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The right dose for oncology

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EPFL researchers develop a tool for oncologists using the electrical signature of cancer cells to get just the right treatment dosage for each patient.

King Mithridates understood that poison is only as good as the dosage taken. Each day, he ingested small quantities of poison in order to become immunize and escape his court's plotters. Oncologists run up against the same principle when fighting cancer. Sometimes, a small dose of chemotherapy may induce dangerous resistance mechanisms in malignant cells, resulting in relapse. Now, EPFL research published in the journal *PLOS ONE* reports a tool that could simply and accurately determine the right dose for individual patients.

Dosage, a vital issue

This novel tool, developed by Philippe Renaud's team at EPFL, is based on a very simple principle: a cell's electrical conductivity depends on the level of stress induced by chemotherapy. In broad terms, by measuring a cancerous cell's capacity to conduct electricity, researchers can assess the intensity of the treatment's effect.

"When chemotherapy induces very little stress in cells, particularly after the application of a small dose, there is a problem," says Robert Meissner, a co-author of the study. "Not only is its effect not sufficient to kill the affected cells, but this actually increases the risk of inducing resistance, which will eventually make the treatment ineffective."

This is vital during relapse as cells have already developed resistance mechanisms and sometimes oncologists don't have an effective alternative therapy. Hence, it is fundamental to apply the right dose from the start.

Step towards personalized oncology

The method developed at EPFL could help doctors make more patient-specific decisions. "We fully subscribe to the trend of personalized medicine," explains Philippe Renaud. "By making a simple biopsy, oncologists could test the way a particular patient's cells respond to different types of treatments at various doses."

The tool, which was designed for a clinical environment, provides a simple and fast analysis without affecting the treated cells. Unlike methods based on biomarkers, which kill cells and are extremely strenuous to perform, the EPFL technology could be implemented easily in a medical environment. In fact, scientists have already tested it on malignant breast cells treated with a standard drug, doxorubicin.

The EPFL team is currently in discussion with oncologists to continue jointly developing their procedure. Within a few months, researchers say, a startup company will likely be created to help bring the laboratory work into the hospital setting.

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