Zelboraf® has been used to treat 11,000 patients worldwide and has been approved for use in 43 countries.

PARTNERS

Researchers from Plexxikon, Inc., and Genentech, the drug discovery and manufacturing companies, respectively, that developed the melanoma treatment, used the APS x-ray light source at Argonne and two other DOE national laboratories—SLAC National Accelerator Laboratory and Lawrence Berkeley National Laboratory. The research at the APS was carried out on the Argonne Structural Biology Center x-ray beamlines.

FUNDING

The U.S. Department of Energy's Office of Science funds the APS and the Structural Biology Center. Plexxikon paid for use of the APS x-ray beamline.

MORE INFO

http://www.aps.anl.gov/News/APS_News/Content/APS_NEWS_20110822.php

http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm268241.htm

TIMELINE

Clinical trials of Zelboraf® started in 2006, and the U.S. Food and Drug Administration approved it for use in August 2011.

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