

# THE BUSINESS JOURNAL

## W-S inventor ready to test insulin inhaler

**WINSTON-SALEM** — In July 2003, when we last checked in with inventor, entrepreneur and inhalation expert **Bill Line**, he was developing a billion-dollar idea — an inhaler for powdered insulin — whose time hadn't quite come.

But that time is drawing near.

In September, a Food and Drug Administration advisory panel recommended approval of powdered insulin as a substitute for the multiple injections that many diabetics must now inflict on themselves daily. In October, inhalable insulin was approved for sale in Great Britain.

The market is vast. In the United States alone, some 18 million diabetics spend more than \$7 billion annually on insulin and related supplies to manage their blood sugar. It's possible that each and every one would ditch their needles if they had a reliable, easy-to-use insulin inhaler.

That's what has Line so excited. That's why he's flying to San Francisco in a few weeks to meet medical-device experts tied to **Pfizer**, whose powdered insulin, **Exubera**, is closer to market than its worldwide competitors.

Yet while the decade-long journey to get powdered insulin to diabetics is nearing an end, the debate over how best to deliver the insulin to the bottom of the lungs — the only place it's effectively absorbed — is now in full swing.

Line knows all about getting stuff deep into the lungs. For 24 years, prior to his early retirement in 1991, he worked in R&D for **R.J. Reynolds Tobacco Co.** A couple of his former research colleagues, inhalation experts as well, have worked with him over the last five years on their unique insulin inhaler.

They all appear motivated by the same goals: to apply their expertise in healthful, not

**Bill Line's insulin inhaler.**



### TRIAD TALK

JUSTIN  
CATANOSO

harmful, ways, and to score big as entrepreneurs

"We just wanted to do something besides cigarettes, something positive," says Line, an expert also in statistics and mathematical modeling. He has since done consulting work for Volvo, Mars candies and NASA through his company **Design of Experiments Services Inc.**

The inhaler, designed by **Don Wilkinson**, a 35-year veteran of R&D at **RJR**, is deceptively simple. Essentially, Wilkinson created a one-handed plunger system to force air into a straw that is crimped twice to hold a dose of insulin.

"It's simple, cheap and it works," says Wilkinson. "Mechanically, the device does what it's supposed to do. Whether it's actually therapeutic, that's down the line."

Alas, Wilkinson has unwittingly highlighted the biggest obstacle that must be cleared if his idea is to avoid the fate of so many other seemingly can't-miss medical devices: Will it work well enough with the medicine to actually manage a disease?

Line, in flying to San Francisco in early January, is seeking a chance to find out. There he will meet with medical-device experts from **Nektar Inc.**, the company the created the clunky, expensive inhaler used by **Pfizer** in its clinical trials of **Exubera**.

That device, which takes two hands to operate, whips the powered insulin into a dry mist and sends it into a chamber. The diabetic then inhales the mist. Too often, medicine gets stuck in the mouth, where it does no good.

**Andy Clark**, Nektar's chief technical officer, says he's eager to see what Line and his partners have created: "We're always looking at new technology. You don't want to

miss the next great idea. But ..."

There's always a "but" in stories like this. Clark explains that he's been in the business of inhalable drugs for 25 years. He's seen countless devices that are mechanically brilliant. But if the mechanics aren't in synch with the biology of the body and the pharmacology of the drug, the device is worthless.

Clark offers this insight. Insulin is an unstable protein that degrades quickly if exposed to moisture. Thus, the way powdered insulin is packaged for a specific inhaler is critical. Also, the lungs' natural defenses attack and kill 80 percent of all insulin delivered, so the powered dose must be much larger than the injected dose.

"There are just so many variables," Clark says, the least of which is whether the device actually functions as designed.

Line has no answers yet to such biological and pharmacological questions. If Nektar researchers like Clark are impressed with the device, Line hopes the company will buy or license it from him, and prepare it for clinical trials.

It's a long shot, he knows. But Line is a patient man. And the desire to do something therapeutic, after so many years in tobacco, is a powerful force. Especially when he hears from diabetics like **Dominick Cirone**, who learned about Line's inhaler on the Internet and quickly volunteered to test the device for him.

"You can't imagine the mental trauma you go through every day with these (insulin) injections," says Cirone, 47, who owns a sporting goods store in Scottsdale, Ariz. "There's nothing worse. I've tried everything on the market to reduce the pain of injections, but in the end, you know it's going to stick you.

"It would be a serious relief from a mental standpoint to not have to face that needle every morning. I'd pay just about anything not to have to do that."

