Lifestyle Therapy in T2Dm

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Section 1.

Prevention or Delay of Type 2 Diabetes

Overall Recommendation

At least annual monitoring for the development of type 2 diabetes in those with prediabetes is suggested.

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Lifestyle Behavior Change for Diabetes Prevention

- Refer patients with prediabetes to an intensive lifestyle behavior change program modeled on the Diabetes Prevent on Program to achieve and maintain 7% loss of initial body weight and increase moderate-intensity physical activity (such as brisk walking) to at least 150 min/week.

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Therapeutic Lifestyle Management

- Medical nutrition therapy: Reduction and modification of caloric intake, simple sugars and saturated/hydrogenated fat intake, to achieve weight loss in individuals who are overweight or obese.

- Limited alcohol consumption

- Avoidance of tobacco products

- Adequate quantity and quality of sleep

- Appropriately prescribed physical activity(30 min/day)

- Stress reduction

DPP Research Group. Lancet 2009;374:1677-86

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Pharmacologic Interventions

- ✓ Metformin therapy for prevention of type 2 diabetes should be considered in those with prediabetes, especially for those with BMI ≥35 kg/m2, those aged,60 years, and women with prior gestational diabetes mellitus.

- ✓ Long-term use of metformin may be associated with biochemical vitamin B12 deficiency; consider periodic measurement of vitamin B12 levels in metformin-treated patients, especially in those with anemia or peripheral neuropathy.

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Prevention of Vascular Disease and Mortality

Prediabetes is associated with heightened cardiovascular risk; therefore, screening for and treatment of modifiable risk factors for cardiovascular disease are suggested.

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Section 2.

Facilitating Behavior Change and Well-being to Improve Health Outcomes

Diabetes Self-management Education and Support

- In accordance with the national standards for diabetes self-management education and support, all people with diabetes should participate in diabetes self-management education and receive the support needed to facilitate the knowledge, decision-making, and skills mastery necessary for diabetes self-care.

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Diabetes Self-management Education and Support

Four critical time points have been defined when the need for DSMES is to be evaluated by the medical care provider and/or multidisciplinary team, with referrals made as needed:

1. At diagnosis

2. Annually and/or when not meeting treatment targets

3. When complicating factors (health conditions, physical limitations, emotional factors, or basic living needs) develop that influence self- management

4. When transitions in life and care occur

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Goals of Nutrition Therapy for Adults With Diabetes

1. To promote and support healthful eating patterns, emphasizing a variety of nutrient-dense foods in appropriate portion sizes, to improve overall health and:

    - achieve and maintain body weight goals
    - attain individualized glycemic, blood pressure, and lipid goals
    - delay or prevent the complications of diabetes

2. To address individual nutrition needs based on personal and cultural preferences,health literacy and numeracy, access to healthful foods, willingness and ability to make behavioral changes, and existing barriers to change

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Medical Nutrition Therapy

Table 5.1—Medical nutrition therapy recommendations

Topic	Recommendation
Effectiveness of nutrition therapy	**5.8** An individualized medical nutrition therapy program as needed to achieve treatment goals, provided by a registered dietitian nutritionist (RD/RDN), preferably one who has comprehensive knowledge and experience in diabetes care, is recommended for all people with type 1 or type 2 diabetes, prediabetes, and gestational diabetes mellitus. **A** **5.9** Because diabetes medical nutrition therapy can result in cost savings **B** and improved outcomes (e.g., A1C reduction, reduced weight, decrease in cholesterol) **A**, medical nutrition therapy should be adequately reimbursed by insurance and other payers. **E**
Energy balance	**5.10** For all patients with overweight or obesity, lifestyle modification to achieve and maintain a minimum weight loss of 5% is recommended for all patients with diabetes and prediabetes. **A**

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Medical Nutrition Therapy (continued)

Eating patterns and macronutrient distribution	**5.11** There is no single ideal dietary distribution of calories among carbohydrates, fats, and proteins for people with diabetes; therefore, meal plans should be individualized while keeping total calorie and metabolic goals in mind. **E** **5.12** A variety of eating patterns can be considered for the management of type 2 diabetes and to prevent diabetes in individuals with prediabetes. **B**
Carbohydrates	**5.13** Carbohydrate intake should emphasize nutrient-dense carbohydrate sources that are high in fiber and minimally processed. Eating plans should emphasize nonstarchy vegetables, minimal added sugars, fruits, whole grains, as well as dairy products. **B** **5.14** Reducing overall carbohydrate intake for individuals with diabetes has demonstrated the most evidence for improving glycemia and may be applied in a variety of eating patterns that meet individual needs and preferences. **B** **5.15** For people with diabetes who are prescribed a flexible insulin therapy program, education on how to use carbohydrate counting **A** and on dosing for fat and protein content **B** should be used to determine mealtime insulin dosing. **5.16** For adults using fixed insulin doses, consistent pattern of carbohydrate intake with respect to time and amount, while considering the insulin action time, can result in improved glycemia and reduce the risk for hypoglycemia. **B** **5.17** People with diabetes and those at risk are advised to replace sugar-sweetened beverages (including fruit juices) with water as much as possible in order to control glycemia and weight and reduce their risk for cardiovascular disease and fatty liver **B** and should minimize the consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices. **A**

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Medical Nutrition Therapy (continued)

Protein	**5.18**	In individuals with type 2 diabetes, ingested protein appears to increase insulin response without increasing plasma glucose concentrations. Therefore, carbohydrate sources high in protein should be avoided when trying to treat or prevent hypoglycemia. **B**
Dietary fat	**5.19**	An eating plan emphasizing elements of a Mediterranean-style eating pattern rich in monounsaturated and polyunsaturated fats may be considered to improve glucose metabolism and lower cardiovascular disease risk. **B**
	5.20	Eating foods rich in long-chain n-3 fatty acids, such as fatty fish (EPA and DHA) and nuts and seeds (ALA), is recommended to prevent or treat cardiovascular disease. **B**
Micronutrients and herbal supplements	**5.21**	There is no clear evidence that dietary supplementation with vitamins, minerals (such as chromium and vitamin D), herbs, or spices (such as cinnamon or aloe vera) can improve outcomes in people with diabetes who do not have underlying deficiencies, and they are not generally recommended for glycemic control. **C**
Alcohol	**5.22**	Adults with diabetes who drink alcohol should do so in moderation (no more than one drink per day for adult women and no more than two drinks per day for adult men). **C**
	5.23	Educating people with diabetes about the signs, symptoms, and self-management of delayed hypoglycemia after drinking alcohol, especially when using insulin or insulin secretagogues, is recommended. The importance of glucose monitoring after drinking alcoholic beverages to reduce hypoglycemia risk should be emphasized. **B**
Sodium	**5.24**	As for the general population, people with diabetes and prediabetes should limit sodium consumption to <2,300 mg/day. **B**
Nonnutritive sweeteners	**5.25**	The use of nonnutritive sweeteners may have the potential to reduce overall calorie and carbohydrate intake if substituted for caloric (sugar) sweeteners and without compensation by intake of additional calories from other food sources. For those who consume sugar-sweetened beverages regularly, a low-calorie or nonnutritive-sweetened beverage may serve as a short-term replacement strategy, but overall, people are encouraged to decrease both sweetened and nonnutritive-sweetened beverages and use other alternatives, with an emphasis on water intake. **B**

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Physical Activity

- Children and adolescents with type 1 or type 2 diabetes or prediabetes should engage in 60 min/day or more of moderate- or vigorous-intensity aerobic activity, with vigorous muscle-strengthening and bone-strengthening activities at least 3 days/week.

- Most adults with type 1 and type 2 diabetes should engage in 150 min or more of moderate to vigorous-intensity aerobic activity per week, spread over at least 3 days/week, with no more than 2 consecutive days without activity. Shorter durations (minimum 75min/week) of vigorous intensity or interval training may be sufficient for younger and more physically fit individuals.

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Physical Activity (continued)

- Adults with type 1 and type 2 diabetes should engage in 2–3 sessions/ week of resistance exercise on nonconsecutive days.

- All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behavior. Prolonged sitting should be interrupted every 30 min for blood glucose benefits.

- Flexibility training and balance training are recommended 2–3 times/week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance.

- Evaluate baseline physical activity and sedentary time. Promote increase in non sedentary activities above baseline for sedentary individuals with type 1 and type 2 diabetes. Examples include walking, yoga, housework, gardening, swimming, and dancing.

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Smoking Cessation: Tobacco & E-cigarettes

- Advise all patients not to use cigarettes and other tobacco products or e-cigarettes.
- After identification of tobacco or e-cigarette use, include smoking cessation counseling and other forms of treatment as a routine component of diabetes care.
- Address smoking cessation as part of diabetes education programs for those in need.

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Psychosocial Issues

- Psychosocial care should be integrated with a collaborative, patient-centered approach and provided to all people with diabetes, with the goals of optimizing health outcomes and health-related quality of life.

- Consider screening older adults (aged ≥65 years) with diabetes for cognitive impairment and depression.

- Providers should consider assessment for symptoms of diabetes distress, depression, anxiety, disordered eating, and cognitive capacities using appropriate standardized and validated tools at the initial visit, at periodic intervals, and when there is a change in disease, treatment, or life circumstance. Including caregivers and family members in this assessment is recommended.

Anxiety Disorders

- Consider screening for anxiety in people exhibiting anxiety or worries regarding diabetes complications, insulin administration, and taking of medications, as well as fear of hypoglycemia and/or hypoglycemia unawareness that interferes with self-management behaviors, and in those who express fear, dread, or irrational thoughts and/or show anxiety symptoms such as avoidance behaviors, excessive repetitive behaviors, or social withdrawal. Refer for treatment if anxiety is present.

- People with hypoglycemia unawareness, which can co-occur with fear of hypoglycemia, should be treated using blood glucose awareness training (or other evidence-based intervention) to help re-establish awareness of symptoms of hypoglycemia and reduce fear of hypoglycemia.

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Depression Title

- Providers should consider annual screening of all patients with diabetes, especially those with a self-reported history of depression, for depressive symptoms with age-appropriate depression screening measures, recognizing that further evaluation will be necessary for individuals who have a positive screen.

- Beginning at diagnosis of complications or when there are significant changes in medical status, consider assessment for depression.

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Disordered Eating Behavior

- Providers should consider reevaluating the treatment regimen of people with diabetes who present with symptoms of disordered eating behavior, an eating disorder, or disrupted patterns of eating.

- Consider screening for disordered or disrupted eating using validated screening measures when hyperglycemia and weight loss are unexplained based on self-reported behaviors related to medication dosing, meal plan, and physical activity. In addition, a review of the medical regimen is recommended to identify potential treatment-related effects on hunger/caloric intake.

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Serious Mental Illness

- Incorporate active monitoring of diabetes self-care activities into treatment goals for people with diabetes and serious mental illness.

- In people who are prescribed atypical antipsychotic medications, screen for prediabetes and diabetes 4 months after medication initiation and at least annually thereafter.

- If a second-generation antipsychotic medication is prescribed for adolescents or adults with diabetes, changes in weight, glycemic control, and cholesterol levels should be carefully monitored and the treatment regimen should be reassessed.

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Section 3.

Obesity Management for the Treatment of Type 2 Diabetes

Obesity Management for the Treatment of Type 2 Diabetes
Benefits of Weight Loss

- ✓ Delay progression from prediabetes to type 2 diabetes
- ✓ Positive impact on treatment of type 2 diabetes
- ✓ Improves mobility, physical and sexual functioning & health-related quality of life

American Diabetes Association Standards of Medical Care in Diabetes. Obesity management for the treatment of type 2 diabetes.

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Assessment

- Use patient-centered, nonjudgmental language that fosters collaboration between patients and providers, including people-first language (e.g., “person with obesity” rather than “obese person”).

- Measure height and weight and calculate BMI at annual visits or more frequently. Assess weight trajectory to inform treatment considerations.

- Based on clinical considerations, such as the presence of comorbid heart failure or significant unexplained weight gain or loss, weight may need to be monitored and evaluated more frequently. If deterioration of medical status is associated with significant weight gain or loss, inpatient evaluation should be considered, especially focused on associations between medication use, food intake, and glycemic status.

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Diet, Physical Activity, & Behavioral Therapy

- Diet, physical activity, and behavioral therapy designed to achieve and maintain ≥5% weight loss is recommended for most patients with type 2 diabetes who have overweight or obesity and are ready to achieve weight loss. Greater benefits in control of diabetes and cardiovascular risk may be gained from even greater weight loss.

- Such interventions should include a high frequency of counseling (≥16 sessions in 6 months) and focus on dietary changes, physical activity, and behavioral strategies to achieve a 500–750 kcal/day energy deficit.

- An individual's preferences, motivation, and life circumstances should be considered, along with medical status, when weight loss interventions are recommended.

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Pharmacotherapy

- When choosing glucose-lowering medications for patients with type 2 diabetes & overweight/obesity, consider a medication's effect on weight.

- Whenever possible, minimize medications for comorbid conditions that are associated with weight gain.

- Weight-loss medications are effective as adjuncts to diet, physical activity, and behavioral counseling for selected patients with type 2 diabetes and BMI ≥27 kg/m^2. Potential benefits and risks must be considered.

- If a patient's response to weight loss medication is effective (typically defined as >5%weight loss after 3 months' use), further weight loss is likely with continued use. When early response is insufficient (typically <5% weight loss after 3 months' use), or if there are significant safety or tolerability issues, consider discontinuation of the medication and evaluate alternative medications or treatment approaches.

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Pharmacologic treatment options

- Gastrointestinal lipase inhibitors: orlistat
- C2 serotonin receptor agonists: lorcaserin
- Sympathomimetic medications: phentermine
- Antidepressants: while not FDA-approved for treatment of obesity alone, bupropion and fluoxetine
- Antiepileptic drugs: Topiramate
- GLP-1 agonists: liraglutide affect the POMC neurons and cause satiety

Metabolic Surgery

- Metabolic surgery should be recommended as an option to treat type 2 diabetes in screened surgical candidates with BMI ≥40 kg/m^2 (BMI ≥37.5 kg/m^2 in Asian Americans) and in adults with BMI 35.0–39.9 kg/m^2 (32.5— 37.4 kg/m^2 in Asian Americans) who do not achieve durable weight loss and improvement in comorbidities (including hyperglycemia) with nonsurgical methods.

- Metabolic surgery may be considered as an option to treat type 2 diabetes in adults with BMI 30.0–34.9 kg/m2 (27.5–32.4 kg/m2 in Asian Americans) who do not achieve durable weight loss and improvement in comorbidities (including hyperglycemia) with nonsurgical methods.

- Metabolic surgery should be performed in high-volume centers with multidisciplinary teams knowledgeable about and experienced in the management of diabetes and gastrointestinal surgery.
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metabolic surgery

- Clinical benefits of bariatric surgery have been attributed largely to changes in the physiologic responses of gut hormones and in adipose tissue metabolism

- Contraindications for bariatric Surgery :

- High operative risk (Congestive heart failure , Unstable angina), active substance abuse, and significant Psychopathology

Metabolic Surgery (continued)

- Long-term lifestyle support and routine monitoring of micronutrient and nutritional status must be provided to patients after surgery, according to guidelines for postoperative management of metabolic surgery by national and international professional societies.

- People being considered for metabolic surgery should be evaluated for comorbid psychological conditions and social and situational circumstances that have the potential to interfere with surgery outcomes.

- People who undergo metabolic surgery should routinely be evaluated to assess the need for ongoing mental health services to help with the adjustment to medical and psychosocial changes after surgery.

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PRIMARY PREVENTION: Evidence-based

- **Chinese study :** Lifestyle modification
- **Finnish study :** Lifestyle modification
- **DPP / IDPP :** Lifestyle vs Metformin

Long term follow-up of Da Qing Study

- Over a 6-year period, there was an approximate 2-fold reduction in the incidence of diabetes in individuals practising lifestyle interventions: 7.9 in those receiving lifestyle interventions compared with 14.1 per 100 person years in the control group.

Lancet 2008;371:1783-1789

The Finnish Diabetes Prevention Study

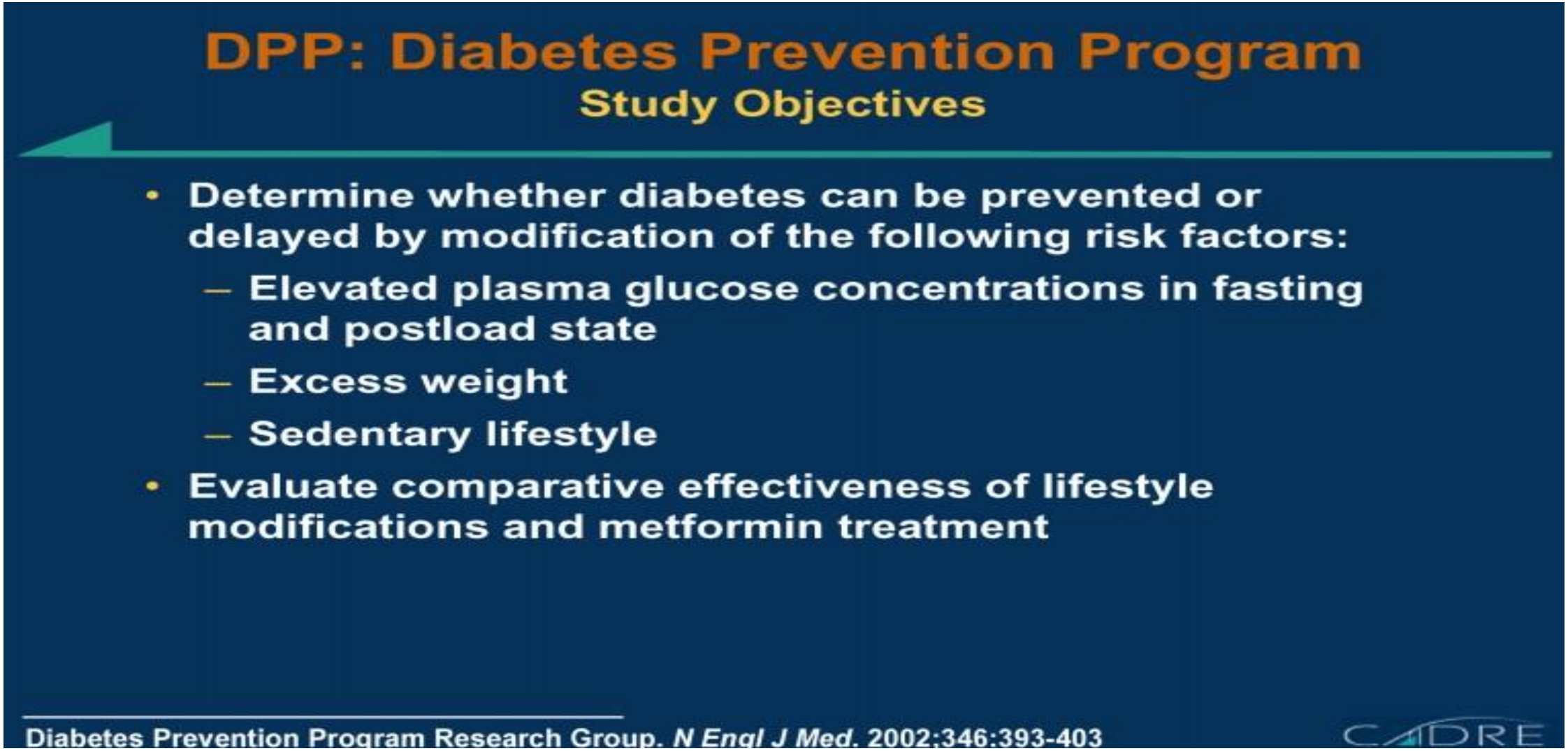
• 522 overweight (BMI ≥25 kg/m2) men and women aged 40 to 65 years with IGT, follow-up for 4 years

• the cumulative incidence of diabetes was - 11% in the lifestyle intervention group, - 23% in the control group.

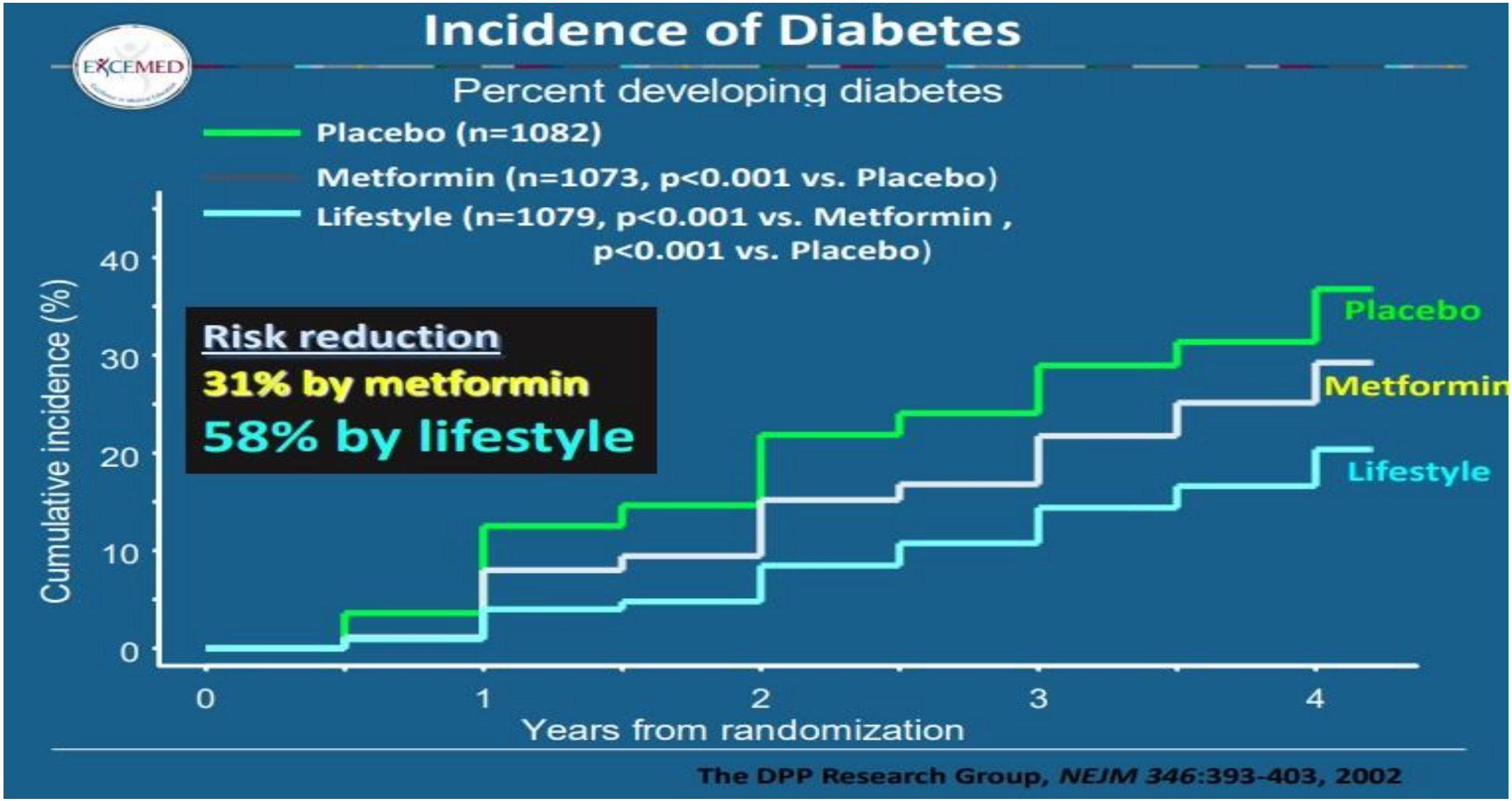
• To prevent 1 case of diabetes, 22 subjects with IGT must be treated with lifestyle intervention for 1 year,

Lancet 2008;371:1783-1789

DPP: 3234 participants, for 5 years



DPP: 3234 participants, for 5 years

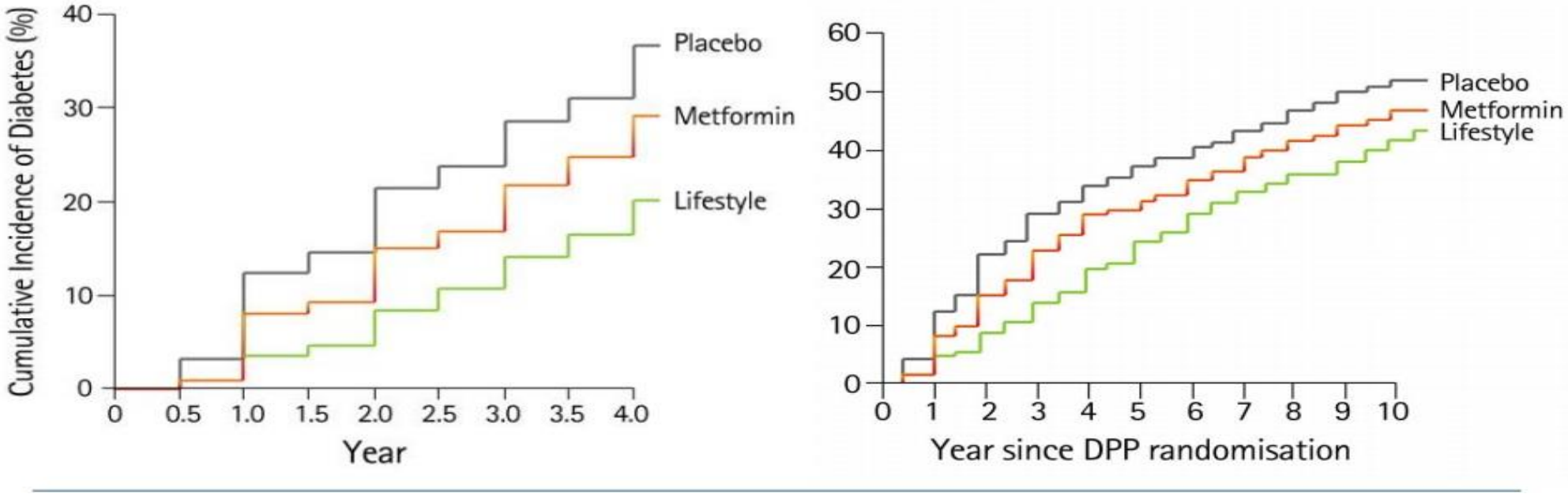


DPP: 3234 participants, for 5 years

Lifestyle modification

- Metformin and Lifestyle Interventions Effectively Delay Diabetes Development for 10 years (DPPOS)

- DPPOS study was an extension to DPP and confirmed DPP results over a 10-year follow-up



DPP Research Group. Lancet 2009;374:1677-86

Diabetes Prevention Program Outcomes Study (DPPOS)

After an average of 10 years follow up,

- Patients who were on intensive lifestyle reduced the rate of developing diabetes by 34% and
- Delayed the progression to diabetes by about 4 years.
- Those treated with metformin reduced the rate of developing diabetes by 18 % and
- Delayed diabetes by 2 years

DPP Research Group. Lancet 2009;374:1677-86

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BRIEF ARTICLE

Mechanistic studies of lifestyle interventions in type 2 diabetes

Analava Mitra, Debasis Dewanjee, Baishakhi Dey

RESULTS: After 1 year, the test group who had a lifestyle intervention was found to show a significant improvement in blood glucose lipid profile. The fasting plasma glucose level (FPG), postprandial plasma glucose level (PPG), glycosylated hemoglobin (HbA1c) and body mass index (BMI) values of the test group were reduced significantly, up to 145 ± 2.52, 174 ± 2.59, 6.3 ± 0.32 and 25 ± 0.41 respectively at the end of the study period, in comparison to the control group

CONCLUSION: The significant improvement in the blood glucose lipid profile of the test group after 1 year signifies the value of non-pharmacological management of type 2 diabetes via lifestyle intervention strategies.

conclusions

- It is extremely important to prevent diabetes, to prevent tsunami of diabetes.

- Lifestyle modification is the best modality of diabetes prevention. (strong Evidence-based) LSI is superior to pharmacological therapy in terms of cost and safety.

- There are multiple health benefits with lifestyle modification.