

MARQUETTE UNIVERSITY RESEARCH AND SCHOLARSHIP 2010

# Discover



## SOLVING SCHIZOPHRENIA

Marquette researchers lead  
the way to new treatments.

# SOLVING SCHIZOPHRENIA

By Christopher Stolarski

Four professors are on two distinct paths with one noble purpose: Develop pharmaceutical agents to help battle schizophrenia, one of the most devastating mental health disorders. And they've started their own drug companies to do it.

Dr. David Baker sums up his business experience before the launch of Promentis Pharmaceuticals in a word: “Zero.” Today he and his partner and fellow associate professor of biomedical sciences, Dr. John Mantsch, have built a board of directors, hired a management team and established corporate offices.

Dr. Behnam Ghasemzadeh’s business acumen wasn’t much different. Ghasemzadeh, also an associate professor of biomedical sciences, never thought he’d be the chief scientific officer of a pharmaceutical startup. His lone advantage: Dr. Dan Sem, an industry veteran and associate professor of chemistry. Out of their partnership came AviMed Pharmaceuticals.

These four Marquette scientists are in the throes of a burgeoning trend among research universities: pharmaceutical development.

“We’re answering the burning question: ‘Where are the next treatments going to come from?’” Baker says. “Over the past five years, there has been a very real shift toward drug discovery and the licensing of drug compounds by university researchers.”

As the first pharmaceutical ventures to come out of Marquette, Promentis and AviMed are charting new territory. And though both companies are addressing the same neurological disease — schizophrenia — they are taking decidedly disparate approaches.

### From bench to business

On the surface, it’s relatively simple: Promentis is developing new chemical compounds to treat schizophrenia. AviMed is repurposing existing drugs toward the same end. How these companies got to this point, though, isn’t as elementary.

As a post-doctoral fellow studying the neurophysiology of addictions, Baker bucked conventional scientific wisdom

and shifted his focus from the neurotransmitter dopamine to another: glutamate. Through an arduous research process, he identified a unique brain mechanism that releases glutamate in an unusual way that is critical to brain function — and dysfunction.

An ambitious researcher, Baker quickly began publishing and presenting his findings. Baker hypothesized the significant role this mechanism could play in other neurological disorders, namely schizophrenia.

Ghasemzadeh’s initial research also focused on addictions. About the same time that Baker was making his glutamate discovery, Ghasemzadeh uncovered a

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**Dr. John Mantsch**

novel brain mechanism that could be used to develop treatments for addiction and other neurological disorders. He surmised that, based on their chemical properties, certain existing drugs that already target this particular mechanism could also be used to treat schizophrenia.

It was Sem, though, who recognized what Ghasemzadeh was trying to do. “It’s drug repurposing,” he told him. A 15-year industry veteran, Sem had co-founded another pharmaceutical upstart, Triad Therapeutics, and developed several drug molecules before coming to Marquette.

“Drug repurposing is a relatively new trend in pharmaceutical development,” explains Sem, AviMed’s CEO. “Drug discovery is incredibly expensive. Repurposing existing drugs is more cost-effective and thus attractive to investors.”

Sem and Ghasemzadeh now are working on the “composition variants” of these compounds. “We have provisional patents on the *use* of the drug compound,” Sem says. “Now we have to alter the compound enough that we can ‘own’ it and improve upon it. It’s a much stronger patent position.”

Once they decided to apply their research and create a business venture, Baker and Mantsch also sought Sem’s

wisdom, as well as the counsel of Tim Keane, an angel investor and entrepreneur-in-residence at Marquette. Keane encouraged the duo to enter the university’s annual business plan competition, which they won.

The AviMed team entered the same competition a few years later and was named runner-up. It went on to earn second place in the life sciences category of the Wisconsin Governor’s Business Plan Competition in 2009. AviMed is now forming its board of directors, which will assist in raising venture capital funds for drug development.

Although headed by four undoubtedly brilliant minds, both teams have learned a great deal about the business of drug development. “People are really investing in your management team,” Baker says. “It can be difficult for investors to decipher the science.”

Ghasemzadeh agrees: “It was critical that we involved individuals with knowledge of the science and business.”

### Staying grounded

None of the four is in this to get rich. All agree that their mission is to advance health.

“This is a way for faculty to advance their scholarship in a way that helps society,” Mantsch says. “What if these really are the treatments that can save lives?”

And both teams are acutely aware that lives are, in fact, at stake. Though it occurs in only 1 percent of the population, schizophrenia is so disruptive that most schizophrenics can’t function in society, and 10 percent commit suicide. The existing medications are so debilitating and ineffective that compliance rates are abysmal.

“We’re still learning how devastating this disease is,” Baker says. “We spend more in the U.S. treating schizophrenia than on all cancers combined.”

These four scientists have heard stories from those whose lives have been affected by the disease. They’ve received letters and e-mails from people with schizophrenia.

They’ve seen beyond their lab walls and past their business plans.

“The people — their stories,” Baker says soberly. “That’s what sustains us.”

**MULTIMEDIA:**  
Go to [marquette.edu/experts](http://marquette.edu/experts) to hear Mantsch speak on addiction and the brain.



### “Molecules to man.”

That’s how Dr. William Cullinan, dean of Marquette’s College of Health Sciences, describes the depth and breadth of the flourishing neuroscience research cluster developing on campus.

Though the brunt of neuroscience research is concentrated in the labs of 11 federally funded scientists from the college’s Department of Biomedical Sciences, more than 30 faculty members from other corners of the university are seeking solutions to some of the most complex mysteries of our time. Projects are aimed at understanding the brain’s stress and reward circuitries, having important implications for mood and cognitive disorders and addiction.

This intensive focus on neuroscience has borne fruit: two pharmaceutical companies, a nationally recognized neuroanatomical dissection course and a multidisciplinary neurological research institute.

Learn more at [marquette.edu/chs/inrc](http://marquette.edu/chs/inrc).