

Defeating Diabetes

Student-Faculty Research Battles Global Epidemic

By Michele Reed

The refrigerator hums in the Molecular Biology and Biochemistry Center in Room 326A of Snygg Hall. Under the glare of fluorescent lights, **Mike Kiley '09** is perched on a lab stool, his hands under a Plexiglas hood. Slowly, painstakingly, he pipettes a solution from one flask to another. It is a tedious task, but one with a potentially huge payoff. Kiley is culturing pancreatic cells to use in experiments exploring how the African plant *Psidium guajava* fights diabetes.

Kiley is working with Chemistry Professors Kestutis Bendinskas and Webe Kadima, under a Student-Faculty Collaborative Challenge Grant, funded in part by a donation from **Tim Murphy '74**.

Diabetes is an epidemic around the world, and the research Kiley, Bendinskas and Kadima are doing could have enormous consequences.

"This is serious work — work which has a potential to produce a solution for a worldwide health problem," says Kadima. More than 20 million people in the United States and 400 million worldwide suffer from diabetes. "There is no cure as of now," Kadima adds.

"Diabetes is a disease that is affecting 7 percent of the U.S. population," says Kiley. "Maybe there's a chance my work could help a lot of people."

He notes that he has family members affected by the disease. It's something he has in common with Kadima, whose father died of complications from diabetes.

Kadima, who graduated from the University of Kinshasa in the Republic of Congo, first brought nine plants, including *Psidium guajava*, from her native Africa, where traditional healers used them to



COURTESY OF WEBE KADIMA

Scientists at Kinshasa University measure the blood sugar of mice using a glucose meter (above). The Congo River (right) flows through the world's second largest rainforest where plants grow that can be used to fight diabetes.



COURTESY OF WEBE KADIMA

treat diabetes. Before he died in 1981, her father turned to traditional remedies. "My attitude was that it was wrong, that it would kill him," Kadima recalls. "My attitude has changed a lot since then."

She has become convinced that herbal medicines like these plants are effective, although why they are is still a mystery — one that Kiley, Bendinskas and Kadima hope to solve. "We know it works, but we don't know how it works," Kiley says.

In Kinshasa, Kadima works with researchers who are testing the plants' efficacy against diabetes in mice. They distill an extract of the plant and feed it to the mice.

Using glucose meters like those sold over the counter in American drug stores, they check the rodents' blood and compare it to a control group.

"When we give the mice the extract, the glucose level decreases faster and reaches a lower level than for control mice," explains Kadima.

In the lab on the Oswego campus, the researchers are culturing pancreatic cells and exposing them to the *Psidium guajava*, in the hope that they can figure out exactly how the plant fights diabetes.

"It could stimulate or simulate insulin, and we are trying to find out which," says Kadima.

Insulin, the natural molecule that controls metabolism of glucose, is made in the pancreas.

When there is a high level of sugar in the bloodstream, insulin is released and acts as a key to allow sugar into cells (for example, muscle cells) where it is broken down or metabolized.

In the lab, pancreatic cells release insulin when glucose is provided. So the first thing Bendinskas advised Kiley to do was add glucose to the cells. Then plant solutions were added to see if it increased or decreased insulin production in the cells.

“If we can find something that works and how it works, we can develop preparations that can be used by diabetics at a cost people can afford,” says Kadima. “Many people in poor countries cannot afford treatment. There is still a need to develop drugs that are affordable to all.”

Natural healing

With research, perhaps other traditional remedies could be made available to people fighting diseases. “The flora is rich in many places around the globe,” Kadima says. “It’s worth investigating what treatments may be available.”

She believes that natural remedies are better, because they have fewer side effects than synthetic drugs since they don’t use artificial “fillers.”

Also plant extracts don’t only have the specific molecules that act, they have a lot of other substances. Although no systematic studies have been conducted as yet, Kadima believes they act in concert, which may explain why they have fewer side effects and work better.

Kadima’s research bridges schools of pharmacy, chemistry departments and medical schools. She also spends a lot of time with native healers, listening to them and learning their ways.

People don’t take traditional healers seriously because they don’t have the backing of the scientific community. “I wanted to develop a team to help provide the evidence needed to prove the plants’ effectiveness,” says Kadima.

Like so many other collaborations, this one began with a casual conversation. Kadima told Bendinskas about her work with the basic chemistry of insulin and how she was interested in moving a step further, toward real systems, working in cells. “He said, ‘I can help! I can do work on cells,’” she recalls. Kadima and Bendinskas gathered a team to collaborate between Kinshasa and Oswego.

JIM RUSSELL '83



Mike Kiley '09 (center) and Professors Kestutis Bendinskas (left) and Webe Kadima (right) collaborate on a project to study African plants that fight diabetes.

While the technical, scientific part of the project is great, even greater is the connection between people. “We need to understand each other,” Kadima says. “It goes to show how we need one another.”

Global perspective

Each December and every summer, Kadima travels from Oswego to Kinshasa, where she works with local healers and professors at the university. Farmers in

the area harvest the plants, which are dried on large racks. Some leaves are crumbled and Kadima brings leaves, powder and extracts back to Oswego in her carry-on luggage.

Kadima is excited to get students involved in a global project. “It’s a window onto a world many miles away, and also involves them in a problem that is so close to home,” she says. “I hope our students feel proud of being involved in an inter-

national project. They can impact what is happening continents away.”

Having international experience also makes students more competitive in the job market. “We are in the 21st century and our economies are so connected,” Kadima says. “Our students need to develop a global perspective.”

Bendinskas sees collaboration with the students as a key part of this grant. “It makes students an equal researcher,” he says. “It forces them to think in terms of graduate students rather than undergraduates and better prepares them for medical school.”

The researchers feel Oswego is an ideal setting for this type of collaboration. “I found a community here very interested in teaching and learning; it’s

one of the reasons I came,” Kadima says. “A lot of effort is put forth to maximize the learning experience for students.”

Kiley agrees. “I had no idea how much help would come my way,” he says. “The faculty [at Oswego] is interested in making a connection with students, and helping them thrive.” He found plenty of support among his professors. “The faculty is really interested in helping you develop, to become a better student and a better person in general.”

Kadima says Kiley is a perfect student partner. “He is so independent and driven on this project,” she says. “We would find him in the department at odd hours. [The project] took a lot of persistence and hard work. He has perseverance and patience,” she says. “Without him we would not

have made progress in identifying the effects of glucose on insulin production in these cells.”

Bendinskas agrees. “Mike has outstanding observational skills — the best of any student I’ve ever worked with,” he says. “He’s very patient. This type of work requires him to feed the cells every other day. It can take half of the whole weekend to do an experiment and he is committed enough to actually complete it.”

Donors provide the seed

Philanthropy was important to helping this project get off the ground.

Festa Fellowships Promote Leadership

There’s no question the *Inspiring Horizons* campaign has made a difference at Oswego: a campus transformation, a stronger curriculum and a renewed enthusiasm for all things green and gold.

The unprecedented investment is also making a difference in students’ lives through programs like the Festa Graduate Leadership Fellowship, established by **Fred ‘81** and **MaryLynn Barbero Festa ‘82** in 2006. The Festa Fellowship provides exceptional graduate students with a resumé-building job and provides an up-to-\$10,000 stipend to help cover living expenses for the one-semester term.

Erison Rodriguez ‘05 says his fellowship with the SUNY Oswego Metro Center in Syracuse has taken him places he didn’t think possible just a little over a year ago.

“It was honestly like a gift from the sky,” said Rodriguez, a master’s of business administration candidate and marketing undergraduate degree holder. “It came at a time when I wasn’t sure what I was going to do with my life.

“It really opened my eyes and showed me ‘Everything is going to be OK, I can do what I want with my life,’” he said.

After two years in marketing and advertising positions, Rodriguez decided it would take a bold move to advance his career to the next level. He quit his job, but needed help plotting his next move.

He returned to Rich Hall where a conversation with School of Business Dean Richard Skolnik would eventually lead to the change Rodriguez was looking for. With an eye toward moving to management, he was offered an administrative position in the new Metro Center as part of the fellowship.

A full-time graduate student, the New York City native still has his job as a research assistant promoting SUNY Oswego programming and meeting Syracuse business leaders for input on expanding programs at the Metro Center, which opened in summer 2008.

“It’s been great because it’s put me in a position to meet a lot of people — executives and owners of local businesses,” Rodriguez said, noting the fellowship and stipend were an invaluable part of the experience.

“I can’t place a value on the experience that I had with them,” he said. “Without it, I’d probably be at another mediocre job just to pay the bills.

“It’s fortunate I had that opportu-



Fred Festa ‘81, right, consults with **Erison Rodriguez ‘05**, a Festa Fellow working with Oswego’s Metro Center in downtown Syracuse.

nity to change my life without having to worry about those financial obligations,” he said.

Rodriguez also takes great pride in being an integral part of the Metro Center’s development. When he first arrived, he was greeted by bare walls in the Atrium building downtown.

“Everyone who comes through the Metro Center is just in awe of the place,” Rodriguez said. “Ten years from now, I’ll be able to look at it and see what it’s become and be able to say, ‘I remember hanging that clock,’ you know?”

There’s little doubt that a decade from now he’ll also remember the Festa Fellowship and Oswego resources that changed his career path and life. ●

— SHANE M. LIEBLER



Mike Kiley '09 feeds pancreatic cells that will be used to test the effectiveness of *Psidium guajava* in fighting diabetes.

“To be able to do something like this without direct alumni support would be difficult,” Bendinskas says.

Kiley agrees. “I’m really grateful for the student-faculty collaboration grant, because even though the professors may have ideas, and the students, a really good work ethic and desire to put in a lot of effort, it can’t necessarily go anywhere without a little bit of financial support, kind of starting the engine,” he says. “You may have all the gas there; you need that spark to get it going.”

The Student-Faculty Collaborative Challenge Grant allows the project to show progress necessary to seek major funding.

“Seed money provided by alumni allows us to attract a larger federal grant,” says Bendinskas.

The work that Kiley is doing was earlier done with graduate students. The

results of his work may be included in a National Science Foundation or National Institutes of Health proposal for further funding, Kadima says. “We need proof that we are onto something. We must show we are capable of doing significant work, with the possibility of finding a solution.”

The research grant isn’t the only donor-sponsored help to come Kiley’s way. Last summer he worked at the headquarters of W. R. Grace, thanks to a fellowship established by **Fred '81** and **MaryLynn Barbero Festa '82**.

Over the summer, Kiley worked on nano-sized particles of silica in suspension and presented his research in front of Grace CEO Fred Festa. “It was a good experience,” Kiley says. “The industrial environment is very different from the academic one.”

With the aid of his Festa Fellowship, Kiley is developing critical thinking skills, which can translate into any field — business, pure research, medical school.

He can certainly go anywhere he wants, thanks in part to the wide variety of experiences he has embraced while at Oswego. Kiley is a resident assistant, holds a dean’s scholarship, and is president of the Chemistry Club.

“There’s a lot of opportunity with a major such as biochemistry,” Kiley says. “My future is wide open.” 🌍