

Bacterial gems against skin cancer

A high school student team of Heidelberg Life Science Lab at the German Cancer Research Center (DKFZ) wins high-profile Synthetic Biology competition

Genetic engineering and jewelry – how do these two go together? The answer is provided by a team of five high school students of the Heidelberg Life Science Lab (LSL) located at the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ). As part of the International Genetically Engineered Machine (iGEM) competition, the young researchers have re-programmed bacteria in such a way that they warn against cancer-provoking UV and X-ray radiation. “When our genetic material is hit by radiation, this causes dangerous DNA breaks. Fortunately, there is a repair mechanism in the cell that becomes active in case of DNA damage,” explains Jakob Kreft, one of the participants in the competition.

Jointly with Charlotte Bunne, Anna Huhn, Mariam Harmouche and Stefan Holderbach, he is constructing a synthetic system based on standard biological parts called BioBricks, which indicates the activity of the cellular repair mechanism with a color signal and, thus, makes the radiation dose directly visible. “We were thrilled when we saw that our system is really able to indicate health-hazardous doses of UV radiation. That was the highlight of our project work,” says Mariam with enthusiasm.

“To encourage people to wear our radiation detectors, for example when sunbathing, we have developed, besides our scientific project work, an exclusive jewelry collection and integrated our radiation sensor into it,” says Charlotte, explaining the kicker of their living detector.

Together with their scientific mentors from DKFZ and Heidelberg University, the five young researchers presented their project last weekend at the international iGEM 2012 High School Jamboree in Greenfield, Indiana, U.S.A., and won the competition among 17 entering teams from the USA, Europe and Asia. To sum up: The Heidelberg team succeeded in winning not only the Grand Prize, the GreenBrick Trophy, in the shape of a giant lego brick, but also five of ten special prizes including three for best experimental measurement, best presentation and best website.

The GreenBrick Trophy will remain at DKFZ's Life Science Lab for one year. Next year, there will be another round of competition for high school teams from all over the world competing for this prestigious award. Of course, the Heidelberg LSL intends to participate again.

iGEM (international Genetically Engineered Machines competition) is a Synthetic Biology competition held by the Massachusetts Institute of Technology (MIT) in Boston, USA, since 2003. Since then iGEM has grown into one of the largest international science competitions. iGEM collects standardized biological parts in a library which is provided to participants for use in their projects.

This year, the iGEM Foundation was spun out of MIT as an independent non-profit organization. In 2011, the iGEM competition was expanded into having not only the collegiate division, but also a competition for high school students. The Heidelberg LSL team is the first high school student team from Germany to participate.

The trip of the young researchers to the 2012 iGEM HS Jamboree was sponsored by companies Abbot and Promega, the Baden-Württemberg Youth Foundation, the “Freundeskreis des Englischen Instituts Heidelberg”, and the Life Science Lab Alumni.

The German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) with its more than 2,500 employees is the largest biomedical research institute in Germany. At DKFZ, more than 1,000 scientists investigate how cancer develops, identify cancer risk factors and endeavor to find new strategies to prevent people from getting cancer. They develop novel approaches to make tumor diagnosis more precise and treatment of cancer patients more successful. Jointly with Heidelberg University Hospital, DKFZ has established the National Center for Tumor Diseases (NCT) Heidelberg where promising approaches from cancer research are translated into the clinic. The staff of the Cancer Information Service (KID) offers information about the widespread disease of cancer for patients, their families, and the general public. The center is a member of the Helmholtz Association of National Research Centers. Ninety percent of its funding comes from the German Federal Ministry of Education and Research and the remaining ten percent from the State of Baden-Württemberg.

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