

Mayo Clinic developing artificial pancreas to ease diabetes burden

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The 25.8 million Americans who have diabetes may soon be free of finger pricks and daily insulin dosing. Mayo Clinic endocrinologists Yogish Kudva, M.B.B.S., and Ananda Basu, M.B.B.S., M.D., are developing an artificial pancreas that will deliver insulin automatically and with an individualized precision never before possible.

As part of this effort, Drs. Kudva and Basu will present their latest findings on how the mundane movements of everyday life affect blood sugar to the American Diabetes Association meeting this month in San Diego.

"The effects of low-intensity [physical activity](#), mimicking activities of daily living, measured with precise [accelerometers](#) on glucose variability in type 1 diabetes had not been examined," says Dr. Kudva.

Among his newest findings is that even basic physical activity after meals has a profound impact on [blood sugar levels](#) for people with type 1 diabetes. "You would expect this result, but we wanted to know to what extent this phenomena would happen in people with [type 1 diabetes](#)," Dr. Kudva says.

Diabetics who engaged in low-grade physical activity after eating had blood sugar levels close to those of people with fully functioning pancreases. Those who remained sedentary after their meal, however, had elevated blood sugars.

The researchers plan to incorporate these findings into an [artificial pancreas](#) being developed at Mayo Clinic. The "Closed Loop System" under development includes a blood sugar monitor, an automatic [insulin pump](#), a set of activity monitors that attach to the body and a central processing unit.

Clinical trials of the artificial pancreases are likely to begin in November with a handful of inpatient volunteers. Study participants will follow strict diet, exercise and insulin-delivery regimens in Mayo's Clinical Research Unit. Data will then be fed into an insulin-delivery algorithm, which mimics the body's natural process of monitoring and responding to [glucose levels](#) in the bloodstream.

"Physical activity enhances insulin action, hence lowering blood glucose concentration," Dr. Kudva says. "Real-time detection of physical activity -- and modeling of its effect on glucose dynamics -- is vital to design an automatic insulin delivery system."

Dr. Kudva and other Mayo researchers have spent nearly 15 years working on various aspects of diabetes and obesity. They are collaborating on the artificial pancreas and developing an algorithm that will afford patients the peace of mind to eliminate their daily routine of diabetes maintenance.

Dr. Basu will present findings that [blood sugar](#) levels decrease faster in the mornings in healthy adults than at dinner time, suggesting a diurnal pattern to natural insulin action. He proposes further study of this phenomenon and possible incorporation into the algorithm that drives the Closed Loop System.

Provided by Mayo Clinic

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