in the Amazonian medicine ayahuasca—can produce similar results.

Nor is taking a drug even necessary. Investigators seem to agree that the salutary effects come not from the compounds themselves but from the spiritual epiphany they produce, so nonpharmacologic ways of achieving the same outcome should be just as beneficial. For example, many people use meditation to attain a transcendent state similar to that produced by psilocybin, and evidence indicates that the changes in brain activity evoked by the drug mimic those seen in Buddhist monks while meditating. Ross pointed out that throughout history, people have used prayer, fasting, dancing, and even sex to expand consciousness.

“Palliative-care doctors will tell you people can have these shifts toward the end of life that really transform the relationship of the patient to the dying process, so we know that humans are capable of [profound changes],” said Roland Griffiths, Ph.D., professor of behavioral biology at Johns Hopkins University, who has studied psilocybin in healthy volunteers and is now recruiting subjects in Houston; the Vall d’Hebron Hospital in Barcelona, Spain; the Chaim Sheba Medical Center in Tel Aviv, Israel; and the Gustave Roussy Institute in Villejuif, France. The trial will enroll 200 patients in two arms: One group will receive treatment according to tumor DNA characteristics, and the other will receive treatment according to tumor DNA.

Twoyear WINTHER trial will be conducted at four institutions around the globe: the University of Texas M. D. Anderson Cancer Center in Houston; the Vall d’Hebron Hospital in Barcelona, Spain; the Chaim Sheba Medical Center in Tel Aviv, Israel; and the Gustave Roussy Institute in Villejuif, France. The trial will enroll 200 patients in two arms: One group will receive treatment according to tumor DNA characteristics, and the other will receive comprehensive analysis of RNA, microRNA, and DNA of both tumor and normal tissue, along with a bioinformatics-driven score designed to estimate the odds of response to several treatment options.

Also this year, a research team at the Fred Hutchinson Cancer Research Center reported in the May 16, 2012, issue of Science Translational Medicine that they could detect MRD in T-lymphoblastic leukemia patients by using a highly sensitive technology allowing patient samples to be processed in less than a week, and it carries a low rate of false positives and negatives. Specifically, the test identifies genetic rearrangements in the T-cell receptor that genetically define the leukemia. The presence of abnormal cells after treatment can indicate relapse and a need for further treatment to eliminate the remaining cancer cells. The researchers have applied for a patent and have licensed the technology to Adaptive Biotechnologies, which has applied for U.S. Food and Drug Administration approval to market the test.

The research team, led by Harlan Robins, Ph.D., a computational biologist at the Fred Hutchinson Cancer Research Center, and Mardis, Ph.D., codirector of the genome institute at Washington University in St. Louis, Mardis, who was not involved in the research, leads a team that provides high-throughput sequencing to several cancer-related research projects. She pointed out that the cost of stem cell treatment for leukemia can run $300,000–$800,000, and using a more sensitive technology to identify patients most likely to benefit from treatment could actually save money.
The key to bringing high-throughput sequencing to the clinic will be reducing turnaround time, identifying enough mutations that can affect clinical decision making, and providing reports in a format that fits into what oncologists are used to seeing, she said, adding that rapid progress is being made on all three fronts.

“We’re at the point where we can handle significant throughput, and the price point is already competitive with what they do now,” Robins said about the MRD test. Over time, he added, as physicians become comfortable with the technology and realize they get more information than from flow cytometry, he predicted it will become hard not to adopt it. However, how the test would be administered remains unclear, because the technology supporting it is so new to CLIA (Clinical Laboratory Improvement Amendments)-certified reference labs.

“A bit needs to get figured out,” said Robins. “Who would actually be running the test? Is our best path to use local reference labs to use the technology, or is it better off being centralized and having people send us samples? Those are questions that we are wrestling with a little bit now. Part of the issue is that the sequencing technology can be a bit finicky, and being experts in it makes a big difference.”

Working Models of Genomics in the Clinic

Few working models exist to describe how genomics would fit into the clinic, and one of the largest is being organized by John McPherson, Ph.D., genome technologies director, and his colleagues at the Ontario Institute for Cancer Research in Toronto.

The Toronto research team is using whole-genome sequencing to guide treatment for late-stage patients with 10 types of solid tumors at four hospitals, along the lines of the proposed WINTHER trial. McPherson reports that in about one-third of cases, they find mutations that suggest treatment with a therapy targeted to a particular metabolic pathway. Results are presented at a regular tumor board meeting, one that included the genomics researchers.

“I think we are ready now to make a clinical difference,” said McPherson. “Looking for recurrence and residual disease, I think, is a really important application.”

McPherson said his research team is publishing results from the research team’s first 2 years of experience.

“What [the Ontario group has] done is actually really impressive,” said Michael Berger, Ph.D., a genomics researcher at Memorial Sloan–Kettering Cancer Center in New York. “I think we are all headed in that direction, but what they’ve done in setting up a system is admirable. They are leading the way to some degree.”

Berger said current efforts in his lab, which involve complete sequencing of a large bank of tumor samples housed at Memorial Sloan–Kettering, aim to offer a retrospective database of mutations against which to compare future samples. However, he added that for the foreseeable future, an expert level of analysis will be necessary to interpret findings, because mutations, even in the same gene, may not have the same effect; conversely, mutations in different genes along the same metabolic pathway can lead to a similar deleterious result.

Mardis concurs, “Just getting the central facts that you need is important,” she said. “Medical interpretation is a much harder, human-centric activity that’s going to require the ability to coalesce that information into a tangible set of clues for the patient’s oncologist in an evidence-based approach to medicine. That’s the hard part.”

© Oxford University Press 2012. DOI:10.1093/jnci/djs466

A Tale of Two Countries: Lung Cancer Care in Brazil and China

By Merrill Goozner

L ung cancer persists throughout the world, but wide disparities in care exist, particularly between developing countries and advanced industrial nations. Even developing countries with high-growth economics face obstacles not often encountered in developed nations. Screening is not as widely available, so diagnoses often come late, decreasing survival rates.

Brazil and China are two examples of high-growth developing countries facing challenges in delivering lung cancer care, as revealed at the 2012 annual meeting of the American Society of Clinical Oncology in Chicago.

Antismoking Campaigns

Brazil has been a global leader in smoking reduction. Beginning in the early 1990s, the nation of 190 million banned smoking in public places, restricted tobacco advertising, hiked cigarette taxes, and initiated smoking-cessation counseling through its public health system. In 2003, Brazil became one of the first countries to sign the World Health Organization’s (WHO) Framework Convention on Tobacco Control.

Smoking rates dropped dramatically, going from nearly a third of the adult population in the late 1980s to 17% in the 2000s. The ongoing campaign has aims to reduce smoking rates to no more than 7% by 2030.

China is in a different situation. The tobacco industry is huge, and the government is not in the business of curbing smoking. The Chinese government has tried to educate the public about smoking’s dangers, but it has also tried to cooperating with the tobacco industry. The country’s tobacco industry produces about $200 billion in sales per year, which makes it China’s second-largest private-sector employer.

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