DIABETES TRANSLATION ON CLINICAL AND PUBLIC HEALTH RESEARCH: LEARNING OBJETIVES EPIDEMIOLOGY, PRIMARY PREVENTION, DOMINAN INHERITANCE OF TYPE 2 DIABETES MELLITUS (T2DM)

1 ORAL GLUCOSE TOLERANCE TEST (OGTT)
2 EPIDEMIOLOGY OF TYPE 2 DIABETES MELLITUS (T2DM)
3 PRIMARY PREVENTION OF T2DM
4 DOMINANT INHERITANCE OF T2DM
5 LEARNING OBJECTIVES CONCLUSIONS

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(Research paid by the researcher's savings)
Research started in Brownsville, TX, USA
and will finish in Bogotá-Colombia,S.A.

1 ORAL GLUCOSE TOLERANCE TEST (OGTT)

The Objective is to prove and promote the ORAL GLUCOSE TOLERANCE TEST (OGTT), measuring insulin, glucose, cholesterol, triglycerides and HDL, is the only test useful for the Epidemiology, primary prevention, and dominant inheritance of T2DM. This test was standardized in 1925 by Hale-White and Payne Q.J.M.1925, Oxford 1:XIV:393-410

It is as follows: To a twelve-hour fasting person blood samples were obtained at zero minutes 0' (fasting), and at 30', 60', 120' and 180' minutes after an oral intake of 100g, 75g, or 50g dextrose solution in water. Serum insulin in Mu/ml analyzed by the electrochemiluminescence Immunoessay, serum glucose, cholesterol, triglycerides, and HDL in mg/dl analyzed using the enzymatic colorimetric essays by the Bayer and Roche Laboratories. Plasma Glucagon pg/ml measured using Radioimmunoessay (RIA).

2 EPIDEMIOLOGY OF TYPE 2 DIABETES MELLITUS (T2DM)

TABLE 1 Shows, reference range: lower and higher values and the mean value of the range of insulin Mu/ml, glucose mg/dl, and Glucagon pg/ml. abnormal values are in red. Normal fasting glucose values found in all subjects. Postprandial high glucose values found in subjects with IGT and all subjects with diabetes. High values of insulin found in subjects with Hyperinsulism (HI), in subjects with IGT and some subjects with Diabetes.

Subjects	Insulin Mu/ml			Glucose mg/dl			Glucagon pg/ml		
Minutes	0'	30'	60'	0'	30'	60'	0'	30'	60'
N=25.Age 3-63	5-20	45-63	5-25	78-90	103-140	80-90	28-53	21-34	18-29
BMI=16-29	13	54	15	84	122	85	41	28	24
HI=37.Age10-50	5-59	36-363	34-257	75-95	119-138	80-102	38-72	31-46	26-36
BMI=14-25	32	210	156	85	129	91	55	39	31
IGT=95Age 8-74	5-94	45-488	42-944	78-124	112-191	75-189	28-86	27-86	28-73
BMI=14-60	50	267	493	101	152	132	65	57	51
DM-85 Age10-81	1-156	6-589	6-548	73-330	194-415	173,522	42-230	32-230	35-160
BMI=22-66	79	298	277	202	305	348	136	131	98

Total subjects studied= 243. from wich were 173 Mexican Mexican-Americans, and 70 Colombians.
Females=126. Males=117. Ages 3 to 81 years. BMI 14-66kg/m2.
N=Normal. HI= Hiperinsulinemia. IGT= Impaired Glucose tolerance. D= diabetes.

Figure 1 and 2 show mean values of Insulin in Mu/ml and glucose mg/dl: dark blue curve represents normal subjects. Red curve represents subjects with

Hyperinsulinemia (HI), and normoglycemia. Turquoise color represents subjects with diabetes and yellow curve represents subjects with glucose intolerance (IGT) (postprandial and fasting).
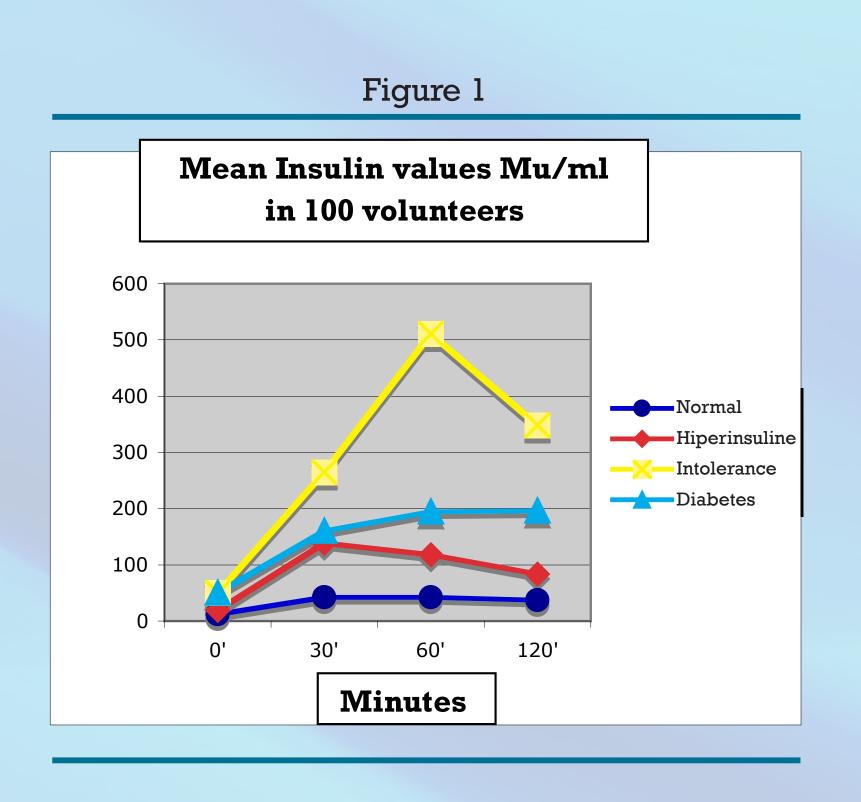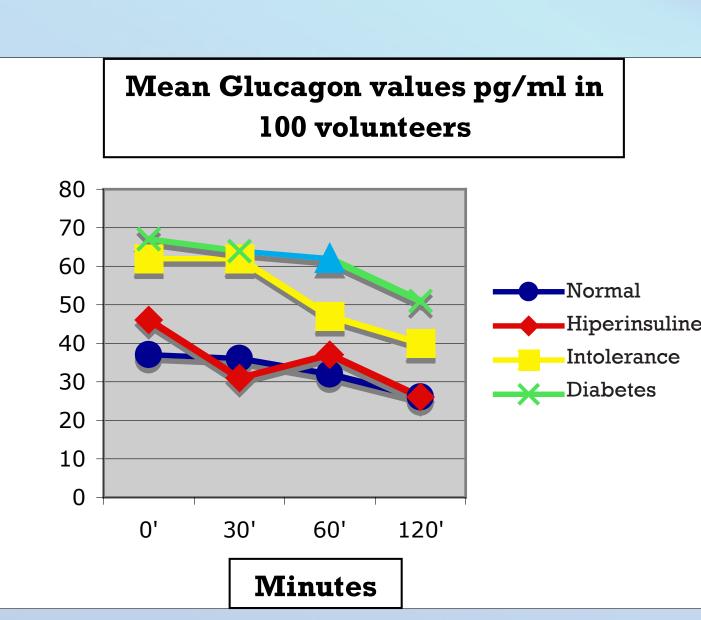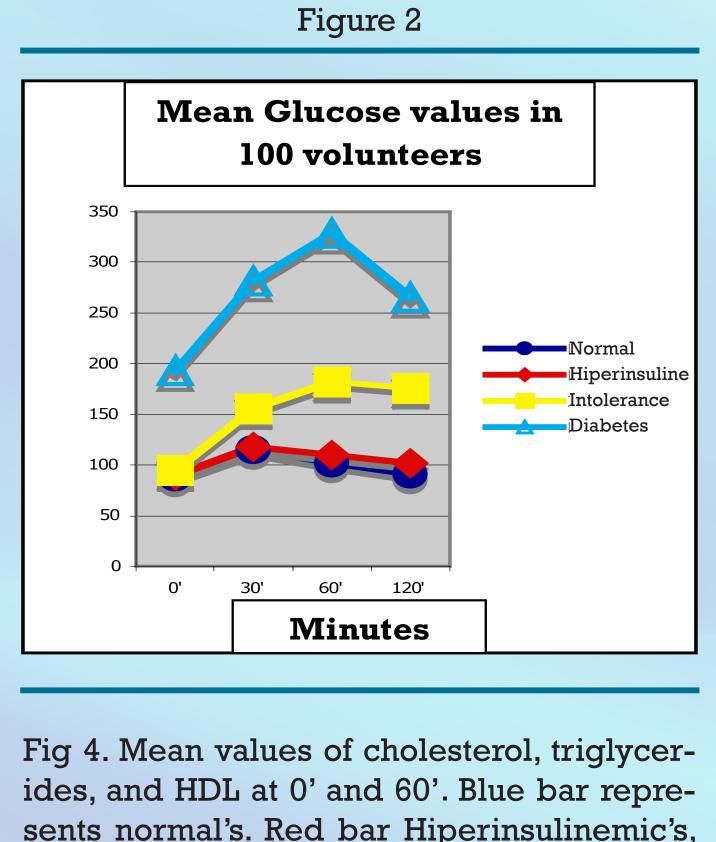
Figure 1

Mean Insulin values Mu/ml in 100 volunteers

Figure 2

Mean Glucose values in 100 volunteers

Figure 3.Mean values of Glucagon pg/ml. Dark blue curve normal,red curve Hiperinsulinemic's, yellow curve intolerants' and turquoise curve diabetics'

Fig 4. Mean values of cholesterol, triglycerides, and HDL at 0' and 60'. Blue bar represents normal's. Red bar Hiperinsulinemic's, intolerants' and turquoise diabetics'

Mean Glucagon values pg/ml in 100 volunteers

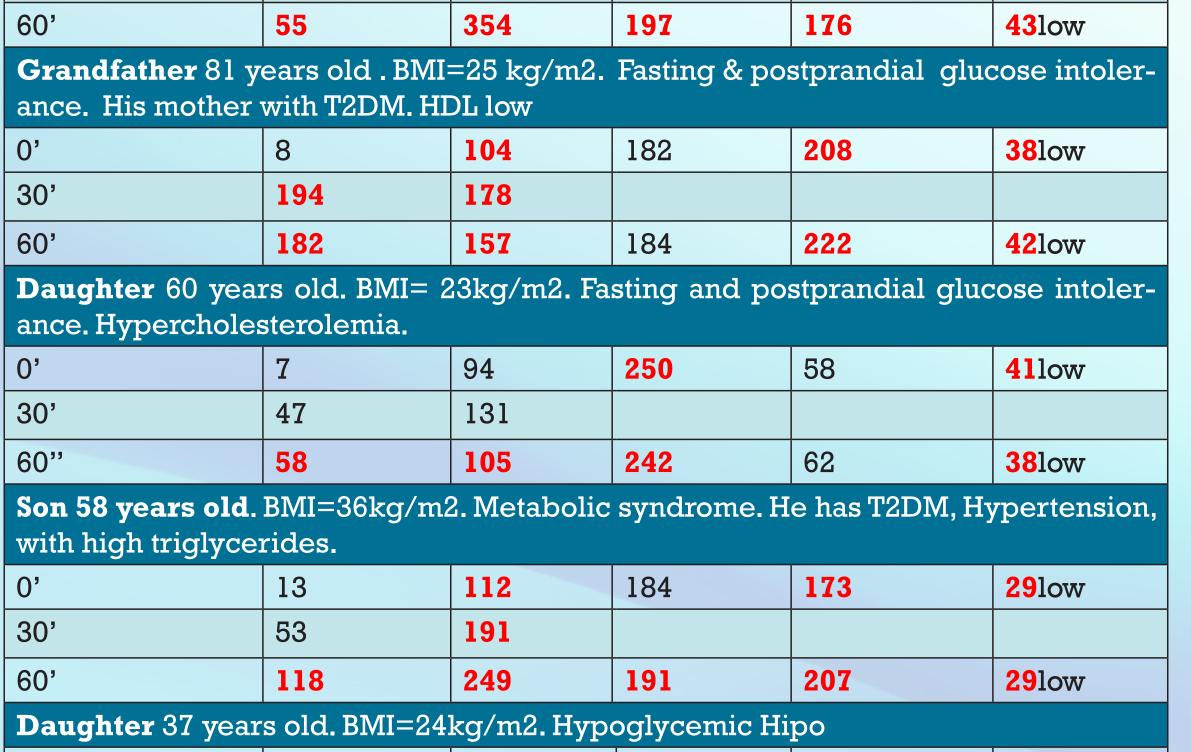### Mean Cholesterol, triglycerides and HDL in mg/dl in 100 volunteers

3 PRIMARY PREVENTION OF T2DM

N: Nurse 72 years old treated for 14 years for ½ hour postprandial impaired glucose tolerance (IGT) without developing diabetes mellitus type 2 (T2DM). Treated with a normal life style and long and fast acting insulins subcutaneously injected.

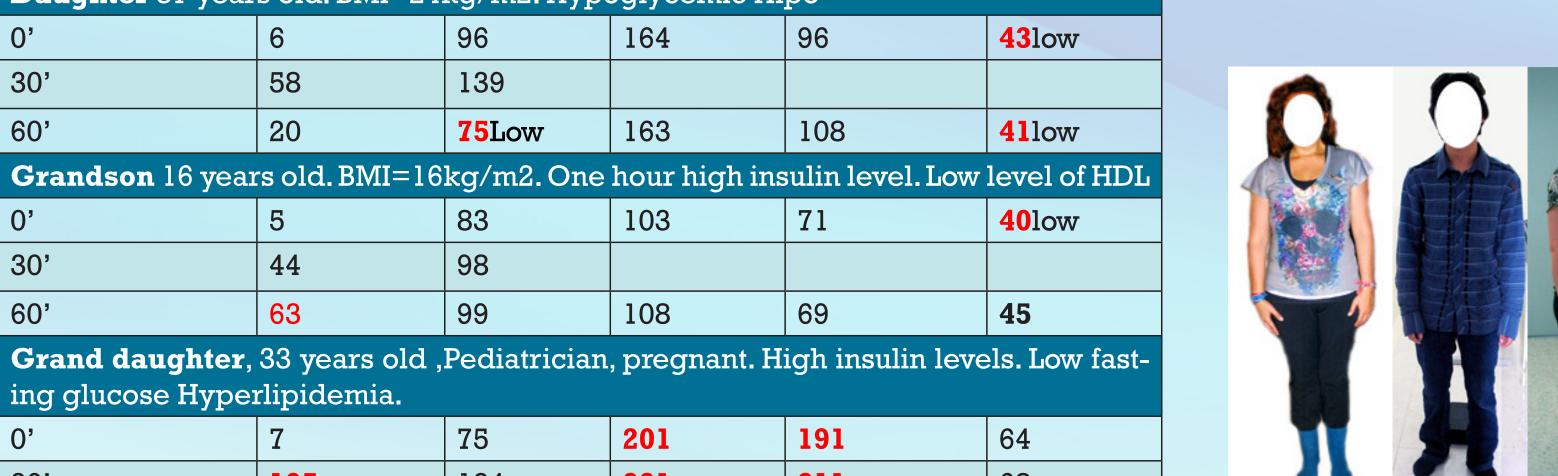| Years	Fasting glucose mg/dl	Total cholesterol/ HDL in mg/dl	Fasting Triglycerides mg/dl
1978-1987	88-110	173-247	84-103
1989-1993	94-99	242-276	96-155
		43-54	
	Fasting & postprandial (PP) glucose,	Fasting total cholesterol and HDL and postprandial(PP) in mg/dl	Fasting,& postprandial (PP) triglycerides in mg/dl
1996-2003	95-103/168-191	239-265/51-55	94-100/228-350
Oral Glucose Tolerance Test (OGTT)	Oral Glucose Tolerance Test (OGTT)	Oral Glucose Tolerance Test (OGTT)	Oral Glucose Tolerance Test (OGTT)
2004	Insulin Mu/ml	Glucose mg/ml	Glucagon pg/ml
Minutes	0' 30' 60'	0' 30' 60'	0' 30' 60'
	45 45 58	92 170 130	51 43 35
2009	Fasting & PP glucose M/dl	Fasting & PP cholesterol mg/dl	Fasting & PP triglycerides mg/dl
	92/120	245/220	100/198
Normal Values	13 54 15	85 122 85	41 28 24
	Physical changes		
	Ophthalmological	Cardiological	Neurological and radiological.
1978	Normal	Normal	Normal
1993-2009	abnormal	abnormal	abnormal
Abnormal high values are in red.	Abnormal physical finding are in red		

4 DOMINANT IHNERITANCE OF T2DM UP TO THE FOURTH GENERATION.

Ten families with members with diabetes (grandparents, parents, aunts and uncles) out of a total of 243 subject studied.

A family of seven members is presented: grandparents (grandmother with diabetes). Grandfather (with IGT), a son with diabetes, and two daughters and 2 grandchildren with hyperinsulinism.

	Insulin Mu/ml	Glucose mg/dl	Cholesterol mg/dl	Triglycerides mg/dl	HDL mg/dl
Grand mother with T2DM, 77 years old. Her father with DMT2. BMI 28 Kg./m2. TIAs with lost of memory and imbalance.					
Minutes					
0'	12	138	181	147	40low
30'	40	280			
60'	55	354	197	176	43low
Grandfather 81 years old . BMI=25 kg/m2. Fasting & postprandial glucose intolerance. His mother with T2DM. HDL low					
0'	8	104	182	208	38low
30'	194	178			
60'	182	157	184	222	42low
Daughter 60 years old. BMI= 23kg/m2. Fasting and postprandial glucose intolerance. Hypercholesterolemia.					
0'	7	94	250	58	41low
30'	47	131			
60''	58	105	242	62	38low
Son 58 years old. BMI=36kg/m2. Metabolic syndrome. He has T2DM, Hypertension, with high triglycerides.					
0'	13	112	184	173	29low
30'	53	191			
60'	118	249	191	207	29low
Daughter 37 years old. BMI=24kg/m2. Hypoglycemic Hipo					
0'	6	96	164	96	43low
30'	58	139			
60'	20	75Low	163	108	41low
Grandson 16 years old. BMI=16kg/m2. One hour high insulin level. Low level of HDL					
0'	5	83	103	71	40low
30'	44	98			
60'	63	99	108	69	45
Grand daughter, 33 years old .Pediatrician, pregnant. High insulin levels. Low fasting glucose Hyperlipidemia.					
0'	7	75	201	191	64
30'	195	134	221	211	68
60'	242	130	197	185	70

5 LEARNING OBJETIVES IN CONCLUSIONS

1. Oral Glucose Tolerance Test (OGTT), measuring insulin, glucose, cholesterol, triglycerides and HDL, is the only useful test for the Epidemiology of (T2DM). It helps to diagnose who is born to have diabetes, who has postprandial and fasting glucose intolerance, who has mild, established overt, and severe diabetes. Fasting and HbA1c tests of glucose and lipids are unable to do that.

2. OGTT is useful in the Primary Prevention of T2DM by diagnosing who has postprandial and fasting Impaired Glucose Tolerance (IGT), and treating it immediately with a normal life style, and long and short acting insulins subcutaneously injected.

3. OGTT is useful in the dominant inheritance of T2DM by demonstrating that all family members who have (grandparents, parents, uncles or aunts) with diabetes have insulin, glucose or lipids abnormalities.

4. Self-Glucose monitoring, using a glucometer, is essential to know what and how much to eat and how much insulin to inject.