당뇨병 전단계: 의미와 관리

나 은 희

안국건강관리협회 건강증진연구소

- 내 용 -

- 당뇨병 전단계의 진단
- 유병률
- 당뇨병 전단계의 건강위험요소
- 당뇨병 전단계의 치료(관리)
- 결론

당뇨병 전단계의 진단

WHO 정의

IFG: 110-125 mg/dL

IGT: 2h plasma glucose in the 75g OGTT 140-199 mg/dL

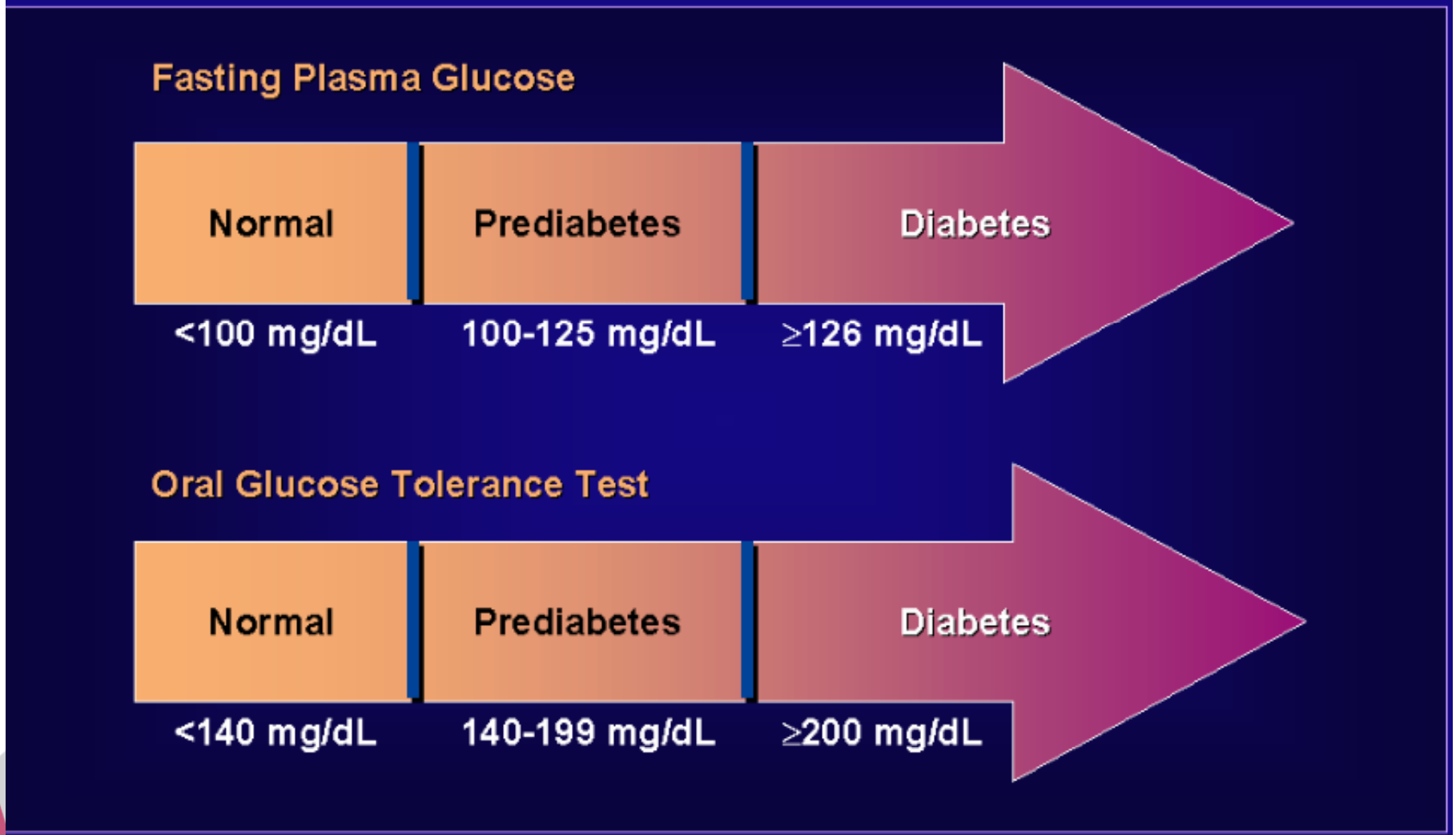
ADA 정의

IFG: 100-125 mg/dL

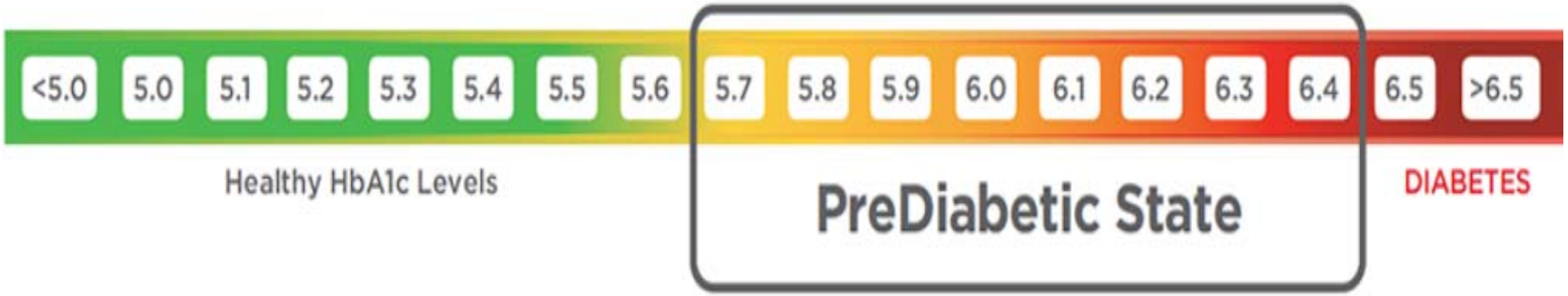
IGT: 140-199 mg/dL

HbA1c: 5.7-6.4%

Diagnosing Prediabetes and Diabetes Mellitus



The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2003;26:3160-3167.


<5.0
5.0
5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6.0
6.1
6.2
6.3
6.4
6.5
>6.5
Healthy HbA1c Levels
PreDiabetic State
DIABETES

당뇨병 전단계의 유병률

- **In Korea (30세 이상 성인)**

  ✓ 공복혈당장애 유병률: 19.9% ✓ 당뇨병 유병률: 10.1%

- **In USA (20세 이상 성인)**

  ✓ 공복혈당장애 유병률: 37% cf) 65세 이상 성인의 51%

- **World wide prevalence of IGT in 2010**

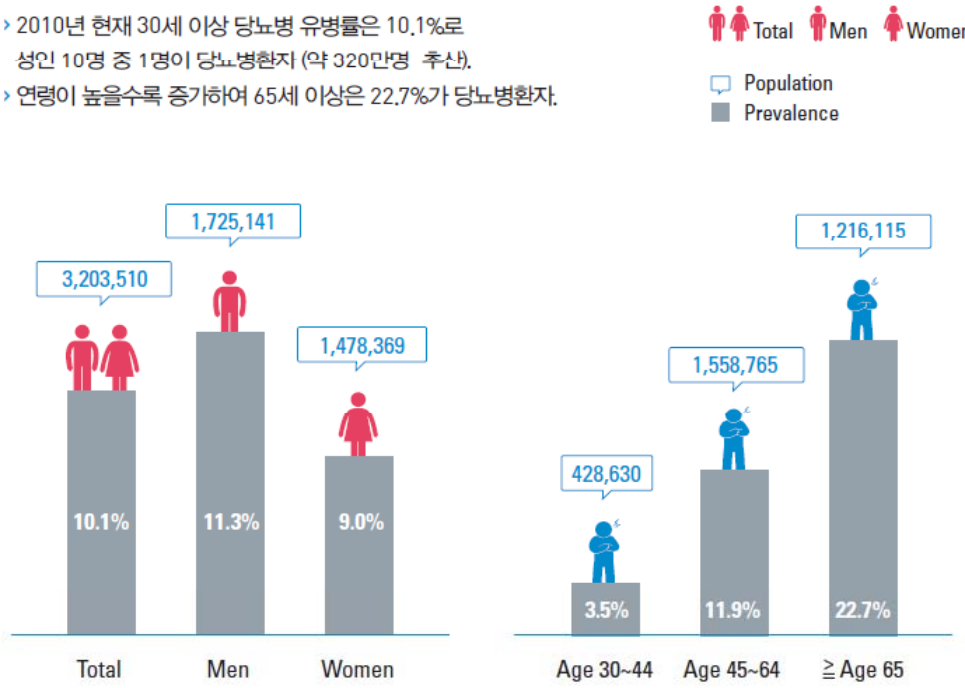
  ✓ 343 million (7.8%: 5.8-11.4%)

PREVALENCE OF DIABETES 2010 (≥ 30 YRS OLD)

성인당뇨병 유병률

3.2 Million

› 2010년 현재 30세 이상 당뇨병 유병률은 10.1%로 성인 10명 중 1명이 당뇨병환자 (약 320만명 추산).
› 연령이 높을수록 증가하여 65세 이상은 22.7%가 당뇨병환자.

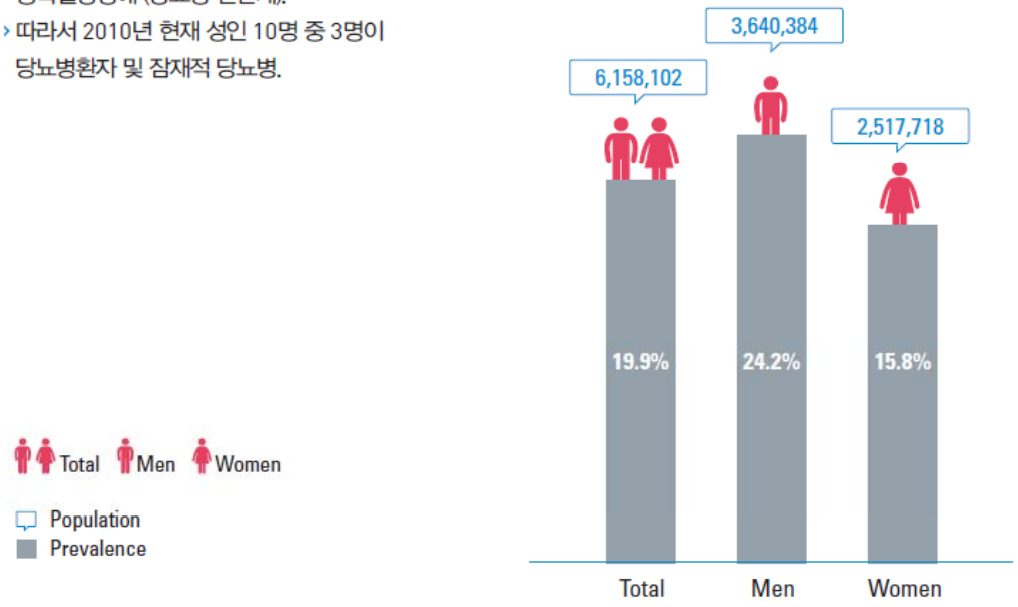


IMPAIRED FASTING GLUCOSE (PREDIABETES)

공복혈당장애 (당뇨병 전단계)

6.2 Million

› 30세 이상 성인의 약 20%인 620만명이 공복혈당장애 (당뇨병 전단계).
› 따라서 2010년 현재 성인 10명 중 3명이 당뇨병환자 및 잠재적 당뇨병.



조사 기준 및 방법

› 자료산출방법 : 당뇨병 및 당뇨병 전단계의 유병률과 환자 수치는 2007년부터 2010년도에 질병관리본부와 보건복지부에서 우리나라 30세 이상 성인을 대상으로 시행한 국민건강영양조사 자료로부터 산출하였음.
› 당뇨병 진단기준 : 공복혈당 126 mg/dL 이상, 현재 당뇨병 치료를 하고 있거나 이전에 당뇨병으로 진단받은 환자를 포함.
› 공복혈당장애 진단기준 : 공복혈당 100~125 mg/dL 사이

출처: 대한당뇨병학회. 질병관리본부. Diabetes fact sheet in Korea 2012. Available from http://www.diabetes.pr.kr/temp/DiabetesmFactmsheet2012.pdf

PREDIABETES

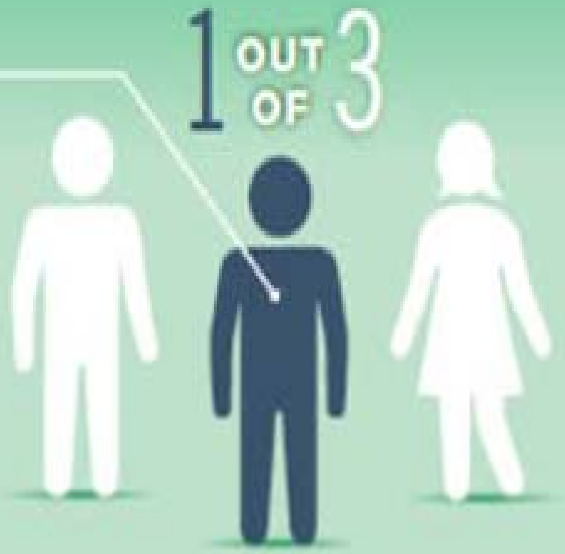
COULD IT BE YOU?

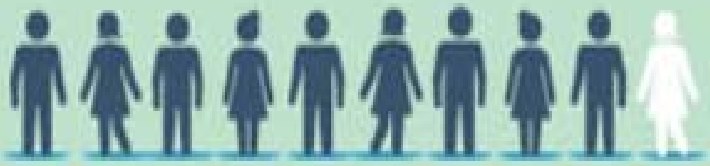
CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

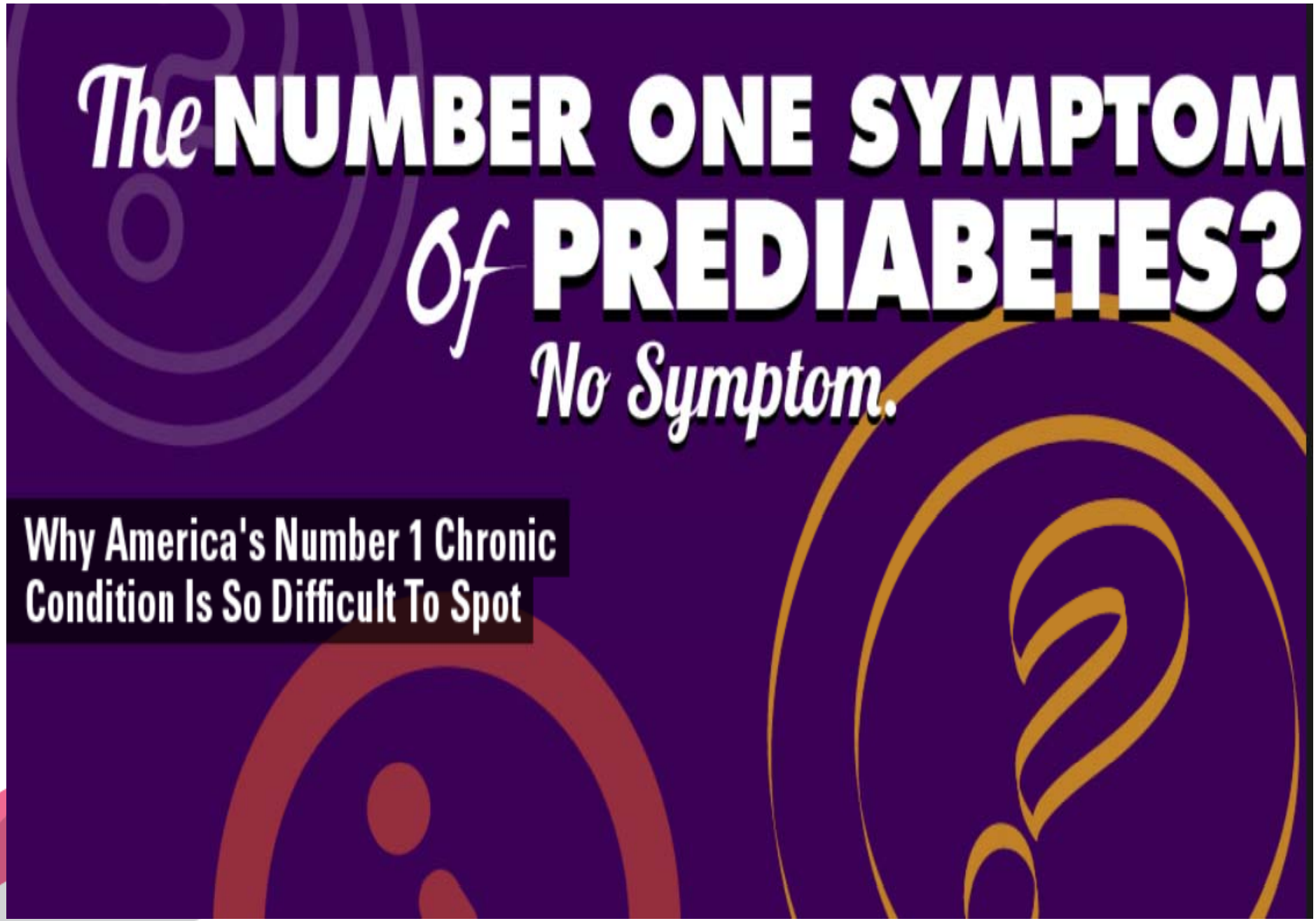
86 MILLION

86 million American adults—more than 1 out of 3—have prediabetes





9 OUT OF 10 people with prediabetes do not know they have it


The NUMBER ONE SYMPTOM
Of PREDIABETES?
No Symptom.
Why America's Number 1 Chronic
Condition Is So Difficult To Spot

Screening for Pre-diabetes

- Clinical features increase the likelihood of a positive finding:

✓ advancing age
✓ obesity
✓ other features of metabolic syndrome
✓ family history of DM or CVD
✓ signs of atherosclerotic disease

당뇨병 전단계의 건강위험요소

1 당뇨병 발생

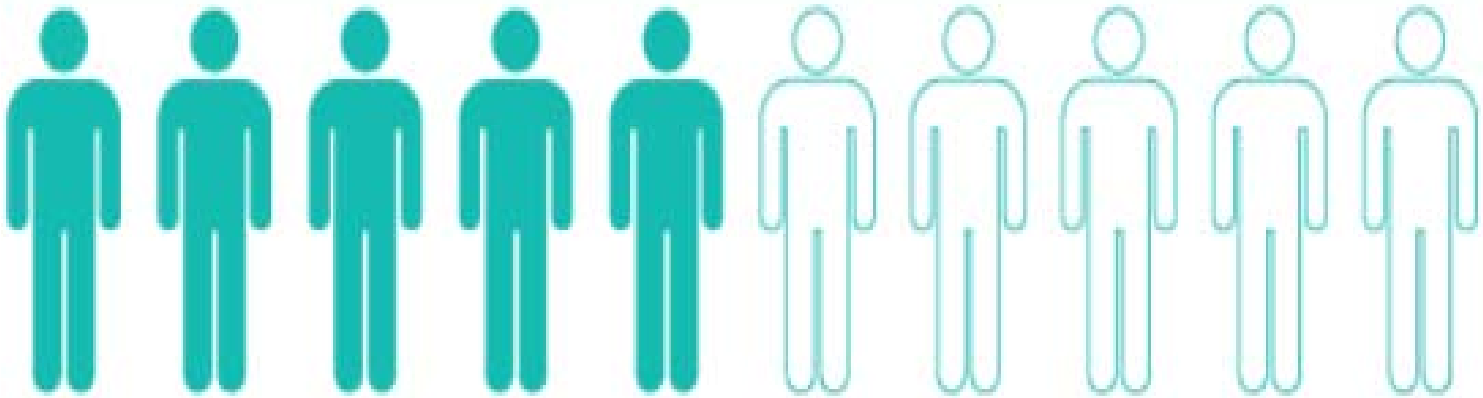
연간 발병률 (2007 메타분석)

4-6% for isolated IGT

6-9% for isolated IFG

15-19% for both IGT and IFG

HIGH BLOOD SUGAR?



50% develop Type 2 diabetes within 10 years.

50% Do Not

YOUR CHOICES MAKE A DIFFERENCE!

당뇨병 전단계의 건강위험요소

당뇨병 전단계의 특징

✓ 인슐린 저항성

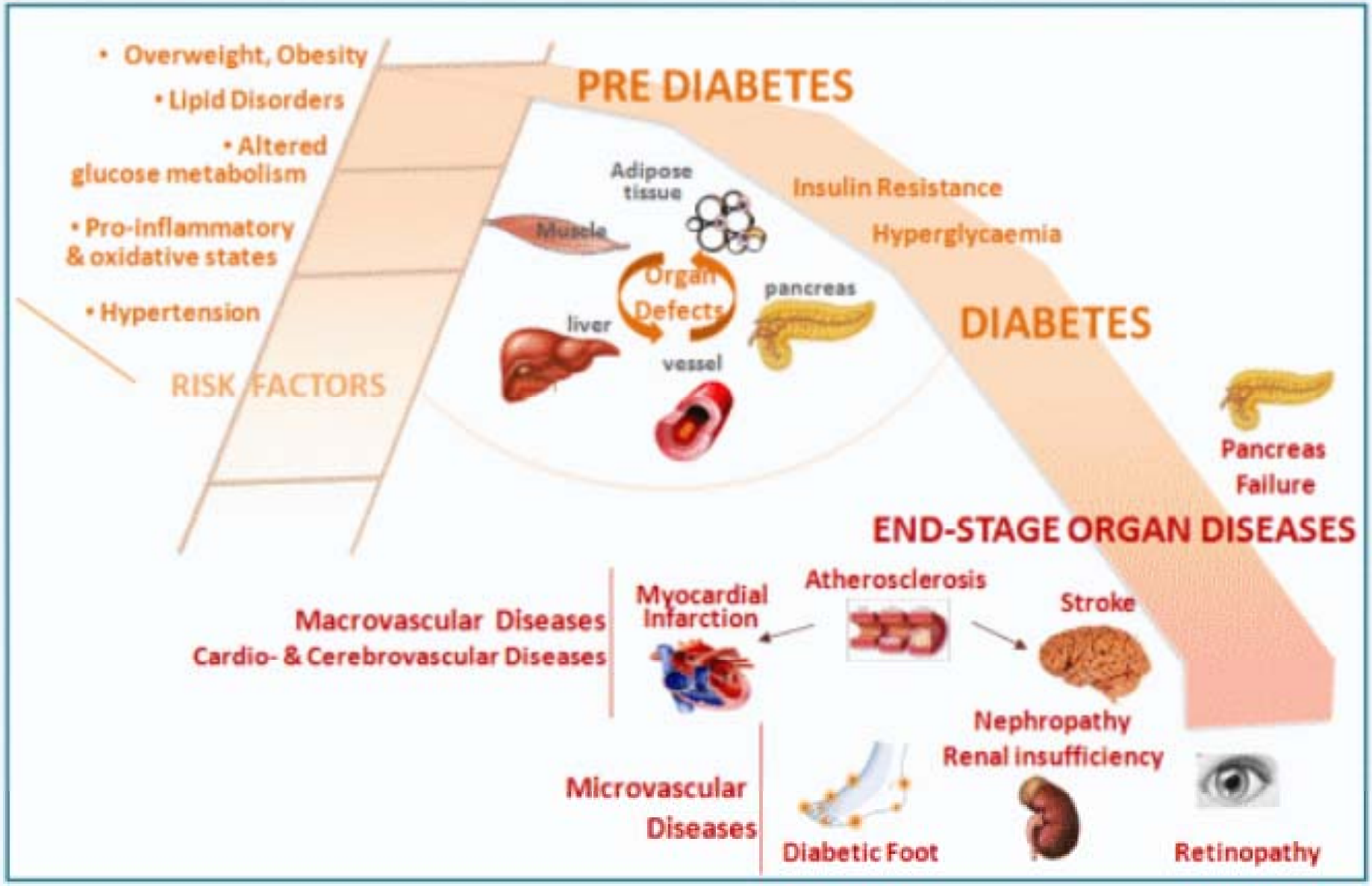
✓ 베타세포의 장애

당뇨병과 관련된 합병증이

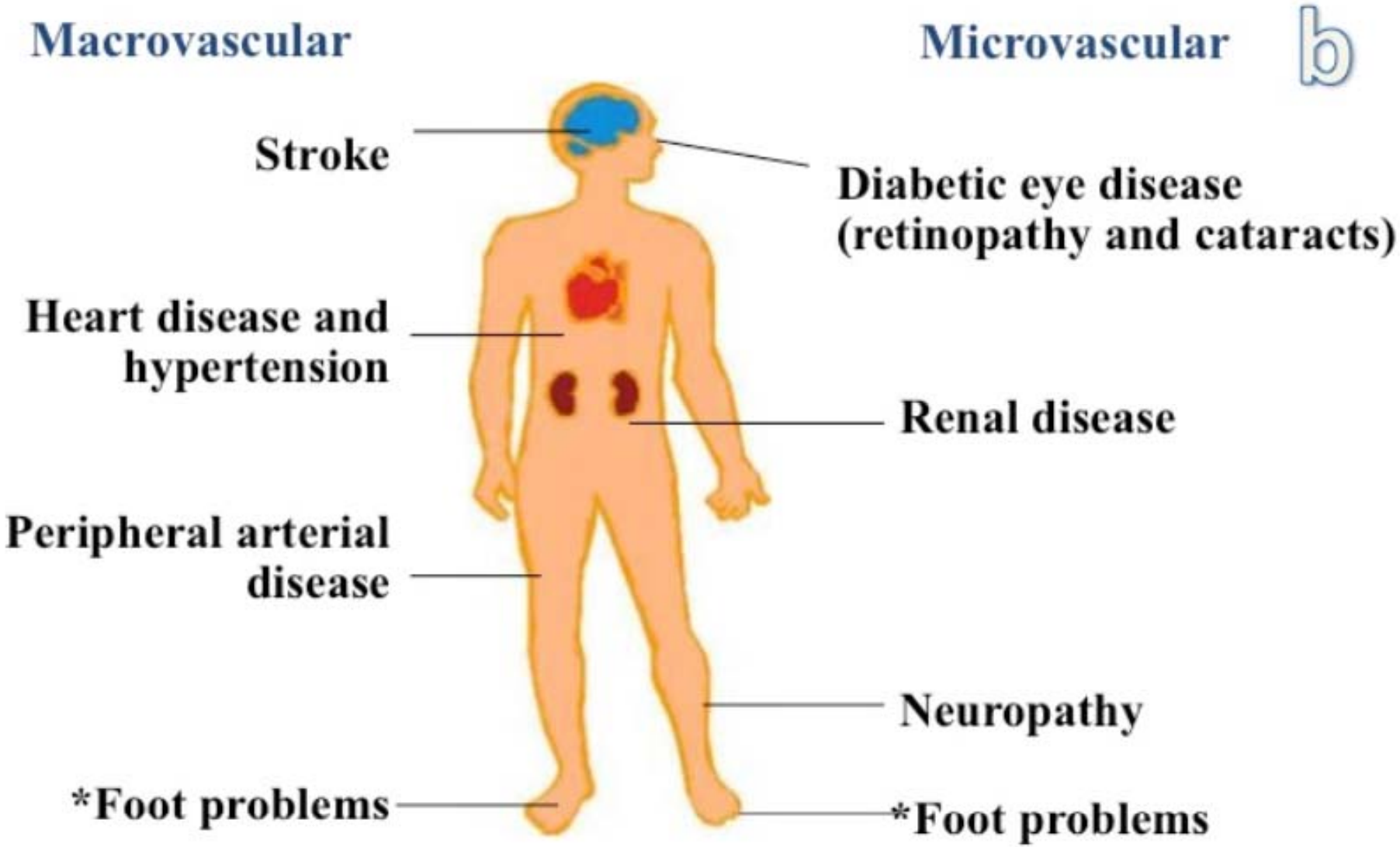
당뇨병 전단계에서도 연관성이 있다.

Prediabetes - Diabetes

A Deleterious Progression



Overview of Diabetic Complications



당뇨병 전단계의 건강위험요소

2 심혈관계 질환의 위험

- In the GAMI Study

  급성심근경색증에서 IGT인 사람이 **35%**

- In stroke cohort study

  52%가 **"당뇨병 전단계"** 였다.

당뇨병 전단계의 건강위험요소

3 소혈관질환의 위험

- **망막병증**
  당뇨병 전단계의 **8-12%**에서 망막병증이 발견되고
  FPG가 높을수록 유병률이 높아진다.

- **신경병증**
  당뇨병 전단계의 **11-25%**에서 **말초신경병증**,
  13-21%에서 **신경병적 통증**이 있다.

- **신병증**
  알부민요, GFR감소(CKD)가 정상 혈당에서보다
  당뇨병 전단계에서 더 많다.

당뇨병 전단계의 건강위험요소

4 그 외

- 치주 질환
- 인지기능장애
- 수면무호흡증

당뇨병 전단계의 치료(관리)

1 생활습관 변화

2 약물 치료

3 수 술

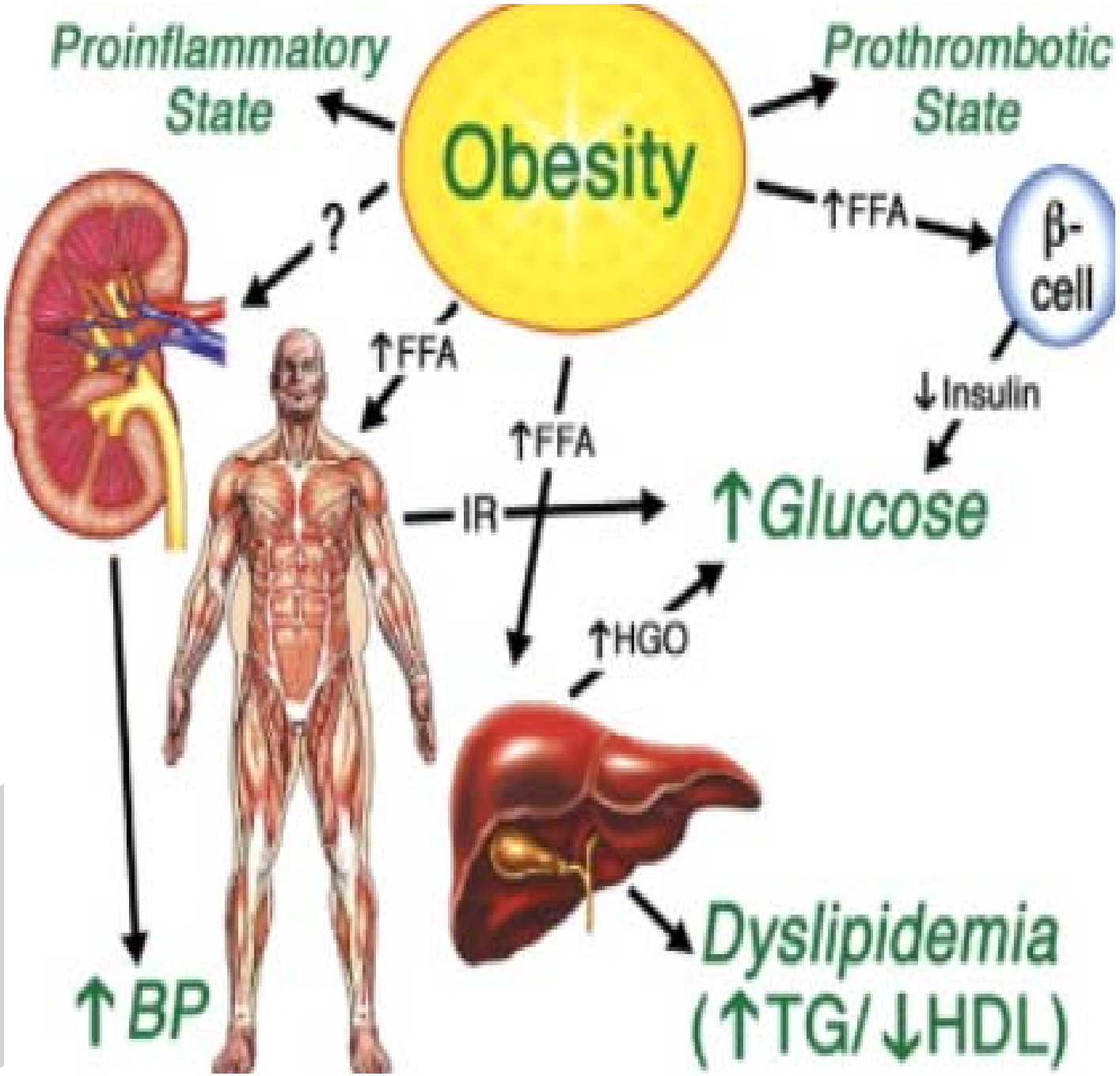
당뇨병 전단계의 치료(관리)

1 생활습관 변화

비만개선을 목표로 당뇨병(전단계)의

개선 가능한 위험인자들을 변화시키는 것.

(활동량 증가, 식이요법)


Proinflammatory State
Obesity
Prothrombotic State
?
↑FFA
β-cell
↑FFA
↓Insulin
↑FFA
IR
↑Glucose
↑HGO
↑BP
Dyslipidemia
(↑TG/↓HDL)

당뇨병 전단계의 치료(관리)

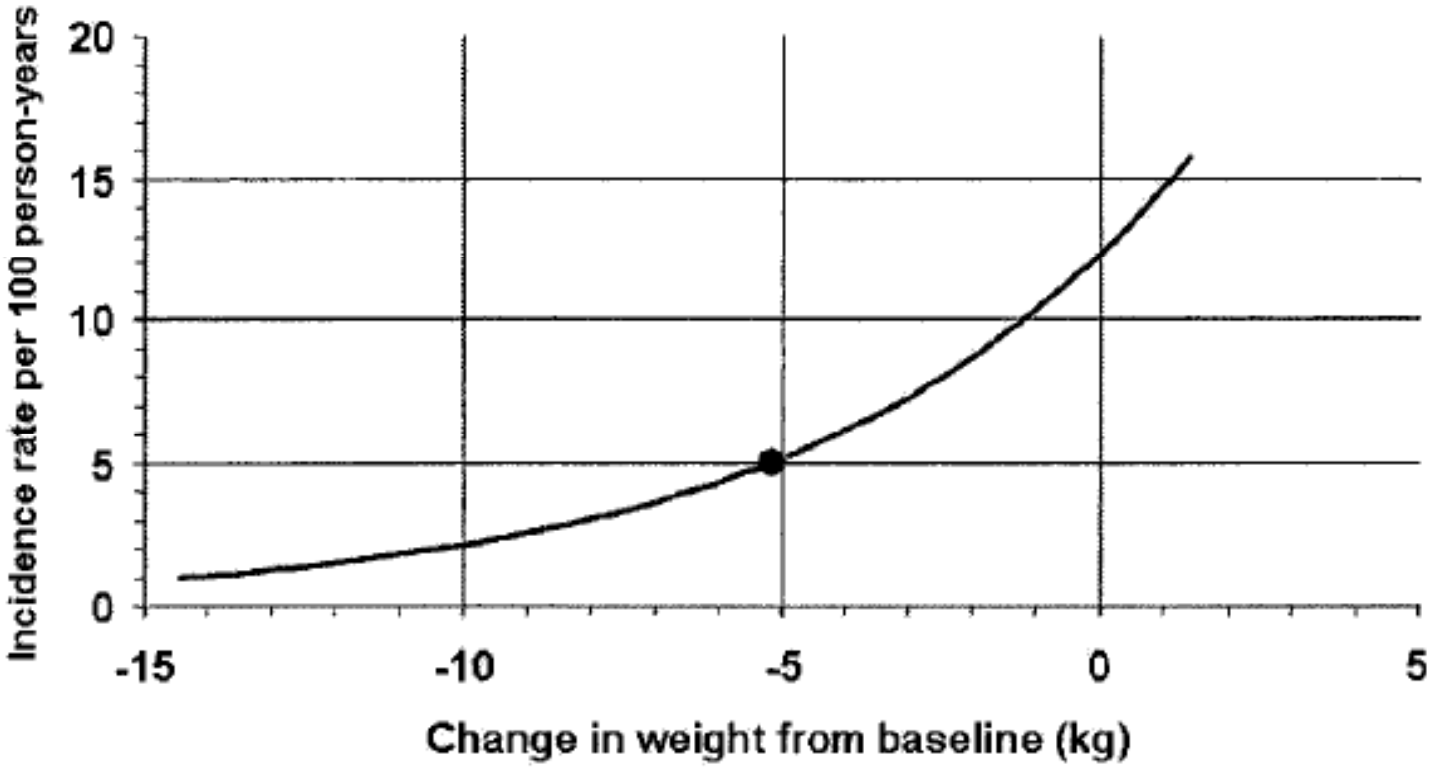
1 생활습관 변화

- In the U.S. DPP (Diabetes Prevention Program)

  - 3년 추적기간 동안 Intensive lifestyle intervention (ILS)이 당뇨병 발생 위험을 **58% 감소**시킴.

  - 위험율 감소의 가장 큰 결정인자는 **"체중감량"**
    위험율 16%감소/체중 1kg 감량

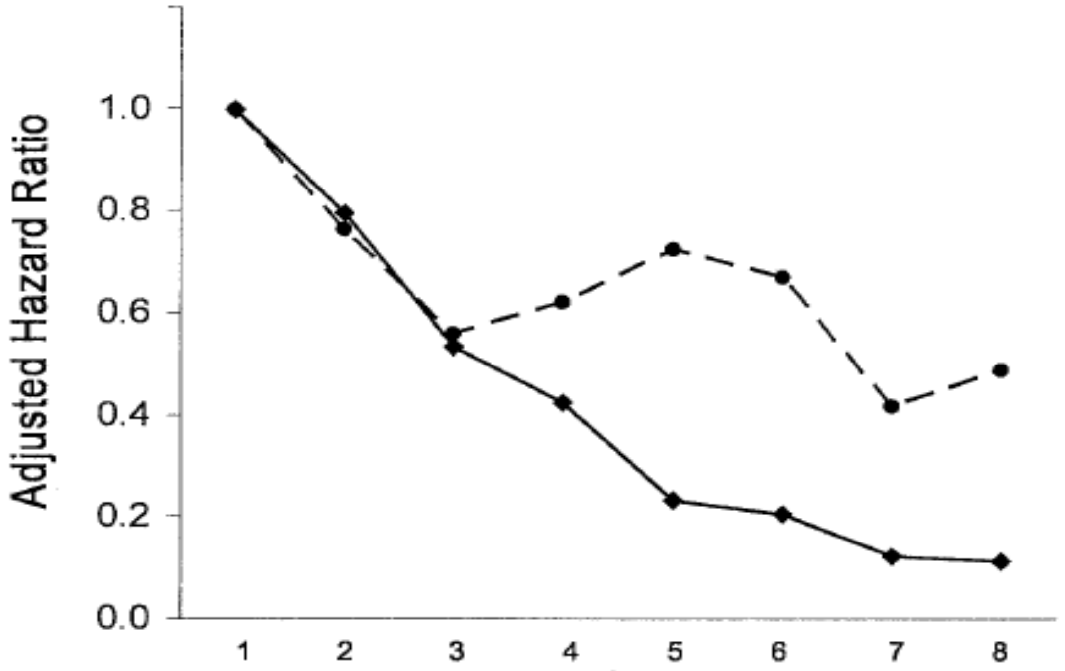
당뇨병 전단계의 치료(관리)



Diabetes incidence (per 100 person-years) by change in weight after baseline among DPP ILS participants based on the multivariate model in Table 2.F, overall risk in the group at the mean weight loss over an average of 3.2 years of follow-up.

Source: Hamman et al. Effect of Weight Loss With Lifestyle Intervention on Risk of Diabetes. DIABETES CARE, 2006;29(9):2102-2107.

당뇨병 전단계의 치료(관리)



At weight goal	No	No	No	No	Yes	Yes	Yes	Yes
At exercise goal	No	No	Yes	Yes	No	No	Yes	Yes
At fat goal	No	Yes	No	Yes	No	Yes	No	Yes
Mean weight loss (Kg)	-1.5	-2.5	-2.2	-3.5	-11.5	-11.5	-11.8	-13.4
Sample size	134	32	226	103	51	34	208	187

HRs for diabetes onset over 3.2 years of follow-up in DPP ILS subgroups defined by meeting intervention goals at 1 year compared with those meeting none of the goals (group 1). The solid line is adjusted for baseline covariates used in Table 2 (other than IGR and insulin); the dashed line is also adjusted for weight change over time., adjusted HRs; F, adjusted HRs plus weight change.

Source: Hamman et al. Effect of Weight Loss With Lifestyle Intervention on Risk of Diabetes. DIABETES CARE, 2006;29(9):2102-2107.

당뇨병 전단계의 치료(관리)

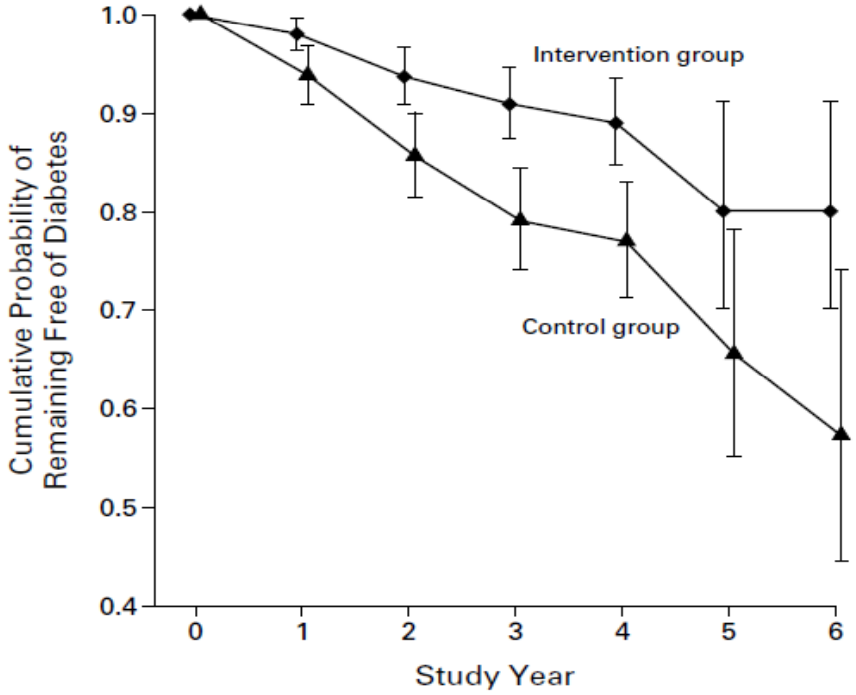
1 생활습관 변화

- In the DPS (Finnish Diabetes Prevention Study)

  Dependent on achievement of the No. of pre-defined goal

  - 5% 이상 체중감량
  - 총 지방섭취량 30% 이내
  - 포화지방 섭취량 10% 이내
  - 섬유질 섭취량 15g/1,000 kcal 이상
  - 운동량 4h/week 이상

당뇨병 전단계의 치료(관리)



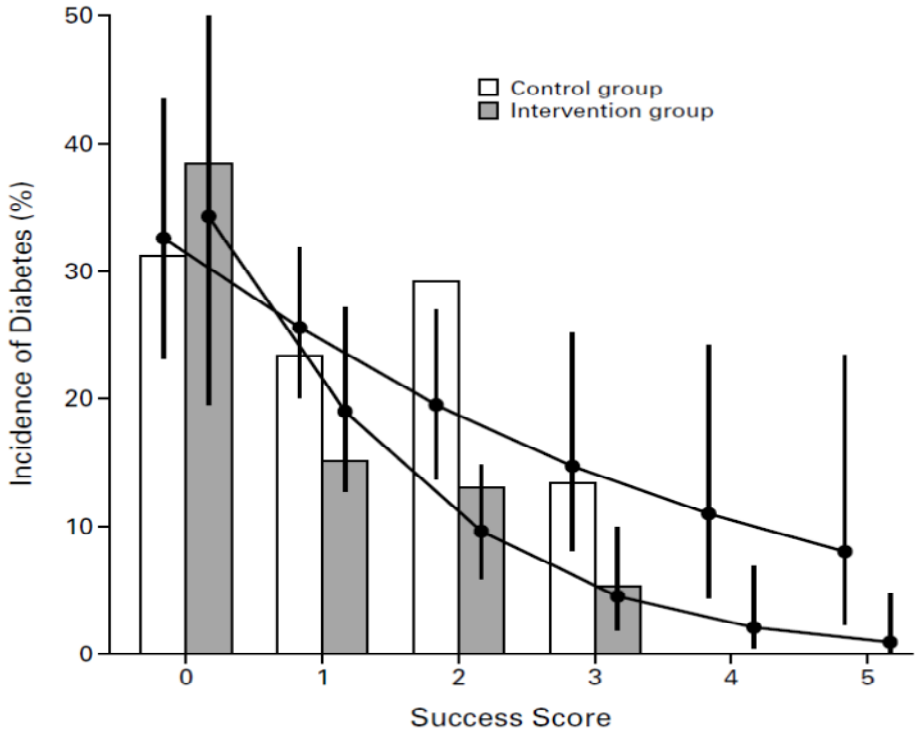
Subjects at Risk						
Total no.	507	471	374	167	53	27
Cumulative no. with diabetes:						
Intervention group	5	15	22	24	27	27
Control group	16	37	51	53	57	59

Proportion of Subjects without Diabetes during the Trial

The vertical bars show the 95 percent confidence intervals for the cumulative probability of remaining free of diabetes. The relative risk of diabetes for subjects in the intervention group, as compared with those in the control group, was 0.4 ($P<0.001$ for the comparison between the groups).

Souce: Tuomilehto et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. The New England Journal of Medicine. 2001;344(18):1343-1350.

당뇨병 전단계의 치료(관리)



No. with Diabetes/Total No.						
Intervention group	5/13	10/66	9/69	2/38	0/25	0/24
Control group	15/48	25/107	14/48	2/15	0/11	0/4

Figure 2. Incidence of Diabetes during Follow-up, According to the Success Score.
At the one-year visit, each subject received a grade of 0 for each intervention goal that had not been achieved and a grade of 1 for each goal that had been achieved; the success score was computed as the sum of the grades. Forty subjects who withdrew from the study when their diabetes status was unknown and 14 subjects with incomplete data were excluded from this analysis. The association between the success score and the risk of diabetes, with 95 percent confidence intervals, was estimated by means of logistic-regression analysis of the observed data. The curves show the model-based incidence of diabetes according to the success score as a continuous variable; the curve whose data points align with the open bars represents the model-based incidence for the control group, and the curve whose data points align with the shaded bars represents the model-based incidence for the intervention group.

N Engl J Med, 2001;344(18):1343-50

당뇨병 전단계의 치료(관리)

2. 약물치료

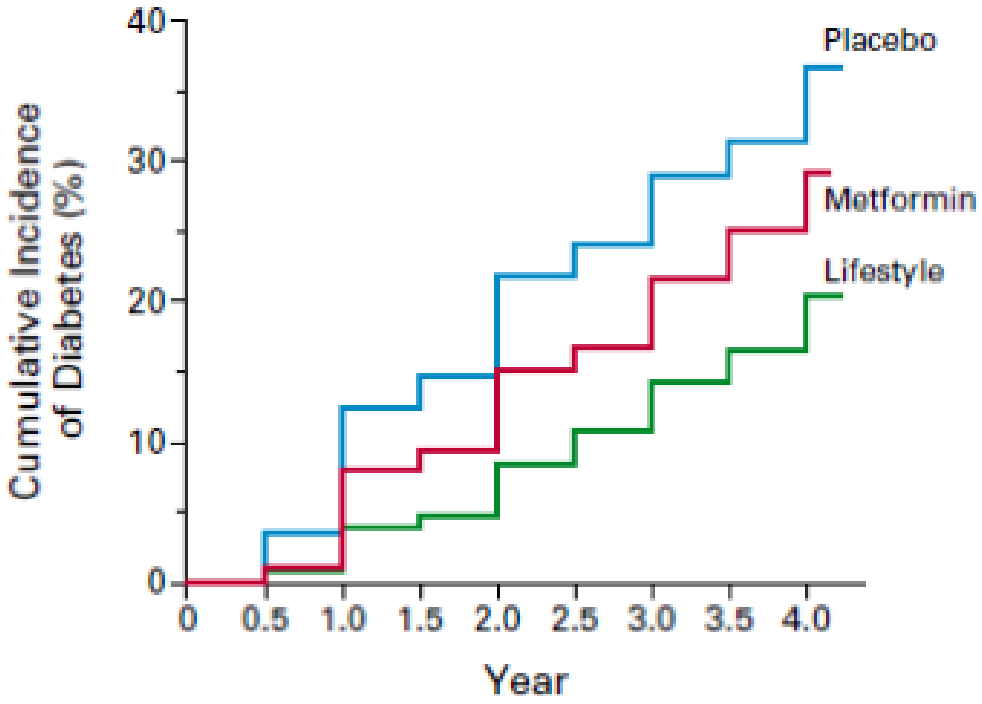
- 메트로포민

: IGT에서 NIDDM발생을 **45% 감소**시킴.

- In US DPP trial: less effective than lifestyle intervention
- In the Indian DPP: as effective as lifestyle intervention

More beneficial to individuals with higher BMI and higher FPG

당뇨병 전단계의 치료(관리)



Cumulative Incidence of Diabetes According to Study Group.

The diagnosis of diabetes was based on the criteria of the American Diabetes Association. The incidence of diabetes differed significantly among the three groups ($P<0.001$ for each comparison).

Souce: DIABETES PREVENTION PROGRAM RESEARCH GROUP. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. The New England Journal of Medicine. 2002;346(6):393-403.

당뇨병 전단계의 치료(관리)

2 약물치료

- **Anti-obesity drug (Orlistat)**

  : acts by inhibiting the absorption of dietary fats by app. 30%

  In XEDOS trail

  : 37% RR reduction in development of DM after 4 years Tx

당뇨병 전단계의 치료(관리)

3 수술(Bariatric surgery)

: procedure aimed mal-absorptive state, restrictive state of caloric intake

after gastric bypass surgery,

78% subjects with previous DM & 98% subjects with IGT reverted to normoglycemia

결 론

당뇨병 전단계의 관리에 대한 정해진 가이드라인은 없다.
선별검사를 통해 당뇨병 전단계를 조기에 발견해서 관리하는 것이 최선이다.

당뇨병 전단계 치료(관리)의 주요한 부분

Lifestyle intervention

dietary modification &
increased physical activity 중점

당뇨병 전단계
예방 · 치료의 기초

Thank You