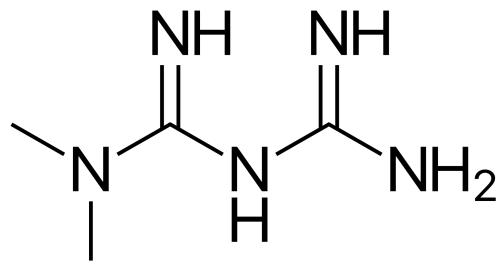
Brand Name: Glucophage
Generic: metformin
Type: small molecule
Year Accepted/Phase: 1995

Mechanism:

Metformin works by reducing hepatic glucose production, enhancing insulin sensitivity, and increasing peripheral glucose uptake and utilization.

Chemical Structure:



Indication:

Glucophage is indicated as an adjunct to diet and exercise to improve glycemic control in adults and children with type 2 diabetes mellitus. It is also used off-label for the prevention of type 2 diabetes in high-risk individuals and for the treatment of polycystic ovary syndrome (PCOS).

Clinical trials:

UKPDS (United Kingdom Prospective Diabetes Study) Trial (Phase III)
Pubmed: https://pubmed.ncbi.nlm.nih.gov/10594464/
Purpose: Assess the efficacy and safety of various treatments, including metformin, in patients with newly diagnosed type 2 diabetes.
Dates: Conducted from 1977 to 1997.
Results: The UKPDS trial demonstrated that intensive glucose control with metformin significantly reduced the risk of diabetes-related complications, including macrovascular complications, compared to conventional therapy. Metformin showed particular benefits in overweight patients, reducing the risk of myocardial infarction and all-cause mortality.
Impact: The UKPDS trial was pivotal in establishing metformin as the first-line therapy for type 2 diabetes, especially in overweight patients.

Diabetes Prevention Program (DPP) Trial
Pubmed: https://pubmed.ncbi.nlm.nih.gov/11832527/
Purpose: Evaluate the efficacy of lifestyle intervention, metformin, and placebo in preventing type 2 diabetes in high-risk individuals with impaired glucose tolerance.
Dates: Conducted from 1996 to 2001.
Results: The DPP trial showed that metformin significantly reduced the incidence of type 2 diabetes by 31% compared to placebo. The lifestyle intervention was more effective, reducing the incidence by 58%. Metformin was particularly effective in younger individuals and those with a higher body mass index (BMI).
Impact: These results supported the use of metformin in diabetes prevention for high-risk individuals, in addition to its use in diabetes treatment.

ADOPT (A Diabetes Outcome Progression Trial)
Pubmed: https://pubmed.ncbi.nlm.nih.gov/12351470/
Purpose: Compare the long-term efficacy and safety of metformin, rosiglitazone, and glyburide monotherapy in recently diagnosed type 2 diabetes patients.
Dates: Conducted from 2000 to 2006.
Results: The ADOPT trial demonstrated that metformin provided durable glycemic control compared to glyburide and had a similar efficacy to rosiglitazone. Metformin had a favorable safety profile and fewer side effects compared to the other treatments.
Impact: These results reinforced the long-term benefits and safety of metformin as a first-line therapy for type 2 diabetes.