

Keynote Address
18th Scottish Conference of PCDOs
Glasgow, 28th October 2025

WHAT CAN WE LEARN FROM DIABETES CLINICS IN INDIA?

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MD., FRCP (Lond, Glasg & Edin), FACE, FACP, FICP



PATRON

**Madras Diabetes Research Foundation,
Chennai, India**

(ICMR COLLABORATING CENTRE OF EXCELLENCE)



VICE-CHAIRMAN

**Dr. Mohan's Diabetes Specialities Centre
Chennai, India**

(IDF CENTRE OF EXCELLENCE IN DIABETES CARE)

Declaration of conflict of interest

None to declare

Outline of my talk

- Background
- Clinical Care
- Research
- Conclusions

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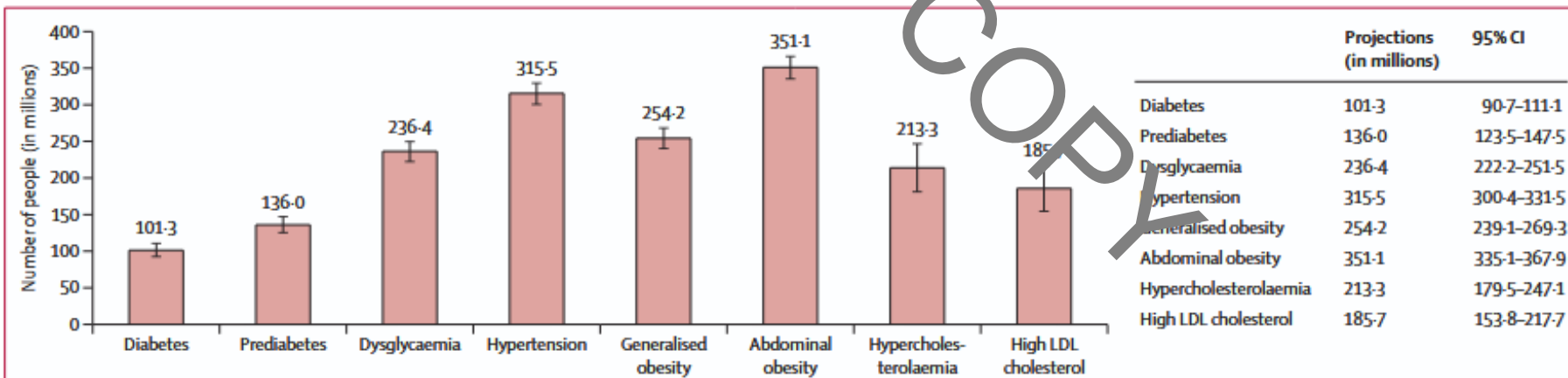
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NCDs in India are a large and growing problem



Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17)

Ranjit Mohan Anjana, Ranjit Unnikrishnan, Mohan D. Gupta, Rajendra Pradeepa, Nikhil Tandon, Ashok Kumar Das, Shashank Joshi, Sarita Bajaj, Puthiyaveetil Kottayam Jabbar, Hiranya Kumar Das, Arav Kumar, Vinay Kumar Dhandhanian, Anil Bhansali, Paturi Vishnupriya Rao, Ankush Desai, Sanjay Kalra, Arvind Gupta, Ramakrishnan Lakshmy, Sri Venkata Madhu, Nirmal Elangovan, Subhankar Chowdhury, Ulagamathesan Venkatesan, Radhakrishnan Subashini, Tanvir Kaur, Rupinder Singh Dhaliwal, Viswanathan Mohan, for the ICMR-INDIAB Collaborative Study Group*



Good metabolic control is a distant dream

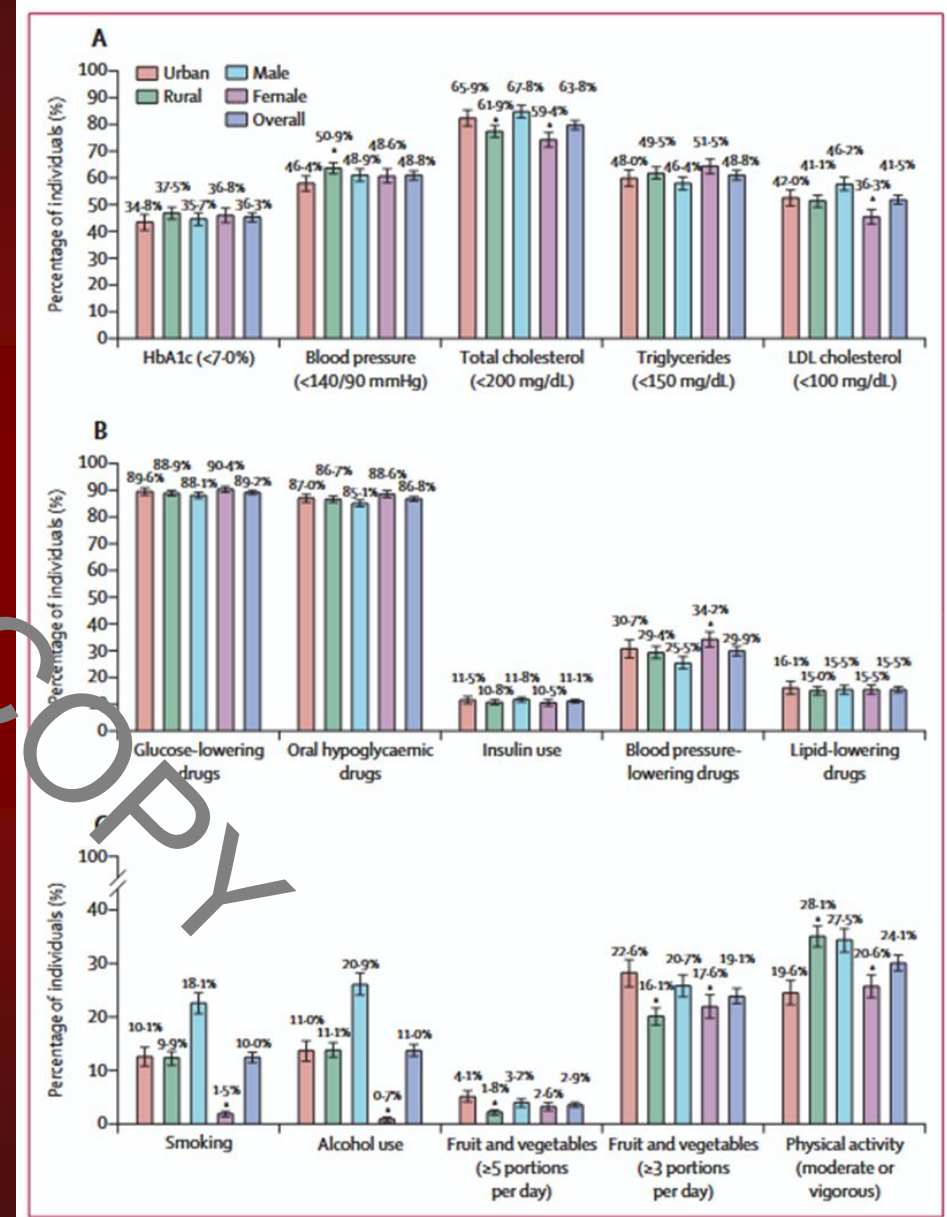


Achievement of guideline recommended diabetes treatment targets and health habits in people with self-reported diabetes in India (ICMR-INDIAB-13): a national cross-sectional study

Ranjit Mohan Anjana, Ranjit Unnikrishnan, Mohan Deepa, Ulagamathesan Venkatesan, Rajendra Prasad, Shashank Joshi, Banshi Saboo, Ashok Kumar Das, Sarita Bajaj, Anil Bhansali, Sri Venkata Madhu, Vinay Kumar Dhandhaniah, Puthiyaveetil Kottaram Jabbar, Sunil M Jain, Arvind Gupta, Subhankar Chowdhury, Mohammed K Ali, Elangovan Nirmal, Radhakrishnan Subashini, Tanvir Kaur, Rupinder Singh Dhaliwal, Nikhil Tandon, Viswanathan Mohan, for the ICMR-INDIAB collaborators*

Only 7.7% of individuals with diabetes in India achieve ABC (HbA1c, BP and LDL cholesterol) targets

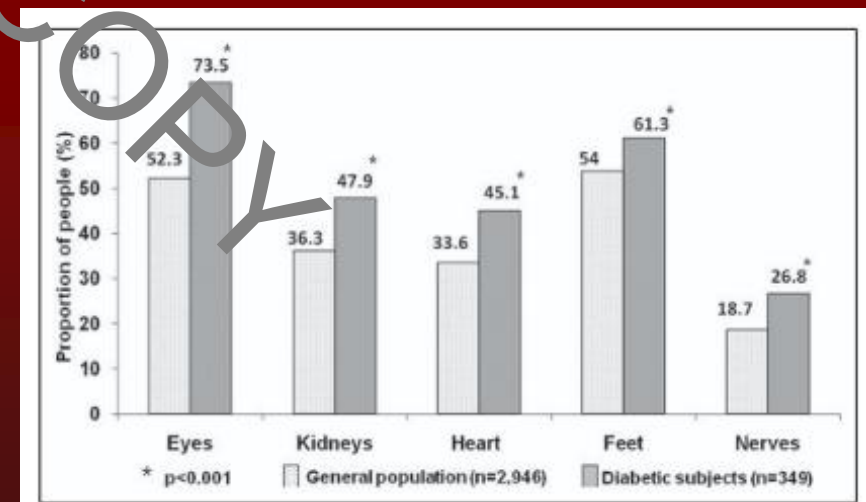
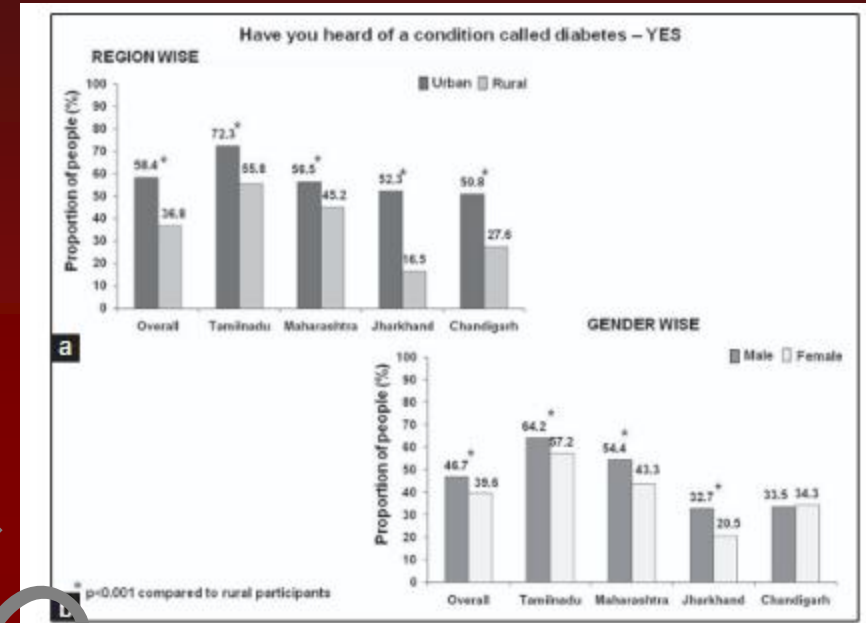
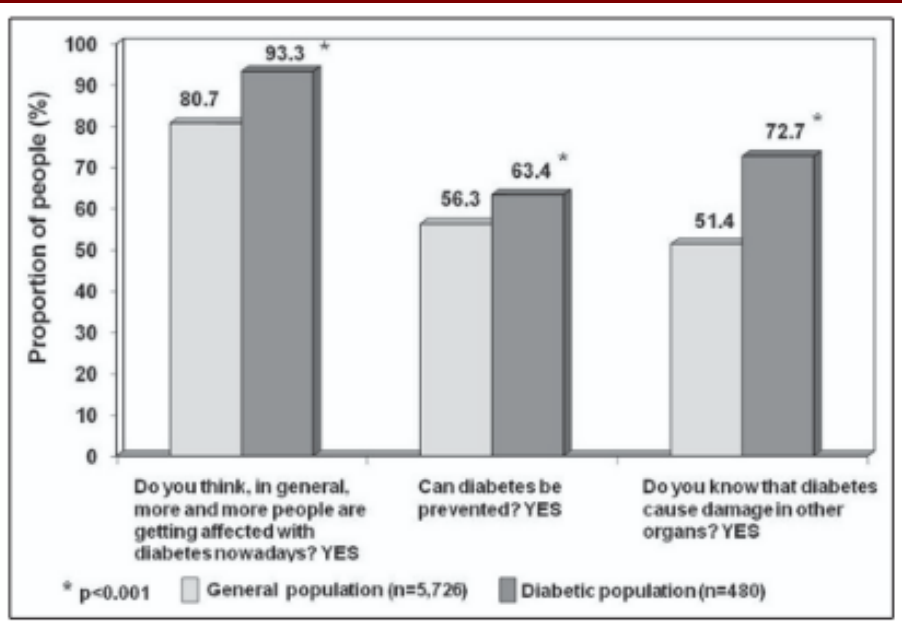
Lancet Diabetes Endocrinol, 2022



Awareness of Diabetes is Poor....

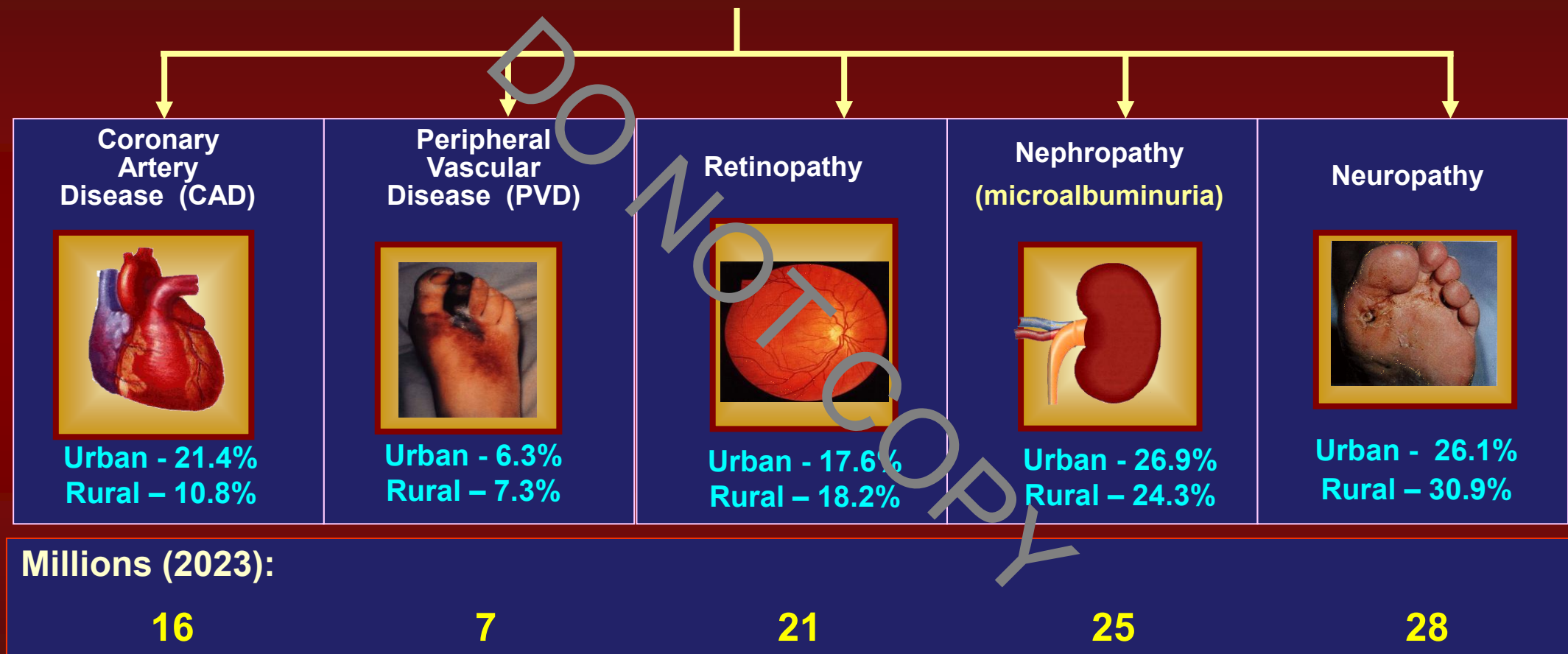
Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4

M. Deepa, A. Bhansali¹, R. M. Anjana, R. Pradeepa, S. R. Joshi², P. P. Joshi³, V. K. Dandhara⁴, P. V. Rao⁵, R. Subashini, R. Unnikrishnan, D. K. Shukla⁶, S. V. Madhu⁷, A. K. Das⁸, V. Mohan, T. Kaur⁶



Unsurprisingly, burden of diabetes complications is high!

DIABETES COMPLICATIONS



Mohan V et al, J Am Coll Cardiol. 38; 682-687, 2001; Premalatha G et al, Diabetes Care, 23: 1295-1300, 2000
Rema M et al, Invest Ophthalmol Vis Sci, 46: 2328-33, 2005; Ranjit Unnikrishnan I et al, Diabetes Care. 30:1527-23, 2007
Pradeepa, et al, Diabetic Medicine, 25: 407 – 412, 2008; Mohan V et al, Journal of Diabetes Science and Technology, 6:1355-1364, 2012
Gurudas S,Rajalakshmi R, et al. Lancet Global Health. 2024 Feb 28:Epub ahead of print

Where are individuals with diabetes in India treated?

- Public healthcare is free in India
- However, most individuals with diabetes (62%) rely on private healthcare facilities
- Most practices are stand-alone, with no facilities for comprehensive evaluation
- Larger private hospitals do not focus on diabetes care, and are often unaffordable

DR. MOHAN'S DIABETES SPECIALITIES CENTRE

Inaugurated on Sept. 1, 1991



PROF. V. MOHAN



Provide world-class care for
diabetes and its
complications under one
roof at affordable cost



Late DR. REMA MOHAN
(1954-2011)



CHAIRMAN



PROF. V. MOHAN

MANAGING DIRECTOR



DR. R.M. ANJANA

VICE-CHAIRMAN



DR.,. RANJIT UNNIKRISHNAN

DR. MOHAN'S GROUP OF DIABETES INSTITUTIONS

**DR. MOHAN'S DIABETES
SPECIALITIES CENTRE**

Clinical Care



**DR. MOHAN'S DIABETES
EDUCATION ACADEMY**

Education and Training



**MADRAS DIABETES
RESEARCH FOUNDATION**

Research



DIRECT

Charity



Outline of my talk

- Background
- **Clinical Care**
- Research
- Conclusions

DO NOT COPY

What makes us special?



Precision Diabetes



Diabetology



Diabetic Eye Clinic



Diabetic Foot Clinic



Advanced Laboratory



Physical Activity



Diabetic Heart Unit



Radiology Unit



Dental Unit



Yoga & Stress Managment



Operation Theatre



Diabetic Liver Clinic



In-Patient Facility



Pharmacy



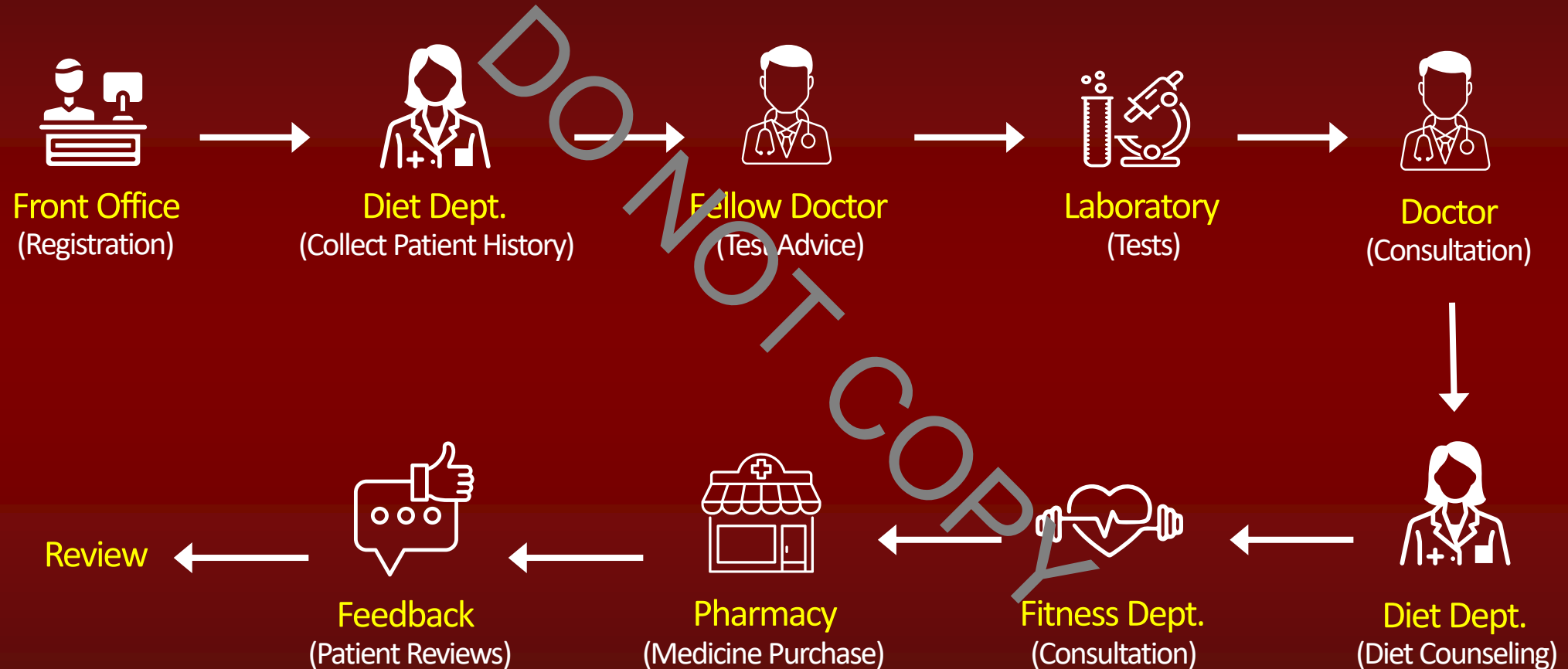
Nutrition & Dietitics



Diabetes Education



Patient Flow at Dr. Mohan's



All check-ups completed in 6 hours!



Awards & Recognitions

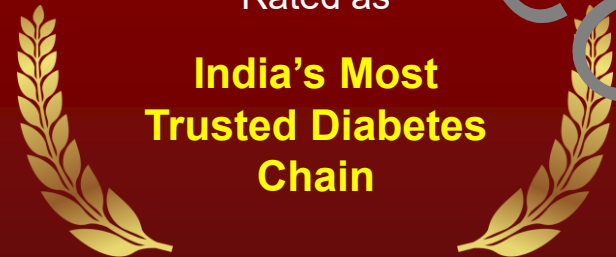
Ranked



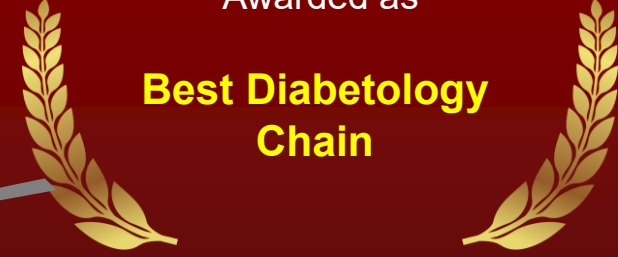
Ranked



Rated as



Awarded as



London, UK

Barriers to diabetes care in India

- Cost
- Inconvenience (travel, waiting time etc.)
- Shortage of qualified personnel
- Lack of awareness
- Lack of India-specific data and guidelines

Making diabetes care more affordable...

- Low-cost investigations (e.g. retinal camera)
- Use of generic drugs and FDCs
- Multitasking of staff

Why Charity ?

- ❖ 70% of patients in India 'pay out of pocket'
- ❖ Many cannot afford to pay



A 100 % NON-PROFIT CHARITABLE ORGANISATION

- Founded in **1991**, **DIRECT** aims to make diabetes care in India comprehensive and affordable for all

15,000+

patients receiving
lifelong free treatment

50+

villages adopted and
screened

800+

Children with T1D provided
free insulin



FREE OUTREACH DIABETES CLINICS & CAMPS

3 Free Diabetes Clinics

Free Mobile Hospital

in association with **Sathya Sai Organization**



25,000+

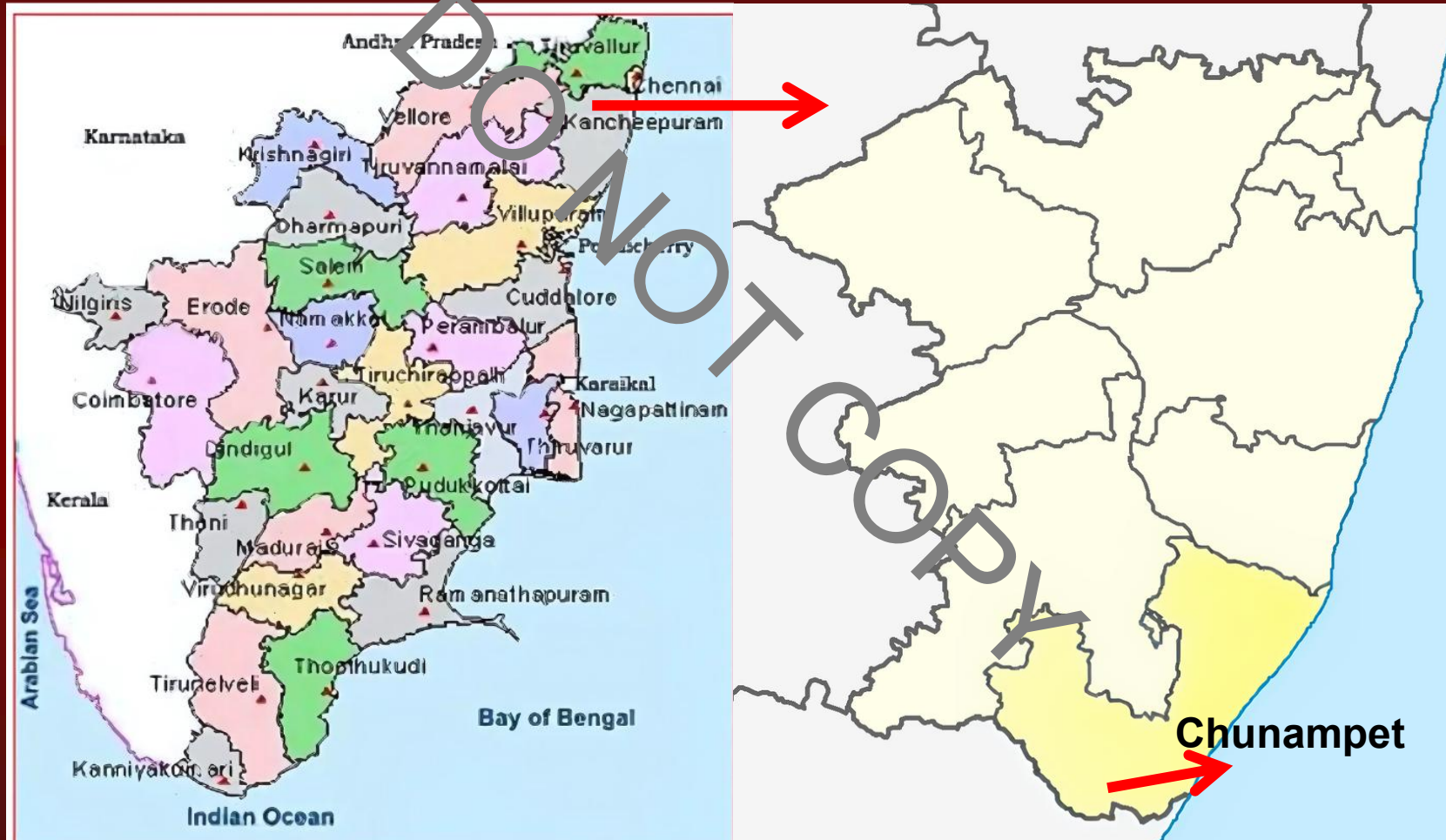
Free Diabetes Camps
Conducted Across India

5M+

People Screened

Chunampet Model for Rural Diabetes Care

Supported by World Diabetes Foundation [WDF], Denmark
& Indian Space Research Organization (ISRO)



TELEDIABETOLOGY VAN

Basic infrastructure in mobile van:

- Facilities for screening for diabetes complications (Retinal camera, Doppler, Biothesiometry and ECG)
- V-Sat dish for telemedicine facility
- Video conferencing equipment
- Computers and Laser printers



VIDEOCLIP OF CHUNAMPET PROJECT



CHUNAMPET & NEIGHBOURING VILLAGE CLUSTERS (n=42)

Total target population; Awareness ~ 200,000 in 3 years



DIABETES SCREENING
Adult Population ≥ 20 yrs (n = 27,014)



SCREENED 23,380 (86.5%) INDIVIDUALS

**INDIVIDUALS WITH SELF
REPORTED DIABETES n = 808**

**NEWLY DETECTED DIABETES
n = 330**

Individuals with diabetes (n=1,138)

**Good control achieved with very low-cost
generic drugs**

India: Towards Universal Health Coverage 3

Chronic diseases and injuries in India

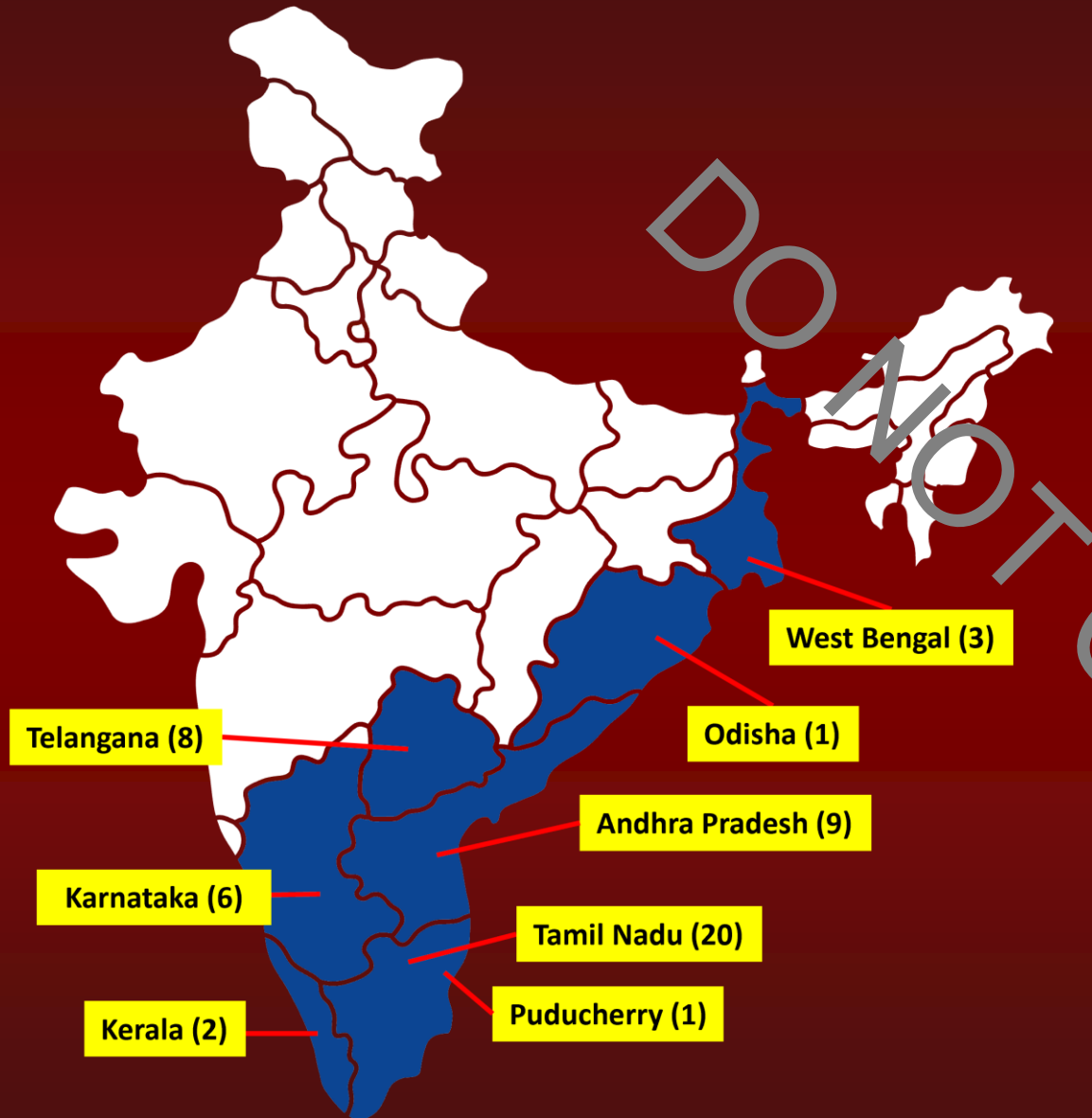
Panel 5: Chunampet Rural Diabetes Prevention Project

In India, 50 million people have diabetes; this number is projected to increase to 87 million by 2030.¹¹⁶ The Madras Diabetes Research Foundation in Chennai, established by Viswanathan and Rema Mohan, set up an innovative new programme for prevention and management of diabetes in rural India—the Chunampet Rural Diabetes Prevention Project—with the support of the World Diabetes Foundation and the Indian Space Research Organisation. The project aims to prevent diabetes in 50 000 people in 42 villages around Chunampet in the Kanchipuram district of Tamil Nadu. Village health workers and a mobile telemedicine unit are used to screen for diabetes. A rural diabetes centre has been set up to provide basic care for people with diabetes, and to ensure community acceptance and project sustainability the project provides employment to men and women from local villages. Although diabetes screening is provided free of charge, about 60% of patients at the diabetes centre pay for

treatment. The Chunampet Rural Diabetes project thus seems to be a good model for delivering preventive and therapeutic diabetes health care to rural areas.

diabetes centre in Chennai, and, depending on their socioeconomic status, are provided free or as subsidised treatment. The Chunampet Rural Diabetes project thus seems to be a good model for delivering preventive and therapeutic diabetes health care to rural areas.

Bringing diabetes care to doorsteps....



50

Branches

32

Cities

1400+

Staff

130+

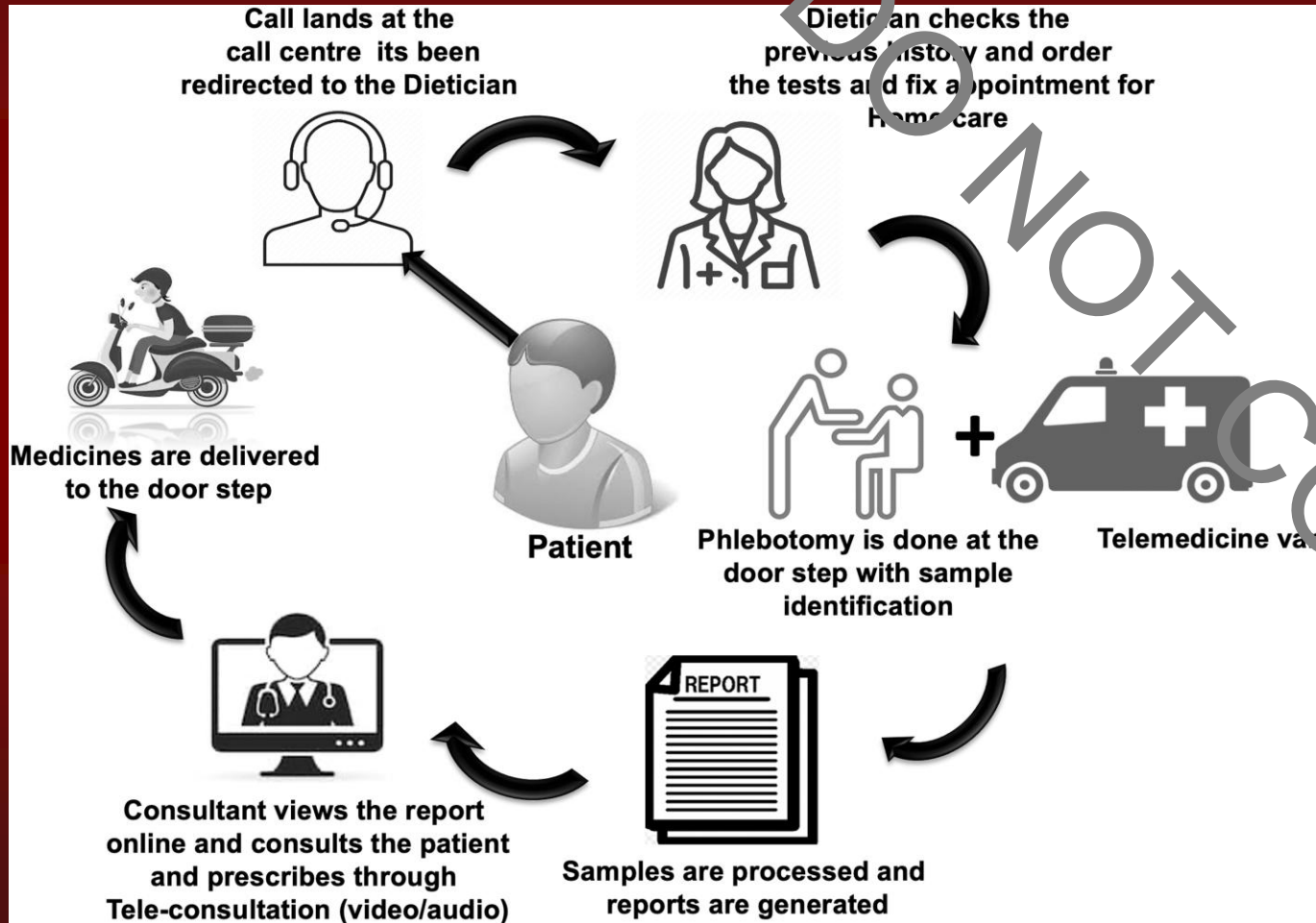
Doctors

700,000+

Registered PWD

All check-ups completed in 6 hours!

Teleconsultation Services



Dr. Mohan's On Wheels Services

Dr. Mohan's ON WHEELS
Bringing Diabetes Care to your doorsteps

We Care For You

- Doctor Consultation
- Nursing Care
- Physiotherapy
- Blood Sample Collection
- Surgical Dressing
- Catheterization
- Nebulization
- AGP Fixing & Removing
- Eye Test
- Vaccination
- Pharmacy Delivery
- IV/IM Injections

Dr. Mohan's
DIABETES SPECIALITIES CENTRE



Tele-Ophthalmology Versus Face-to-Face Retinal Consultation for Assessment of Diabetic Retinopathy in Diabetes Care Centers in India: A Multicenter Cross-Sectional Study

Ramachandran Rajalakshmi, FRCS, PhD,¹ Ganesan UmaSankari, MSc,²
Vijayaraghavan Prathiba, FRCS,¹ Ranjit Mohan Anjana, MD, PhD,³
Ranjit Unnikrishnan, MD, FRCP,³ Ulagamathesan Venkatesan, PhD,²
Saravanan JebaRani, MSc,⁴ Coimbatore Subramanian Shanthirani, PhD,²
Sobha Sivaprasad, FRCO,⁵ and Viswanathan Mohan, FRCP, DSc³

Abstract

Aim: To evaluate the effectiveness of tele-ophthalmology (TO) versus face-to-face screening for diabetic retinopathy (DR) in diabetes care centers (DCC) across India.

Methods: This is an observational, multicenter, retrospective, cross-sectional study of DR screening in individuals with diabetes performed across 35 branches of a chain of DCC in 20 cities in India over 1 year. In 30 DCC, DR screening was performed by TO, where retinal images obtained using Fundus on Phone camera were uploaded through the telemedicine network for centralized DR grading by eight retina specialists. In five DCC, DR screening was performed by fundus examination (FE) by the same retina specialists. The rate of detection of sight-threatening DR (STDR) (defined as the presence of proliferative DR and/or diabetic macular edema) through the two modes was compared.

Results: A total of 58,612 individuals were screened for DR from January 1, 2018 to December 31, 2018: 25,316 by TO and 33,296 by FE. The mean age and mean duration of diabetes of the individuals with diabetes screened by TO was 55.8 ± 11.2 years and 9.5 ± 7.3 years; and in individuals screened by FE, it was 57.5 ± 11.6 years and 11.5 ± 8.0 years respectively. The mean glycated hemoglobin was $8.8\% \pm 2.1\%$ and $8.5\% \pm 1.9\%$ in the two groups, respectively. Any DR was detected in 31.7% (95% confidence interval [CI]: 31.0–32.3) by tele-screening and in 38.5% (95% CI: 37.9–39.0) by FE, whereas STDR was detected in 7.3% (95% CI: 7.0–7.7) by TO and in 10.5% (95% CI: 10.2–10.9) by FE. Overall, 11.4% individuals with diabetes in the TO group, including 4.1% with ungradable images, were advised referral to retina specialists for further management.

Conclusion: Screening for DR at DCC using TO is feasible and effective for STDR detection in India and may be adopted throughout India.

Only 5 of our 50 centres
have ophthalmologists. So,
we launched
Tele-ophthalmology

About 60,000 individuals
are screened every year
using low-cost retinal
camera

3-D Digital Diabetes Delivery

@ our centre



DIA

↓
An *AI-powered chatbot* that uses automated digital conversations to help people with diabetes



DiaLA

↓
A patient-friendly *mobile app* offering appointment booking, health tracking, prescription refills and many more



DiaNA

↓
A web-based *precision medicine tool* to classify type 2 diabetes patients into subgroups & assess the disease complications.



Dr. Mohan's
DIABETES EDUCATION ACADEMY

COURSES OFFERED

- Fellowship in Diabetes
- Postdoctoral Fellowship in Diabetes
- Fellowship in Eye Disorders of Diabetes
- Deakin DMDEA course for Diabetes Nurse Educator



~500

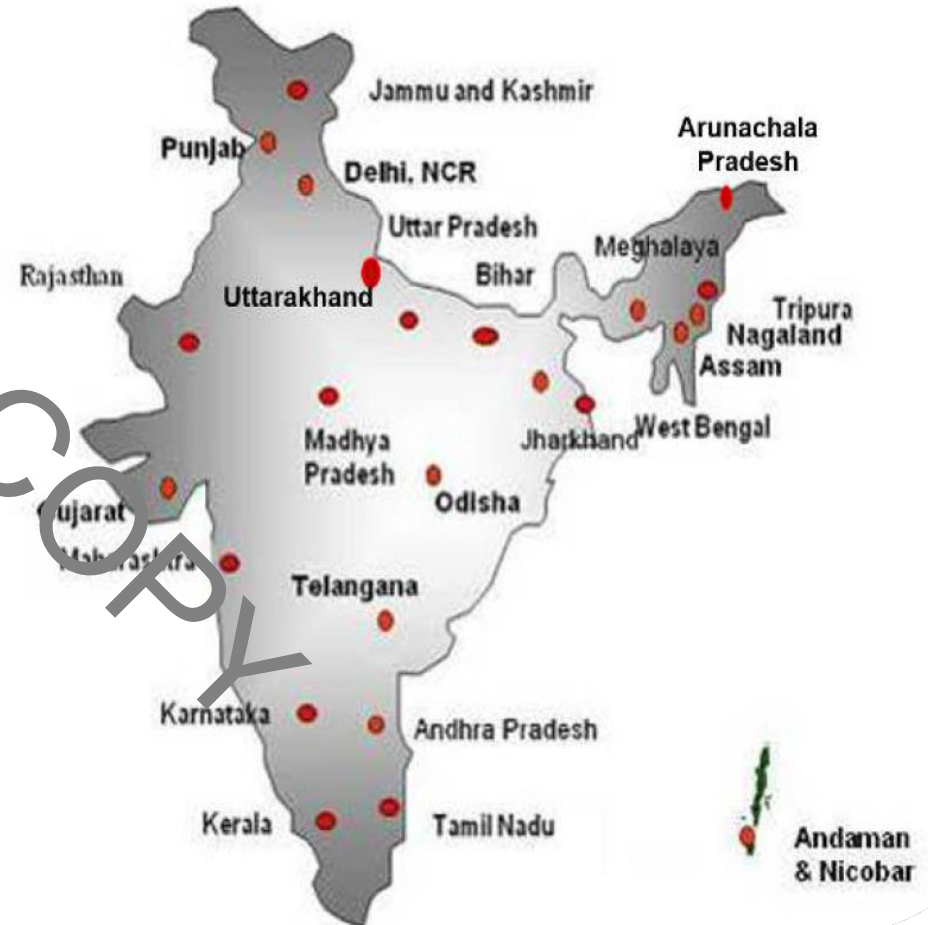
**Fellows Trained till
date**

**Diabetes clinics set up in various
parts of India**

1.5 Million

**People with Diabetes
Treated**

PLACES IN INDIA WHERE OUR FELLOWS WORK



Pan–India courses

in collaboration with

Public Health Foundation of India (PHFI)



- **Certificate Course in Evidence Based Diabetes Management (CCEBDM)**
- **Certificate Course in Gestational Diabetes Mellitus (CCGDM)**
- **Certificate Course in Evidence Based Management of Diabetic Retinopathy (CCDR)**

The material from our Fellowship program was used for these courses

Certificate Course in Evidence Based Diabetes Management (CCEBDM)

18,828

Doctors Trained

17

National Experts

306

Faculty

18.8 Million

People with Diabetes benefitted



Certificate Course in Evidence Based Diabetes Management (CCEBDM)

State Government Collaborations

7 State Governments and 1 PSU

State Govt.	Batch	Participants
Madhya Pradesh	1	96
	2	213
	3	210
Manipur	1	23
	2	34
Kolkata Municipal Corporation	1	20
	2	14
Odisha	1	182
Haryana	1	30
Kerala	1	125
PSU-Reliance Industry Ltd	Jamnagar	18
	Mumbai	27
Mizoram	1	20
Total		1012

International Collaborations

(Collaboration with 8 International organizations spread across Asia and Africa)



Diabetes and Endocrinology association of Nepal (DEAN)



Myanmar Society of Endocrinology and Metabolism (MSEM) & Myanmar Diabetes Association (MMDA)



East African Diabetes Study Group (EADSG)



Ministry of Health of Rwanda



Bangladesh Society of Medicine (BSM)



Kabul University of Medical Sciences



Afghanistan Endocrine Society (AES)



Primary Care Diabetes Group (PCDG) of Sri Lanka

THE LANCET

Diabetes & Endocrinology

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www.thelancet.com/diabetes-endocrinology



Articles

Blood pressure and glycaemic effects of dapagliflozin
See page 211

Series

Puberty and pubertal disorders
See pages 254 and 265

Review

Challenges for global access to insulin
See page 275

Innovation in capacity building of primary-care physicians in diabetes management in India: a new slant in medical education

Sandeep Bhalla, Ranjit Unnikrishnan, Rahul Srivastava, Nikhil Tandon, Viswanathan Mohan, *Dorairaj Prabhakaran

India is home to more than 69 million individuals with diabetes, and this figure is expected to rise to 123 million by 2040.¹ In view of the low doctor-to-population ratio (1:1800),² uneven distribution of specialists (most of whom are in urban areas), and the fact that most initial diagnoses of diabetes (about 70%) are made by non-specialists, one key to effectively tackling the challenge of diabetes is to strengthen primary health care. In India, management of diabetes is predominantly the domain of specialists, who are too few in number

(roughly 1000 endocrinologists [Tandon N, All India Institute of Medical Sciences, personal communication] and 100 000 post-graduate physicians);³ primary-care physicians (PCPs) are ill equipped to manage patients with diabetes, because of inadequate training during their undergraduate studies. Hence, the quality of care provided by PCPs is compromised compared with that by specialists,^{4,5} resulting in poor health outcomes.

Capacity building of PCPs can be an effective short-term intervention to tackle the rising burden of

www.thelancet.com/diabetes-endocrinology Vol 4 March 2016

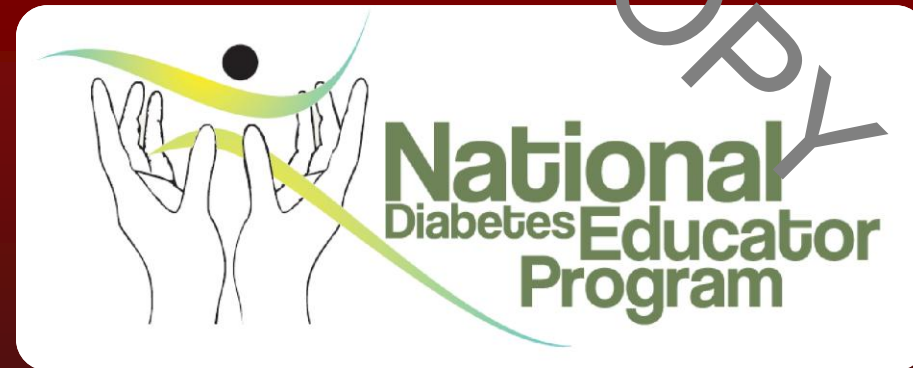
www.thelancet.com/diabetes-endocrinology Vol 4 March 2016

domain of specialists' who are too few in number term intervention to tackle the rising burden of India's management of diabetes

Lancet Diabetes Endocrinology. 2016; 4: 200-202.

**Till around the year 1995,
there were no Diabetes Educators in India**

**Hence, we started the
National Diabetes Educator Program
(NDEP)**



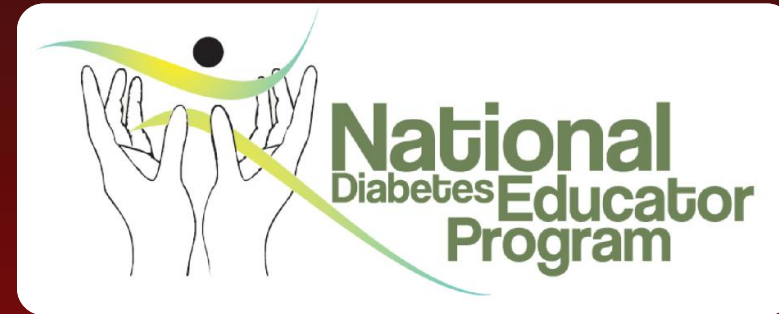
Course Directors



Dr. V. MOHAN



DR. SHASHANK R. JOSHI



Till Now

28,565

**Diabetes Educators Trained
across 7,500 Centres**

In Association with



Supported by



PUBLIC DIABETES AWARENESS PROGRAMS



16,000

**Free Diabetes
Awareness Camps**



1 Million

Beneficiaries

Social media



499,000

Facebook



316,000

YouTube



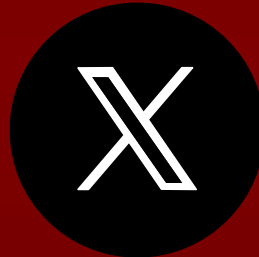
50,400

LinkedIn



99,200

Instagram



132,000

Twitter



10,400

WhatsApp
Channel

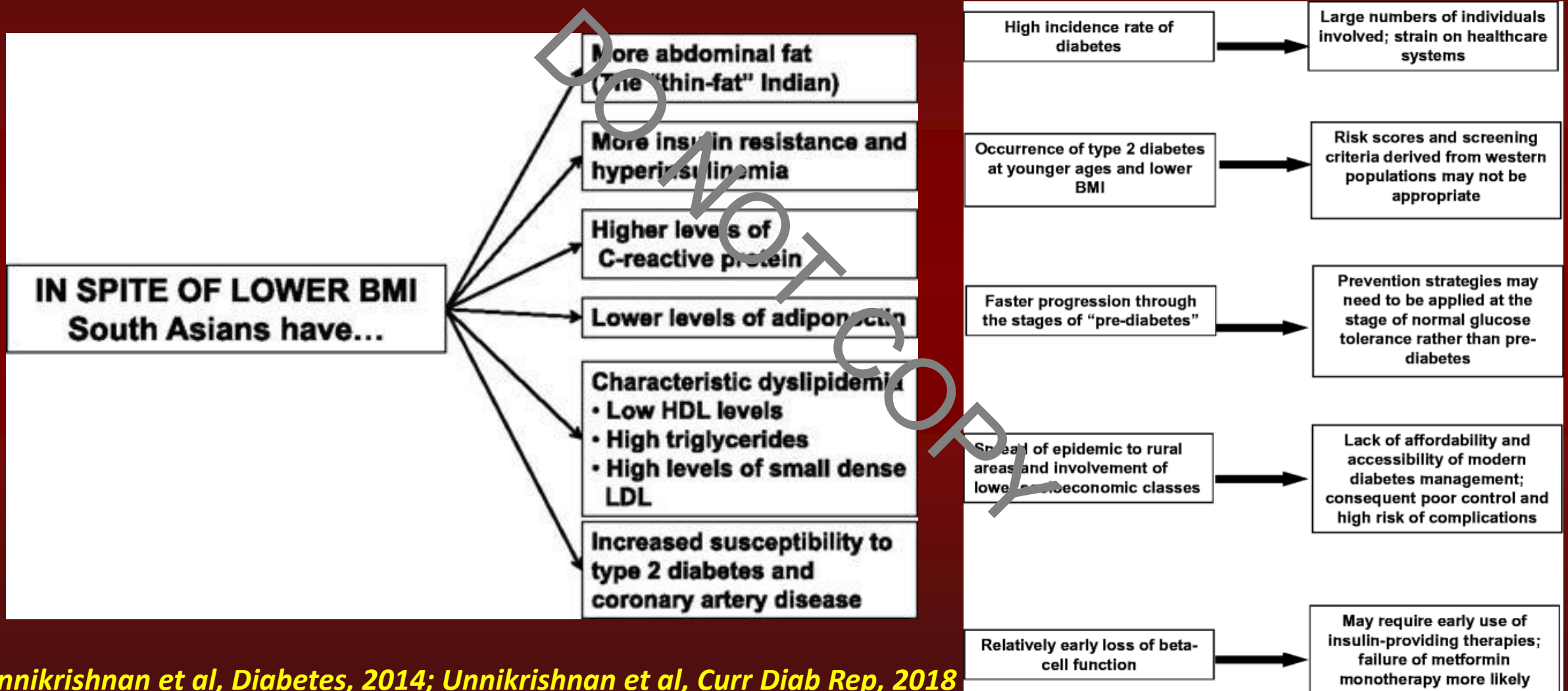
1.10 Million Followers

Outline of my talk

- Background
- Clinical Care
- Research
- Conclusions

DO NOT COPY

Type 2 diabetes in south Asians is different!



1996

Madras Diabetes Research Foundation

Aim: To carry out world-class, India-specific research on diabetes and its complications

2025



4

Locations

20

PhD Students



20

Post-Doctoral
Scientists

200+

Staff

International Collaborations



PUBLICATIONS

1871

Total Articles

169

H-Index

1149

I10 index

243,717

Citations

Journals include

New England Journal of Medicine, Lancet, Nature, Nature Genetics, Nature Reviews and Endocrinology, Lancet Diabetes & Endocrinology, BMJ, Diabetes Care, Diabetes, Journal of Clinical Endocrinology and Metabolism, Diabetologia, etc

RESEARCH CONTRIBUTIONS OF MDRF

- Large epidemiological studies on diabetes and other NCDs providing robust prevalence data at the city (CURES) and state and national (ICMR-INDIAB) levels
- Development of validated diabetes risk score (IDRS)
- First data on incidence of T2D and mortality from India
- Identification of novel subtypes of T2D
- Development of diabetes-friendly food products (low GI rice and snacks)
- Diet recommendations for remission and prevention of T2D
- First ever “Atlas” of Indian Foods
- Development of novel dance-based HIIT intervention to prevent diabetes in women and girls
- Coordinating centre for monogenic diabetes research in India

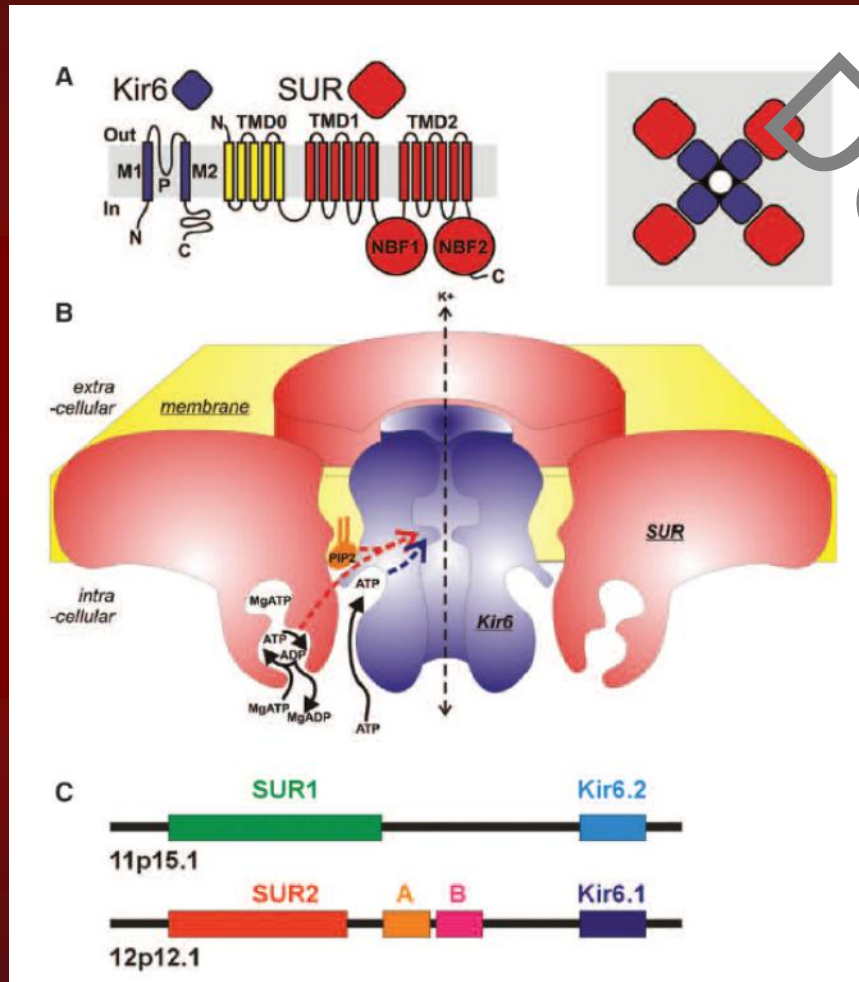
Monogenic diabetes occurs as a result of a mutation in a single gene associated with insulin secretion or action

Analyses performed :

- I. DNA extraction.
- II. Targeted sequencing analyses Seventy five genes associated with MODY and other similar forms of monogenic diabetes were screened and analyzed for pathogenic variations by targeted sequencing analyses using monogenic gene panel. These are given below.

HNF4A (MODY 1)	BSCL2	SATA	LPL	PTF1A
GCK (MODY 2)	CACNA1D	GATA6	LRBA	RFX6
HNF1A (MODY 3)	CAV1	GLIS3	MAFA	SALL1
IPF1 (MODY 4)	CISD2	GLUD1	MNX1	SIRT1
HNF1B (MODY 5)	COQ2	GPC3	NEUROG3	SIX1
NEUROD1 (MODY 6)	COQ9	HADH	NKX2-2	SLC16A1
CEL (MODY 8)	CTLA4	IER3IP1	NKX6-1	SLC19A2
INS (MODY 10)	DCAF17	IL2RA	PAX2	SLC29A3
ABCC8 (MODY 12)	DNAJC3	INSR	PIK3R1	SLC22A2
KCNJ11 (MODY 13)	DYRK1B	ITCH	PLAGL1	STAT1
AGPAT2	EIF2AK3	JAK1	PLIN1	STAT3
AIRE	EIF2S3	KDM6A	PMM2	STAT5B
WFS1	EYA1	KMT2D	POLD1	TNFAIP3
AKT2	ZBTB20	LMNA	PPARG	TRMT10A
APPL1	FOXP3	ZFP57	PPP1R15B	UCP2

KCNJ11 and ABCC8 encode the Kir 6.2 and SUR subunits, respectively, of the ATP sensitive potassium channel



Heterooctamer consisting of:

- Four members of the inwardly rectifying potassium channel (Kir) family
- Four members of the sulfonylurea receptor (SUR) family

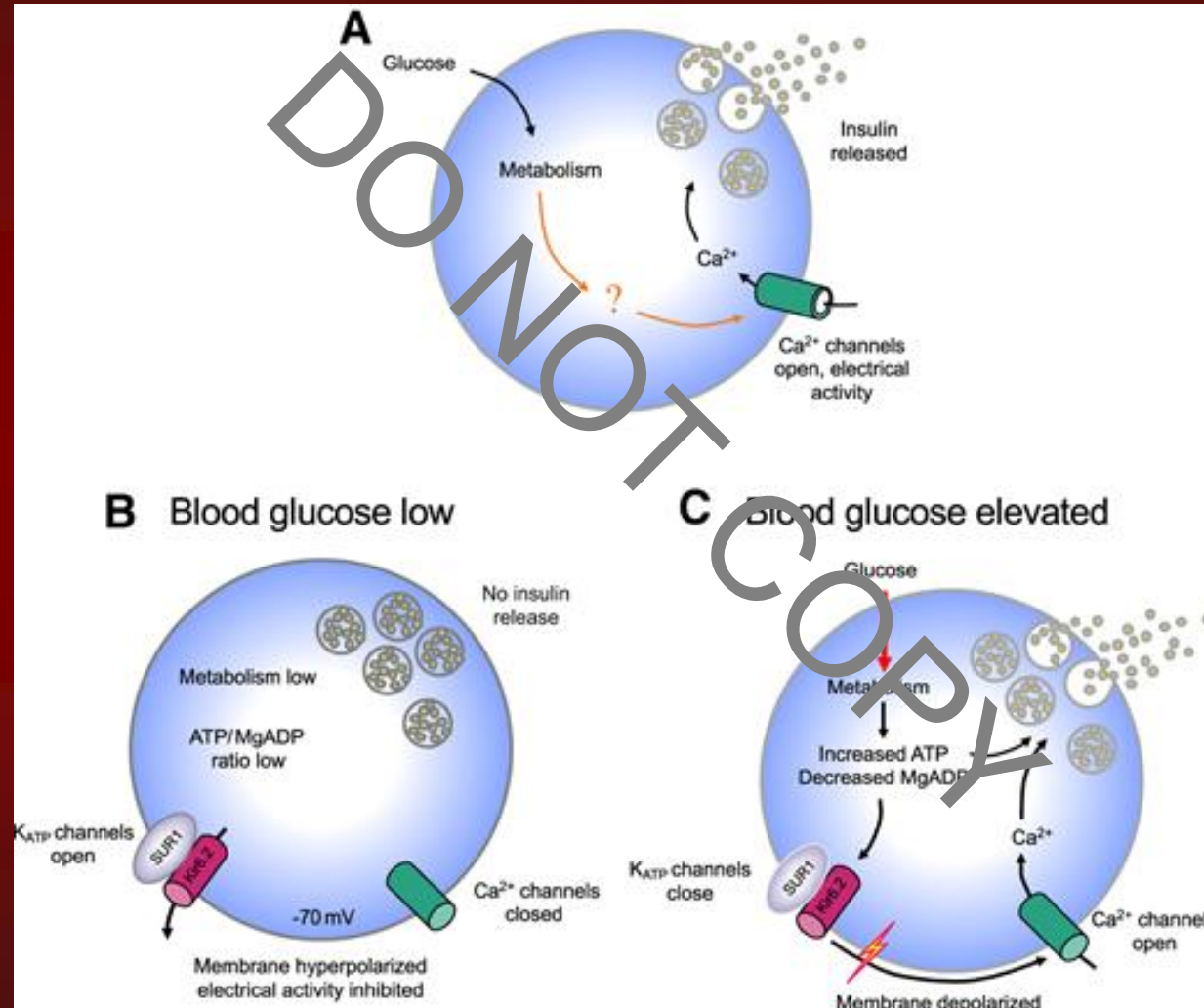
In the beta-cell, the respective components are Kir 6.2 and SUR1.

Cardiac muscle carries Kir 6.2/ SUR2A and vascular smooth muscle carries Kir 6.1 or 6.2/SUR2B

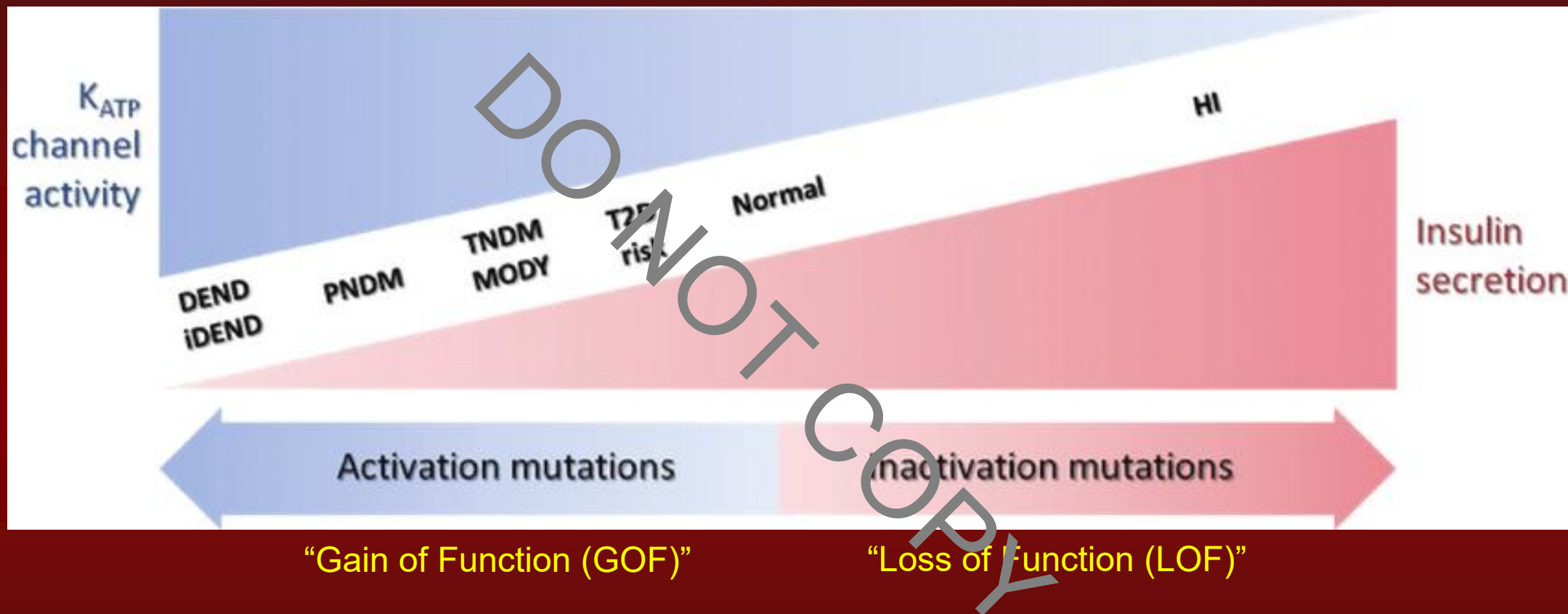
ATP-binding sites are located on the Kir subunit and ADP-binding sites on the SUR subunit

ATP binding closes the channel while ADP binding opens it

The K-ATP channel plays a central role in glucose-mediated insulin secretion from the pancreatic beta-cell

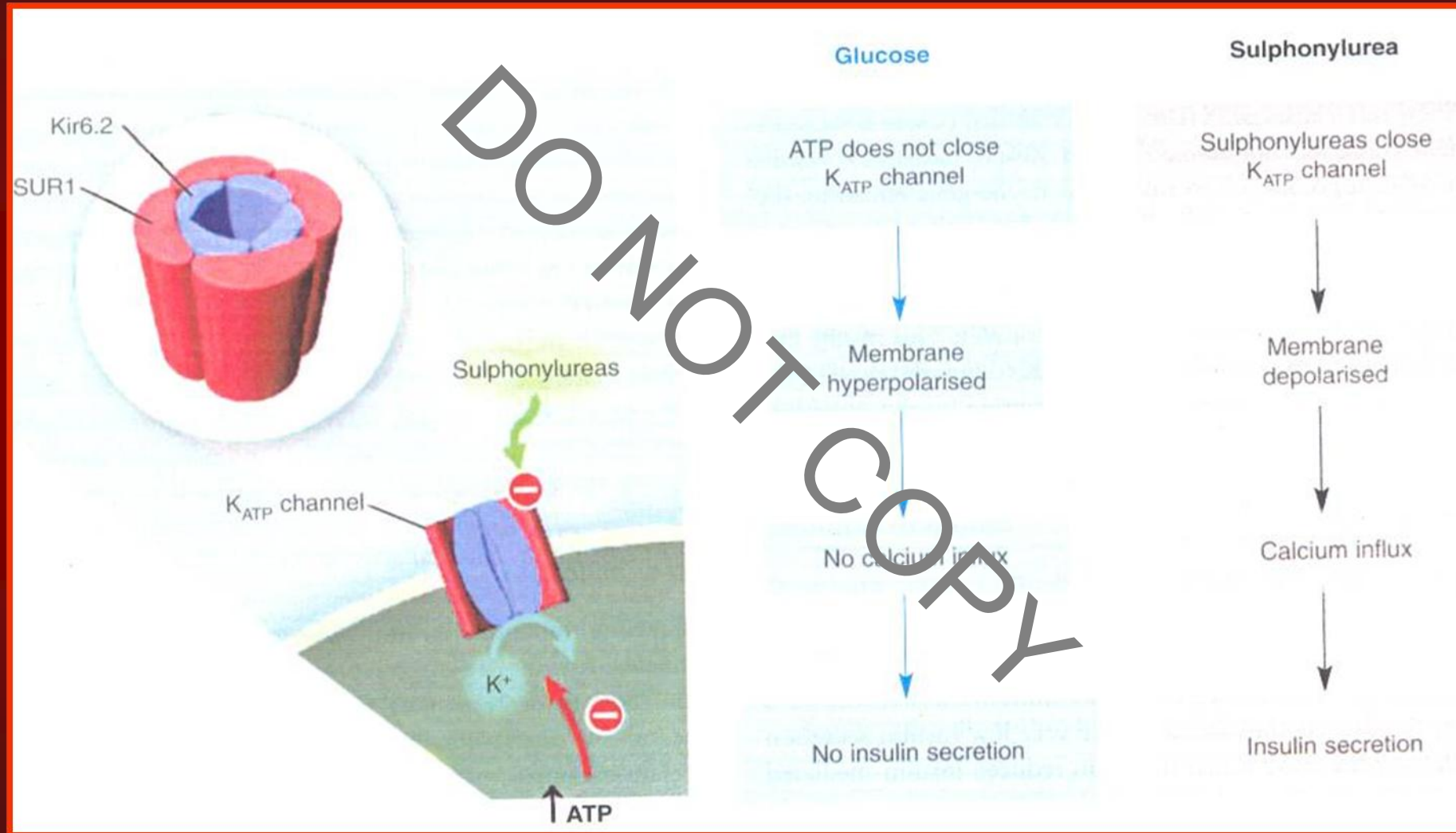


Mutations in K-ATP channel genes (ABCC8 and KCNJ11) can lead to a spectrum of clinical presentations



DEND- Developmental delay, epilepsy, neonatal diabetes; iDEND- intermediate DEND; PNDM- permanent neonatal diabetes mellitus; TNDM- transient neonatal diabetes mellitus; MODY- Maturity onset diabetes of young; T2D- type 2 diabetes. HI- hyperinsulinemia

Sulfonylureas (SU) are effective therapy for diabetes caused by GOF mutations in KCNJ11 and ABCC8 (PNDM, MODY 12, MODY 13)



CASE STUDY

- 3-month-old female baby, Ivana Das from Kolkata diagnosed to have diabetes 15 days after birth.
- Considering her age at onset, she was started on insulin injections.
- However, even with 14 units of insulin (3.5 units/kg body weight) given as four injections per day, her sugar levels remained between 300- 400 mg/dl.
- She was referred to our centre for further evaluation

CASE STUDY

- Considering the age at onset, a diagnosis of Neonatal Diabetes was made.
- The baby's blood sample was sent for genetic testing.

Genetic diagnosis of the patient after sequencing

Heterozygous mutation identified

Gene	: <i>KCNJ11</i>
Location	: Exon 1
DNA Description	: c.1001G>T
Protein Description	: p.Gly334Val (p.G334V)

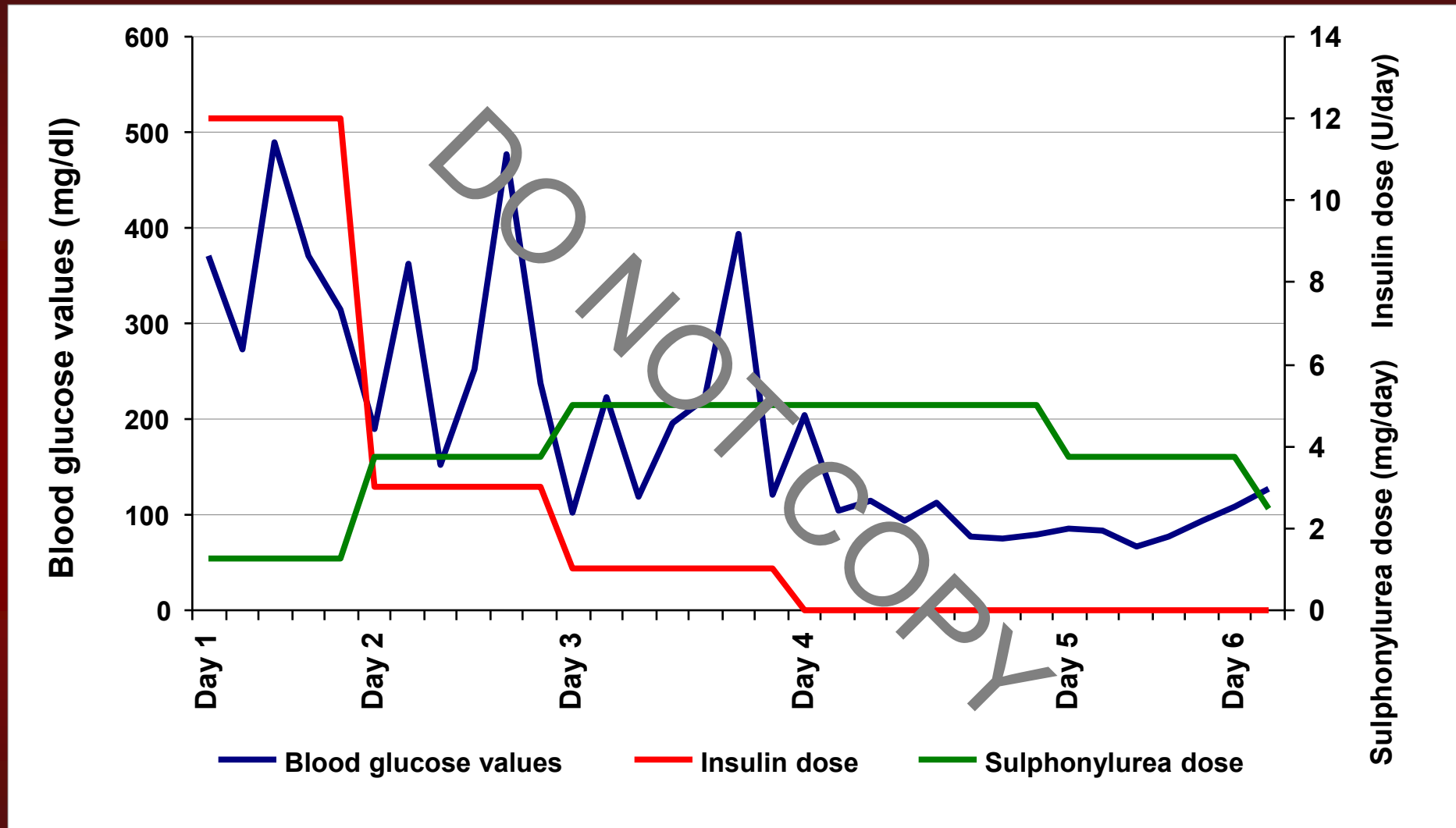
**Children with this mutation can be shifted
from insulin treatment to sulfonylureas**

Contd....

CASE STUDY

**The baby was started on Glibenclamide
and the dose of insulin was gradually
decreased over 5 days**

Response to therapy



By day 5, she was able to completely stop insulin and her sugars were absolutely normal and her general condition also improved

Ivana Das



2014, 3 months



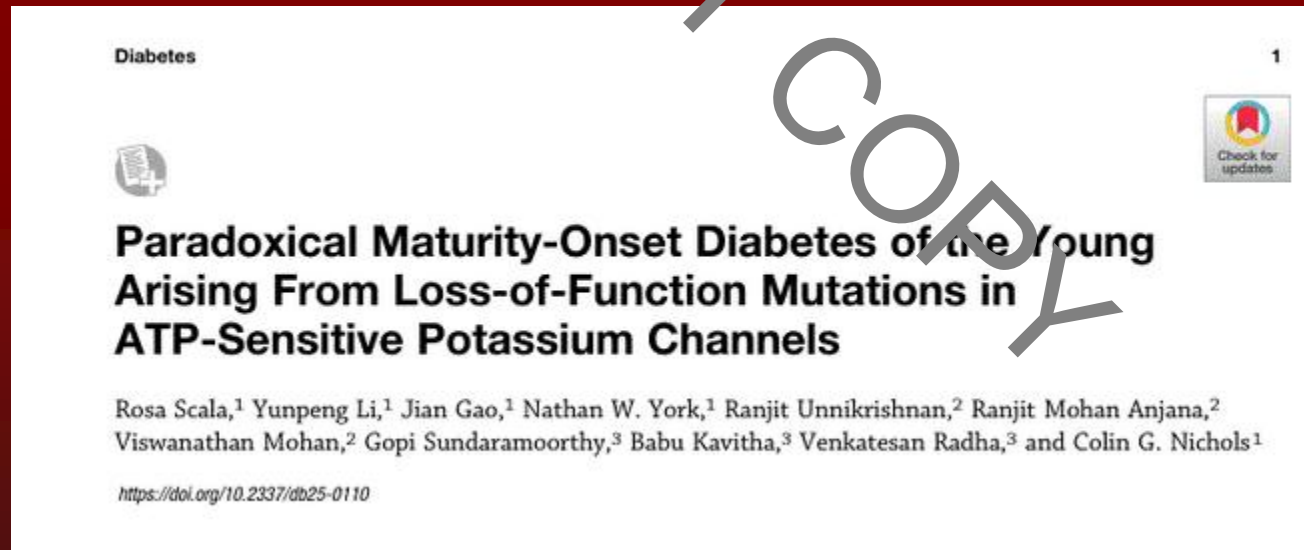
2023, 9 years

So, what benefit did Ivana get by genetic testing ?

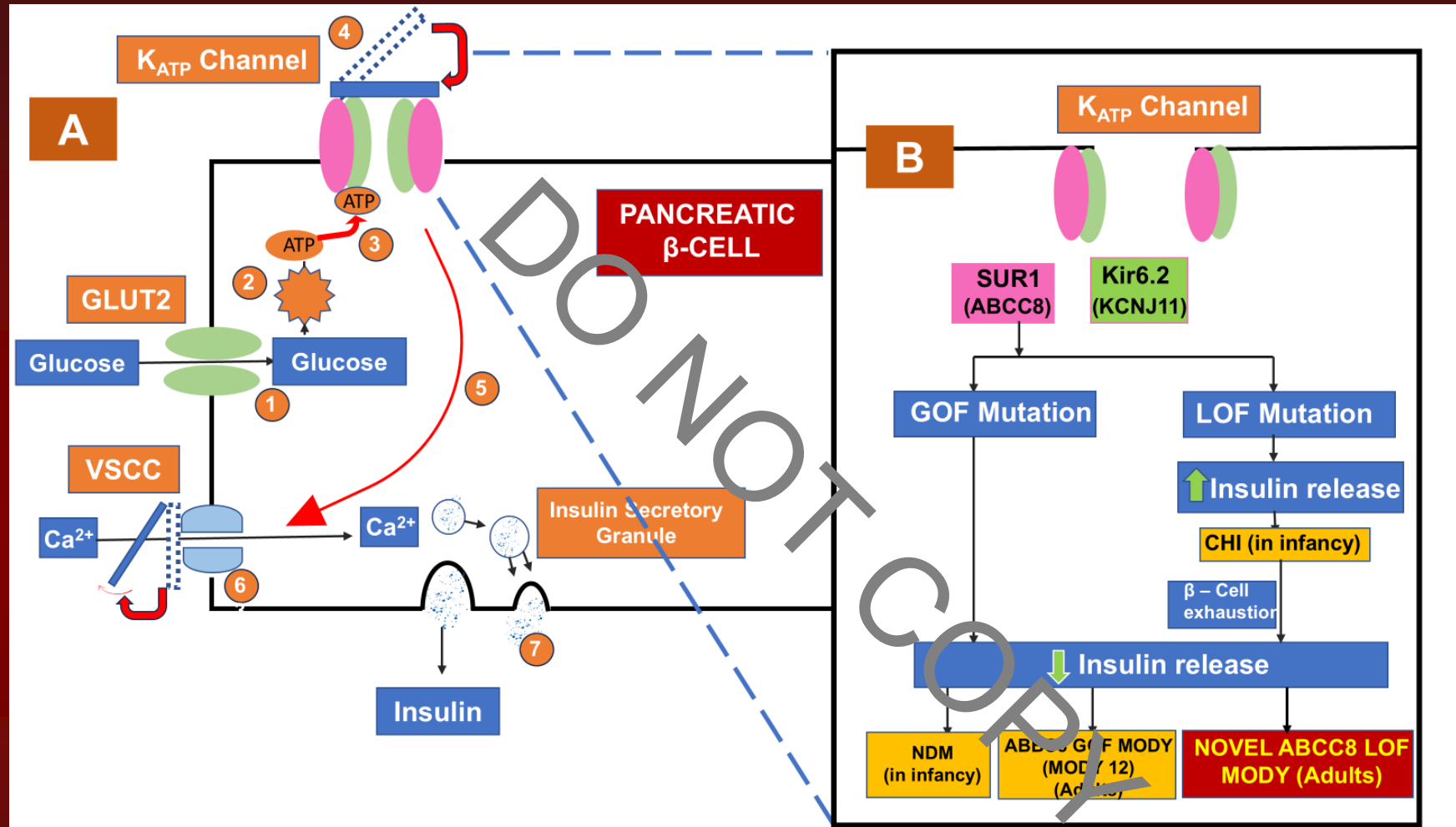
If genetic testing was not done	Thanks to genetic testing
❖ 16,060 insulin injections over 11 years ❖ Total cost of insulin – ~ Rs. 214,000 [GBP 1800] ❖ Cost of glucose monitoring – Rs. 102,000 [GBP 870] Total cost - Rs. 316,000 [GBP 2700] ❖ Monthly income of father – Rs. 20,000 [GBP 170]	❖ Insulin stopped, still on SU, 16,060 injections avoided till now. ❖ Cost of neonatal DM testing – Rs. 2,000 [GBP 17] was done <i>free of cost</i> ❖ Cost of SU over 11 years – Rs. 8,030 [GBP 68] Total amount spent by the family over 11 years - Rs. 8,030 [GBP 68] Total amount saved - Rs. 307,970 [GBP 2632]

Does all diabetes due to ABCC8 or KCNJ11 mutations respond to SU?

- GOF mutations in ABCC8/KCNJ11 have traditionally been associated with diabetes (NDM, MODY 12/13), while LOF mutations with hypoglycemia (CHI)
- We have recently reported on 20 individuals with LOF mutations in ABCC8, who presented with young-onset diabetes with no history of hypoglycemia



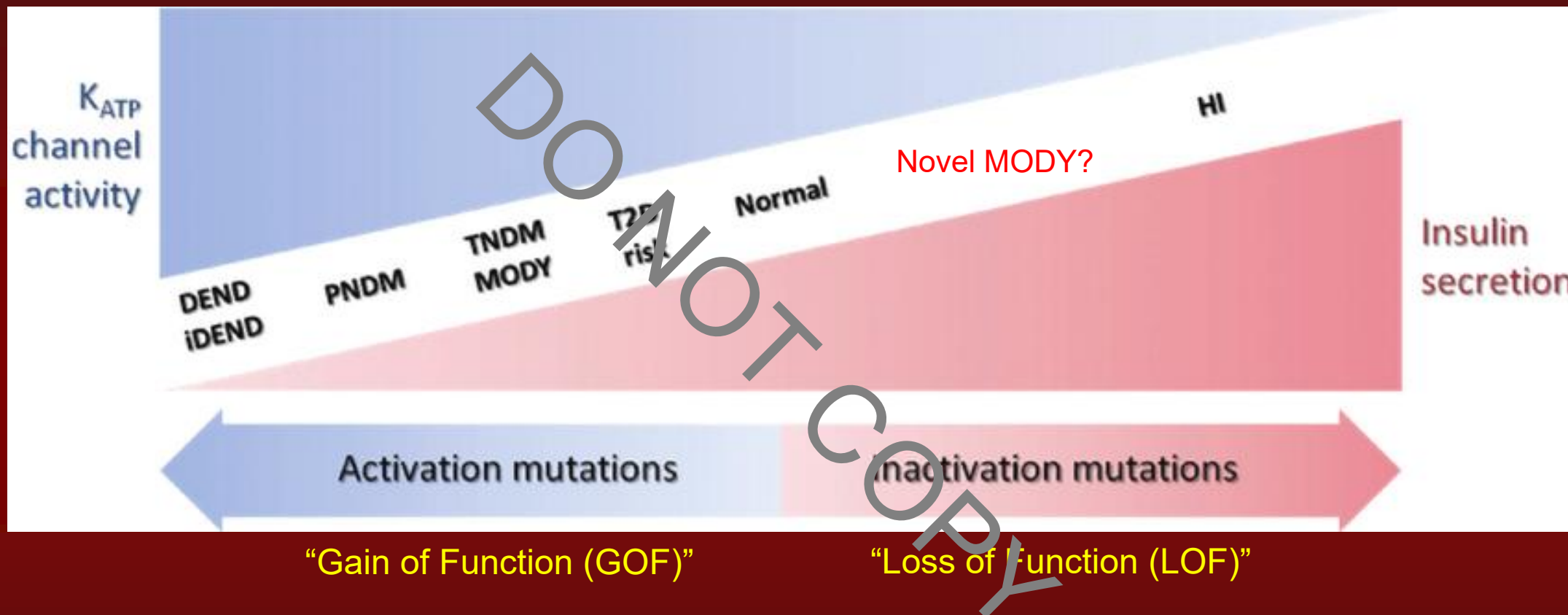
What could be the mechanism of diabetes in these cases?



Mohan et al, J Assoc Physicians India, 2025

- SU are unlikely to work in these cases
- We suggest that diabetes due to LOF mutations in ABCC8 be termed a separate subtype of monogenic diabetes i.e. MODY 15 so as to avoid confusion with GOF mutation-associated diabetes (MODY 12 and 13) which do respond to SU

Mutations in K-ATP channel genes (ABCC8 and KCNJ11) can lead to a spectrum of clinical presentations



DEND- Developmental delay, epilepsy, neonatal diabetes; iDEND- intermediate DEND; PNDM- permanent neonatal diabetes mellitus; TNDM- transient neonatal diabetes mellitus; MODY- Maturity onset diabetes of young; T2D- type 2 diabetes. HI- hyperinsulinemia

Profile of Monogenic Diabetes in India

Diabetes Res Clin Pract. 2025 Jun 2;226:112289



Profile of monogenic diabetes: a Pan-India study

Viswanathan Mohan^{a,b,*}, Anandakumar Amutha^a, Ramasamy Aarthi^a, Subramani Poongothai^a, Coimbatore Subramanian Shanthirani^a, Ranjit Unnikrishnan^{a,b}, Ranjit Mohan Anjana^{a,b}, Sekar Kanthimathi^a, Dhanasekaran Bodhini^a, Phillips Routray^b, Ramkumar Hemachitra^c, Gowrinathan Thannoli Gowthami^c, Sridevi A. Naaraayan^c, Pichakacheri Sureshkumar^d, Banshi Saboo^e, Shariq Masoodi^f, Jayaram Shruthi^f, Madhumitha Singh^f, Idrees A Shah^f, Vijay Viswanathan^g, Radhakrishnan Chandni^h, Neeraj Manikath^h, Palani Raghupathyⁱ, Sukanya Priyadarshini^j, Vandana Jain^j, Rajni Sharma^j, Neeta Deshpande^k, Chittaranjan Sakeralal Yajnik^l, Smita Dhadge^l, Kalpana Jog^l, Sandeep Rai^m, Mallikarjun V. Jaliⁿ, Sujatha M. Jaliⁿ, Shaila Pachapureⁿ, Shivani Sidana^o, Muthu Ramuu^b, Dhanasekaran Killivalavan^b, Arunkumar R. Pande^{b,q}, Venkatesan Radha^a, PAN INDIA Monogenic Study Collaborators Group from India

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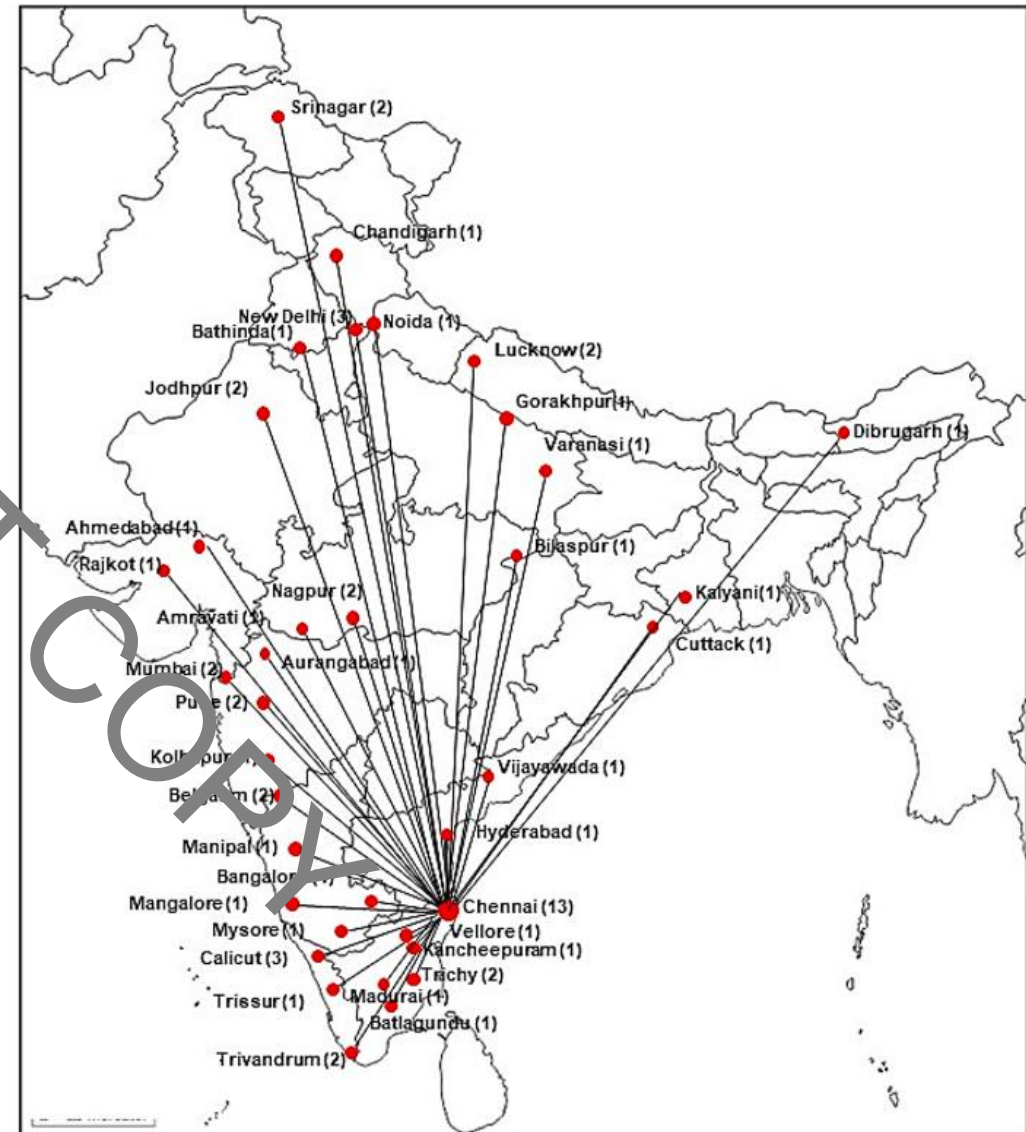
ARTICLE INFO

Keywords:
Monogenic diabetes
MODY
MIDD
India

ABSTRACT

Aim: To evaluate the frequency of monogenic diabetes mutations among individuals clinically suspected to have monogenic diabetes in India.

Methods: Participants (n = 774) were recruited from 65 diabetes centres across India (<http://monogenicdiabetes.in/Collaborators.html>). Inclusion criteria were: age at diagnosis of diabetes ≤ 30 years; family history of diabetes in one or both parents; BMI ≤ 30 kg/m²; and absence of ketonuria. Monogenic diabetes was diagnosed based on pathogenic/ likely pathogenic mutations as per the American College of Medical Genetics and Genomics (ACMG) and Association of Medical Pathology (AMP) guidelines.



INDIAN MONOGENIC DIABETES REGISTRY

Total no. of cases : 2405

NDM

n = 432

KCNJ11 } Respond to Sulphonylurea
ABCC8 }

INS } May not respond to Sulphonylurea
GCK }
NKX2.2 }
LRBA }
FOXP3 }
ZFP57 }

SYNDROMIC FORMS

n = 180

Wolfram Syndrome, DIDMOAD (*WFS1*)
Thiamine-Responsive Megaloblastic Anemia (*SLC19A2*)
Wolcott-Rallison Syndrome (*EIF2AK3*)
IPEX syndrome (*FOXP3*)
Alström syndrome (*ALMS1*)
Werner syndrome (*WRN*)
Rabson Mendenhall syndrome (*INSR*)
Maternally inherited diabetes and deafness (MIDD)

MODY

N = 1369

HNF4A
GCK
HNF1A
HNF1B
INS
ABCC8
KCNJ11

CHI

n = 424

ABCC8 } Some are Diazoxide responsive
KCNJ11 }
HADH } Diazoxide responsive
GLUD1 }
GCK } Diazoxide unresponsive
HNF1A
Chrom 9 del

Outline of my talk

- Background
- Clinical Care
- Research
- **Conclusions**

DO NOT COPY

Conclusions

Diabetes care in India is the art of the **POSSIBLE!**

Even in a resource-constrained setting, it is **POSSIBLE** to.....

- Build and expand a state-of-the-art system to provide affordable, accessible diabetes care
- Engage in research of international standards
- Develop and expand capacity
- Reach out to underserved and marginalized populations

But...

What makes it **POSSIBLE** is **TEAMWORK!**

OUR TEAM OF DOCTORS



Heads of Departments



Scientists



