Cannabinoids and Health

Module 7

Lecture 2: Current Treatments for Obesity and Type II Diabetes

Type 2 Diabetes

- Complex disease with many risk factors

- Symptoms include:
  - increased thirst and urination
  - increased hunger
  - feeling tired
  - blurred vision
  - numbness or tingling in the feet or hands
  - sores that do not heal
  - unexplained weight loss

- Symptoms develop slowly (over years) and some people have no symptoms at all

Diagnosing Type 2 Diabetes

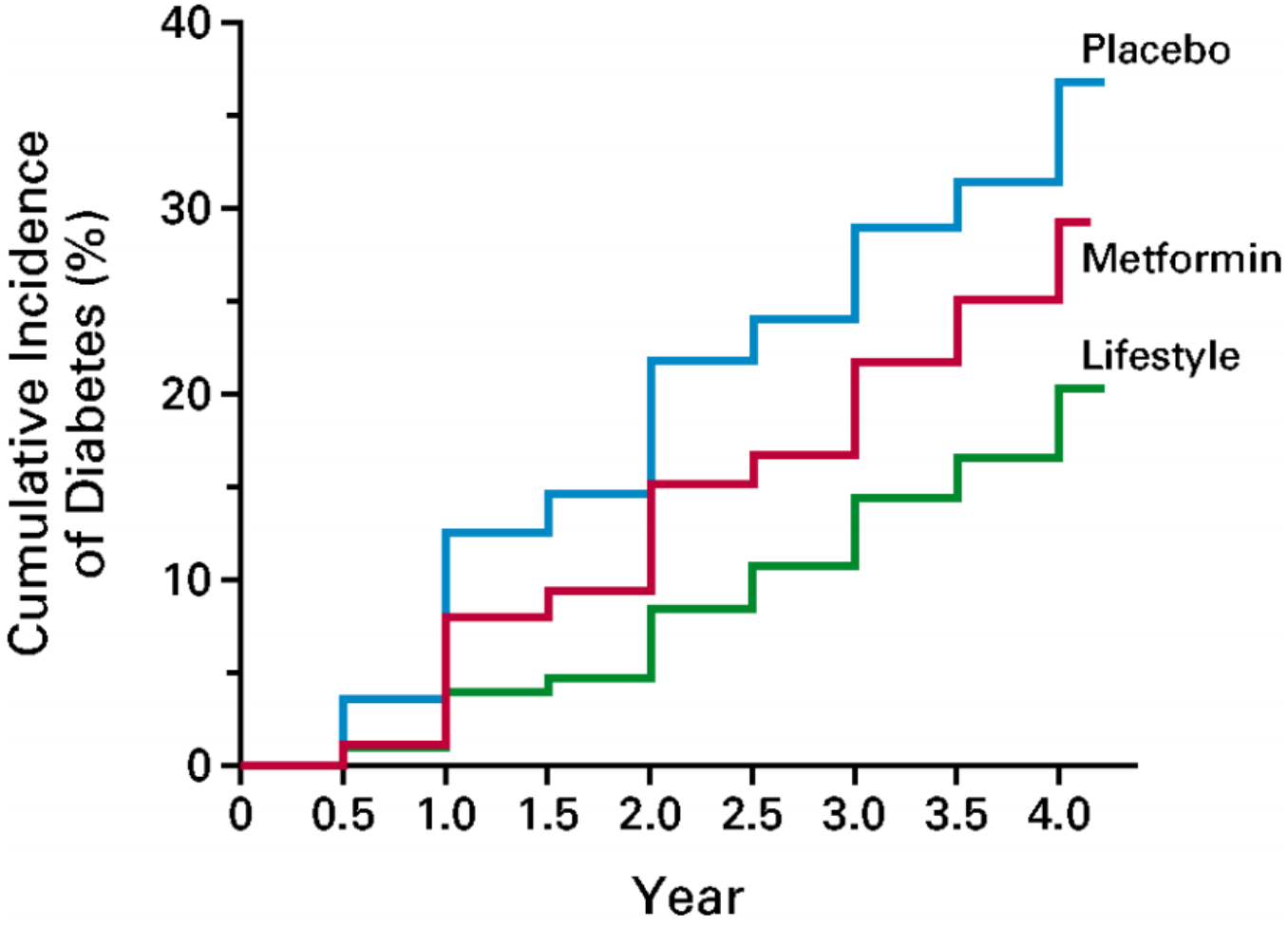
- One-time blood tests (fasting blood glucose test, hemoglobin A1c test)
  - Higher values at one time point or on average (A1c) suggest Type 2 Diabetes

- Oral glucose tolerance test (OGTT) – done after 8 hour fast
  - Baseline blood is drawn
  - Consume glucose beverage
  - Additional blood drawn 1 hour and again 2 hours after glucose beverage
  - If glucose is still high at 2 hour time point, Type 2 Diabetes is suggested

Prevention – the case of prediabetes

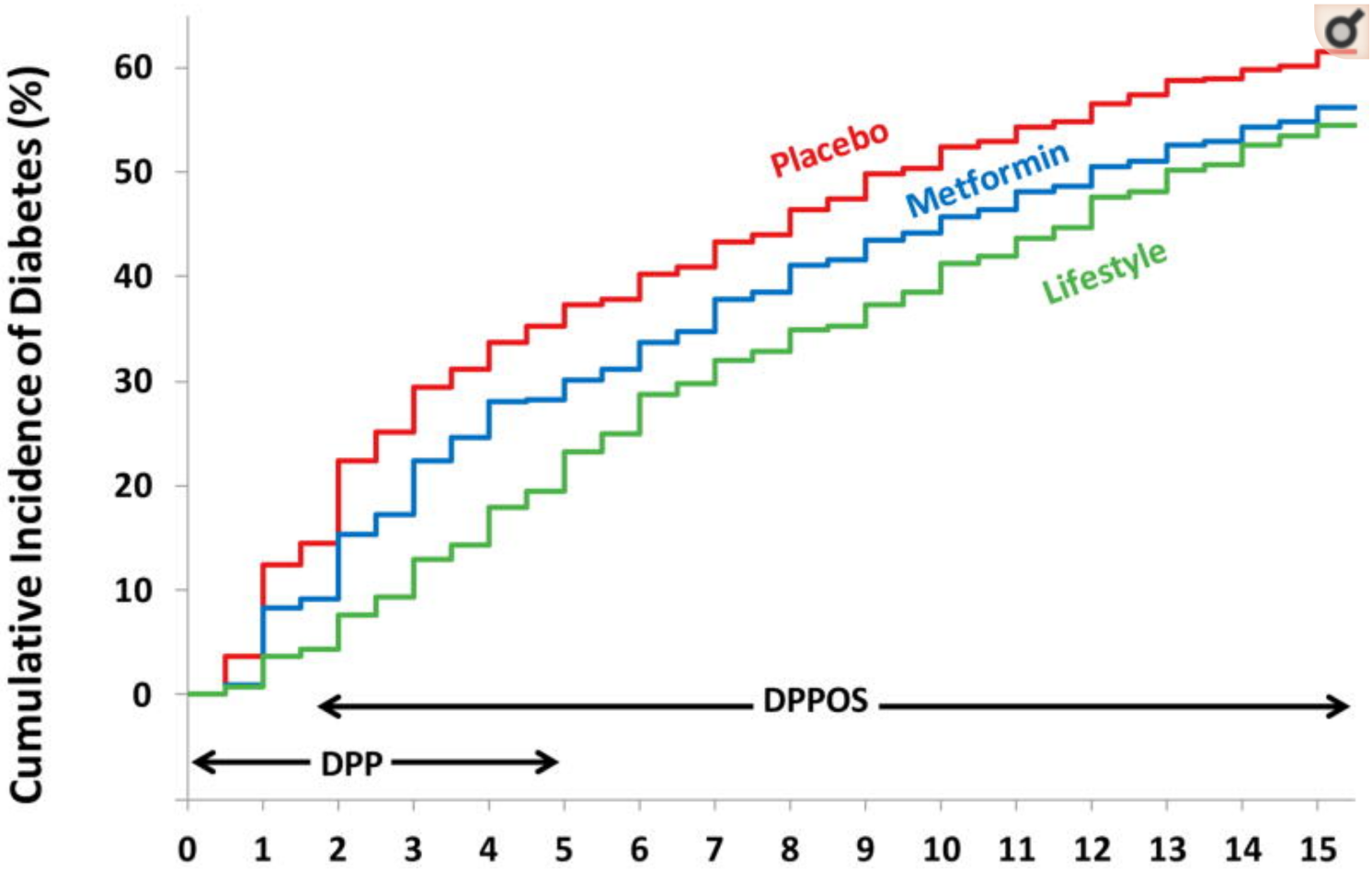
- Prediabetes is a state of elevated blood glucose and A1c levels, but not so high that critera for diabetes diagnosis is met
- Largest study on prediabetes is the Diabetes Prevention Program (DPP)
- The DPP was a randomized controlled trial of 3234 adults with prediabetes. They were randomly assigned to
  - Placebo (n = 1082)
  - Metformin (n = 1073)
  - Intensive lifestyle intervention (n = 1079)

Outcomes of DPP



Diabetes Prevention Program Research Group, 2002, *New England Journal of Medicine*

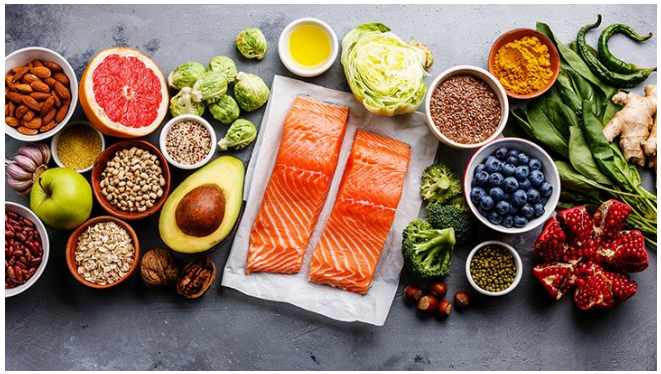
Long-term Outcomes of DPP

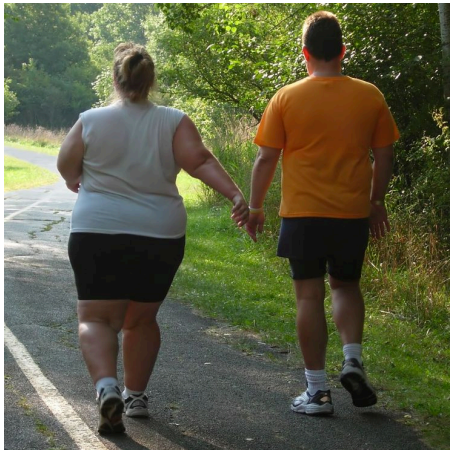


Diabetes Prevention Program Research Group, 2015, *The Lancet: Diabetes & Endocrinology*

Preventing Prediabetes from turning into Diabetes

- Just as with overall prevention of diabetes, intensive changes in behavior, particularly those that result in weight loss, are the best method
  - Healthy Diet
  - Increasing Physical Activity
  - Decreasing Sedentary Behavior





Treatment - Behavioral

- **Diet:** following a diet rich in vegetables, fruits and lean proteins and low in (particularly processed) carbohydrates helps manage blood glucose, blood pressure, and cholesterol.

- **Physical Activity:** exercising at moderate intensity or higher at least 30 minutes a day on most days of the week lowers blood glucose levels, lowers blood pressure and improves blood flow

- **Monitoring glucose:** blood glucose monitoring can help with decisions about food, physical activity, and medicines.

- **STOP SMOKING!!!!!**

Treatment - Medical

- **Insulin**: can be given with individual injections or via a pump

- **Metformin:** lowers the amount of glucose that the liver makes and helps the body use insulin better
  - Also the drug used in DPP to prevent transition to diabetes

Challenges of Treatment

- Effective behavioral and medical treatments DO exist
- But treatment is complex (glucose monitoring, insulin dosing, diet, physical activity, other lifestyle changes, etc. etc.)
- So ADHERENCE to treatment is problematic

State of Adherence

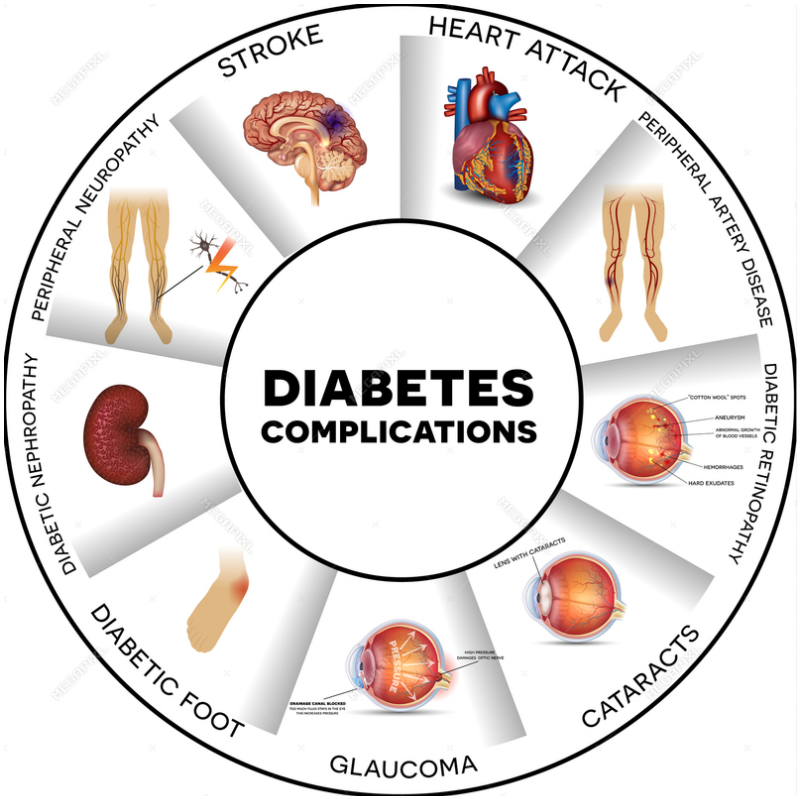
- Only about 50% of adults with Type 2 Diabetes:
  - achieve recommended targets for blood glucose levels
  - achieve recommended blood pressure targets
  - achieve recommended levels of cholesterol

- Taken together, less than 20% of patient achieve all three of the ‘ABCs” of diabetes management (A1c, Blood pressure, and Cholesterol) targets.

- Much of this is driven by poor adherence to behavioral lifestyle changes (diet and physical activity)

Casagrande et al., 2013; Gonzalez et al., 2016

Consequences of Non-adherence



- Nonadherence to treatment is related to a number of negative consequences including
  - worse glycemic control
  - increased risk for hospitalization

  Increased risk for complications all-cause mortality

Diabetic Neuropathy – some detail

- Diabetic neuropathy is a type of nerve damage that results from injury to the nerves caused by high blood sugar

- Most common form in diabetes is **Peripheral Neuropathy** which affects the feet and legs first, then the hands and arms

- Symptoms include:
  - Numbness or reduced ability to feel pain or temperature changes
  - Tingling or burning sensation
  - Sharp pains or cramps
  - Increased sensitivity to touch Muscle weakness
  - Loss of reflexes, especially in the ankle
  - Loss of balance and coordination
  - Serious foot problems, such as ulcers, infections, and bone and joint pain

Treatment for Neuropathy

- Notably, there is NO KNOWN CURE for neuropathy

- Goals of treatment are to:
  - Slow progression (keep it from getting worse)
  - Manage complications and restore function
  - Relieve pain

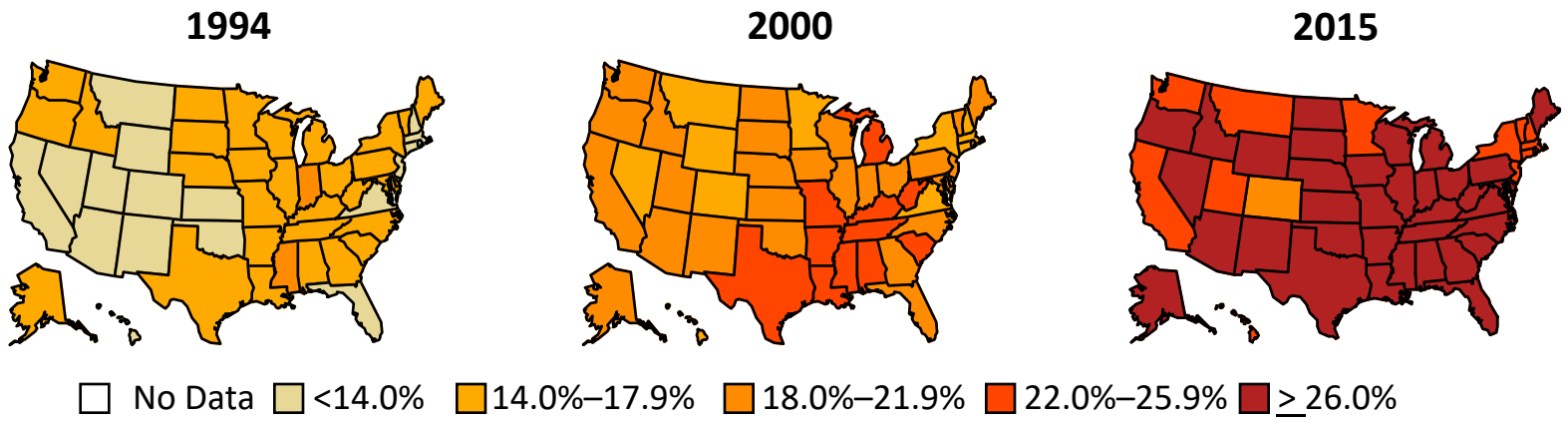
- Neuropathic pain is often treated with
  - **Anti-seizure drugs** including pregabalin (Lyrica), gabapentin (Gralise, Neurontin) and carbamazepine (Carbatrol, Tegretol).
    - Side effects may include drowsiness, dizziness and swelling.
  - **Antidepressants** including tricyclics (Norpramin, Tofranil) and serotonin and norepinephrine reuptake inhibitors (Cymbalta, Effexor).
    - Side effects depending on exact medication include dry mouth, sweating, weight gain (NOT good in diabetes) nausea, sleepiness, dizziness, decreased appetite and constipation.

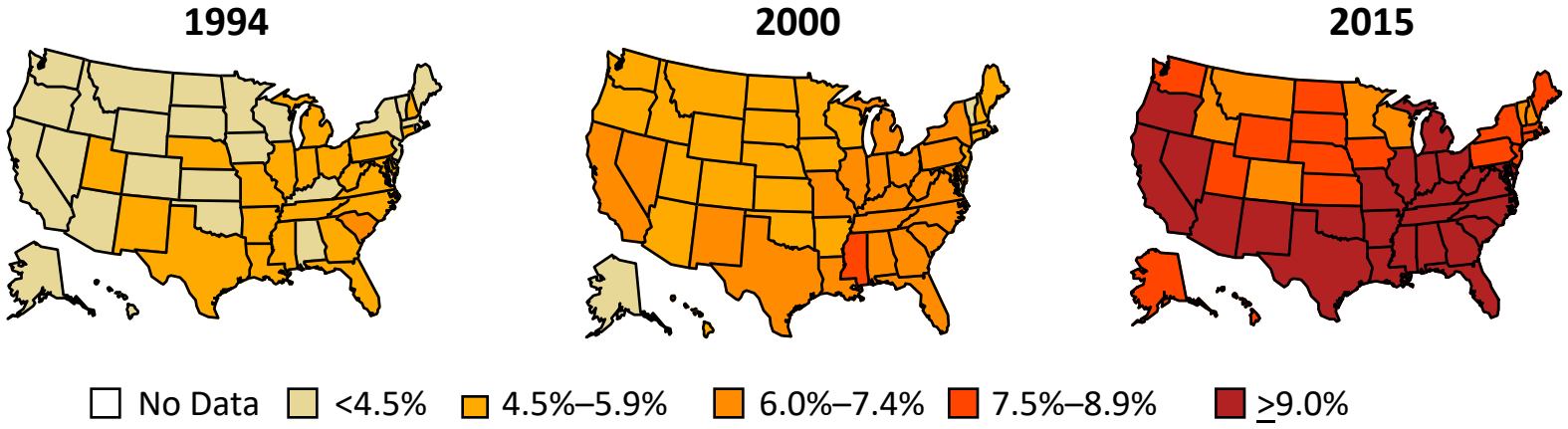
- Public health costs of diabetes epidemic are very high
- Tremendous decreases in quality of life and even life expectancy
- But ECONOMIC costs are also a huge burden

Summary

- Type 2 Diabetes is a very serious chronic illness
- There ARE successful prevention approaches, even for people with prediabetes
  - Diet
  - Physical activity
  - Medication (metformin)
- Once diabetes is diagnosed, treatment is complex and adherence to treatment is less than ideal
- Thus, public health and economic costs are enormous

Age-adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults





Obesity and Diabetes: Twin Epidemics

- Because obesity and diabetes go hand in hand, it is important to understand situations that may *increase* the problem or *decrease* the problem

- In our next module, we explore the intriguing question of what impact cannabis might have on obesity and diabetes?