

Medical News

The teenage scientist revolutionizing cancer detection

Jack Andraka, from Crownsville, Maryland, USA was the recipient, at the age of 15, of the 2012 Gordon E. Moore Award that worth \$75000, the grand prize of the Intel International Science and Engineering Fair and is being introduced as a young inventor, scientist and cancer researcher for his ground breaking invention of early detection of pancreatic cancer.

He was an average but very curious boy who enjoyed mountain biking, whitewater rafting, kayaking, and science until his uncle died of pancreatic cancer. The overall survival of this malignancy is only 3-5% with median survival of 6-10 months for those with locally advanced disease and 3-5 months if metastases are present.

In looking for answers, he found that one reason for the poor survival rate from pancreatic cancer was the lack of early detection and a rapid, sensitive, inexpensive screening method. He began to think of various ways of detecting and preventing cancer growth and terminating the growth before the cancer cells become pervasive.

Jack Andraka used what he found through Google searches and free online science journals to develop a plan and a budget. He then contacted 200 professors at Johns Hopkins University and the National Institutes of Health with a plan, a budget, and a timeline for his project in order to receive laboratory help. He had received nearly 200 rejection emails before he got a positive reply from Dr Anirban Maitra, Professor of Pathology, Oncology, and Chemical and Biomolecular Engineering at Johns Hopkins School of Medicine.

The result of his project was a new dipstick type diagnostic test for pancreatic cancer using a novel paper sensor, similar to that of the diabetic test strip. This strip tests for the level of mesothelin, a pancreatic cancer biomarker, in blood or urine, to determine whether or not a patient has early-stage

pancreatic cancer. The test is over 90 percent accurate in detecting the presence of mesothelin. According to Andraka, it is also 168 times faster, 26,000 times less expensive (costing around three cents), over 400 times more sensitive than the current diagnostic tests and only takes five minutes to run. He says the test is also effective for detecting ovarian and lung cancer, due to the same mesothelin biomarker they have in common.

Andraka cultured MIA PaCa cells, from a commercial pancreatic carcinoma cell line, which overexpress mesothelin, a biomarker for pancreatic cancer. The mesothelin was isolated, concentrated and quantified with ELISA. After optimization with the Western Blot assay, the human mesothelin-specific antibodies were mixed with single walled carbon nanotubes and used to coat strips of ordinary filter paper. This made the paper conductive. The optimal layering was determined using a scanning electron microscope. Cell media spiked with varying amounts of mesothelin were then tested against the paper biosensor and any change in the electrical potential of the sensor strip (due to the changing conductivity of the nanotubes) was measured, before and after each application. Specifically, what happened was this: The antibodies would bind to the mesothelin and enlarge. These beefed-up molecules would spread the nanotubes farther apart, changing the electrical properties of the network: The more mesothelin present, the more antibodies would bind and grow big, and the weaker the electrical signal would become.

He is definitely a science prodigy. We have to wait for the future whether this boy is among those who are going to change our world by their inventions.

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Medical Jokes

Problems of aging

Three old guys are talking about the problems of aging. "I have to stand there forever to complete my urination." "Yeah," says another. "And I'm always constipated, Pitiful." Third guy says, "Well, with me it's just like clockwork: every morning at 6 am I urinate; at 7 I have a nice bowel movement, and around 8, I wake up."

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