Diabetes can be cured, but not by targeting blood sugar: Scientists

Increased blood sugar is only a symptom, not the root cause. Treating symptoms is not sufficient to reverse the condition

Insulin

TV JAYAN

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In a provocative piece of research, scientists in a Pune-based institute used computer simulation to show that the current treatment modalities are not the best for type 2 diabetes and a change in approach could make the nasty disease one of the curable.

The scientists led by evolutionary biologist Milind Watve at the Indian Institute of Science (IISER) Pune, created a computer model by putting together for the first time all known metabolic, hormonal, neuronal, immunological and behavioural signals involved in the onset of diabetes and Plasma Glucose in its manifestation in the human body.

Network model

To construct the network model, Watve's team scoured nearly 500 published papers. This helped them identify as many 330 different interactions - involving over 70 molecules or signals - associated with diabetes. "Glucose and insulin are just two of them," Watve told BusinessLine.

"The network is like a giant cobweb in which perturbing one thread perturbs the entire network," said Shubhankar Kulkarni, Watve's PhD student and first author of the paper, which appeared in the journal PLOS One last week.

Significantly, even though the effects are complex, they are far from being chaotic, he said. The IISER scientists, to their surprise, found that the network is highly structured and with any perturbation it ends up in either of the two possible configurations - one is insulin-sensitive

and the Vitamin B12 Exercise B-adrenergic Receptors

ments, he said.

Insulin-like Growth Factor-1 Brain-Derived Neurotrophic Factor B Cells Dopamine Glucagon Cortico-Releasing Hormone

Histamine Leptin

betes can be completely reversed.

CS Yajnik, who heads the Diabetes

Unit at the King Edward Memorial

Hospital and Research Centre in

Pune, said it's a commendable

piece of theoretical work. But one

cannot be sure of its clinical signi-

ficance unless proven in experi-

Large-scale clinical trials in the

last few decades have shown that

normalisation of glucose is not suf-

ficient to arrest all diabetes related

complications. In some cases,

Gut Motility

the death rate

actu-

Leptin Action

Cocaine and

Transcript

Bone Strength

Nerve Growth Factor

Oxytocin

Erythropoeitin

Food Intake Adipose Tissue Growth Hormone Endorphin Sympathetic Stimulation Glucagon-Like Peptide-1 Vasodilation Endothelin-1

Brain Glucose a-Melanocyte Stimulating Hormone Activin A Aggression Injury Gastrin Adiponectin

Insulin Action Inflammatory Response Testosterone **Epidermal Growth Factor** Ghrelin Muscle Tone Corticosteroids Arginine Vasopressin Nitrogen Oxides

Nociception Y-Aminobutyric acid Nor-epinephrine Gonadotropin-Releasing Hormone Osteocalcin Interleukin-6

Diplomat

Cognitive Functions

Cholecystokinin

Glucose Transporter-1

Free Fatty Acids Melatonin Vitamin D3 Cytokines Klotho

Gluconeogenesis Triglycerides Keto Acids Tumour necrosis factor-a

Anti-oxidants Secreted Frizzled-Related Protein 5 Cholesterol

Angiogenesis

Different molecules and signals that are affected by diabetes PLOS ONE

other insulin-resistant. Using the model, the researchers could not only mimic many known patterns and processes associated with diabetes, but could also make a number of surprising predictions, the remarkable one being that diaally increased after aggressive normalisation, the researchers said.

More importantly, the scientists said the complex computer model showed that increased blood sugar is not central to abnormal changes in diabetes and, therefore, con-

trolling sugar was ineffective in reversing the condition. Increased blood sugar is only a symptom, not the root cause. Treating symptoms is not sufficient to reverse the condition, said Watve. Yajnik, however, disagreed. He said clinicians rely on regulating glucose and insulin as they have been able to improve the quality of life of the diabetics world over.

They continue to be the principal targets as far as diabetes is concerned as they are easy to be manipulated and results can readily be quantified.

In the prevalent clinical practice, diabetes is considered to be irreversible.

But, according to the IISER network model, not a single step in the known pathophysiology is irreversible. "What is becoming Amphetamine Regulated

evident from our theoretical work is that diabetes can be cured in the long-term, but not by targeting glucose and insulin," Watve said. Another interesting take-

home message that came through this study is that behavioural exercises have better impact on maintaining healthy blood sugar levels than calorie-burning, mechanical exercises.

"Running or jogging is just an exercise that burns your calories, but chasing a target or partaking in a competitive sport is more than calorie-burning as it stimulates the neuro-endocrine circuitry, and thus helps improve hormonal balance which is also seen seriously impaired in diabetic patients.