# Melatonin as a key regulator in molecular-genetic network of glucose variability related to circadian rhythm
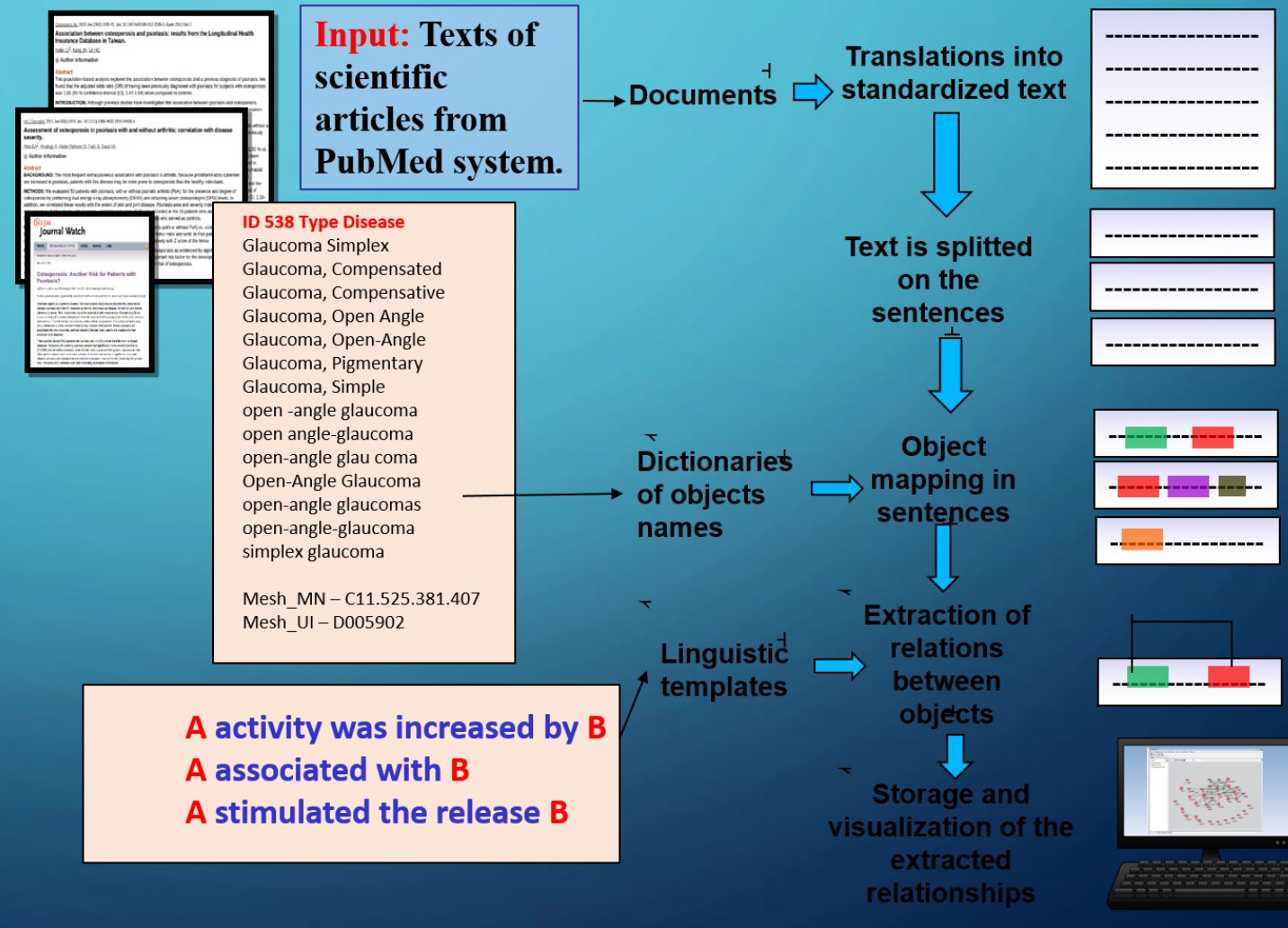
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- Pathological fluctuations in glucose levels are associated with various aspects of diabetes and especially with the development of its complications. The glycemic variability depends, among other factors, on the circadian rhythm.
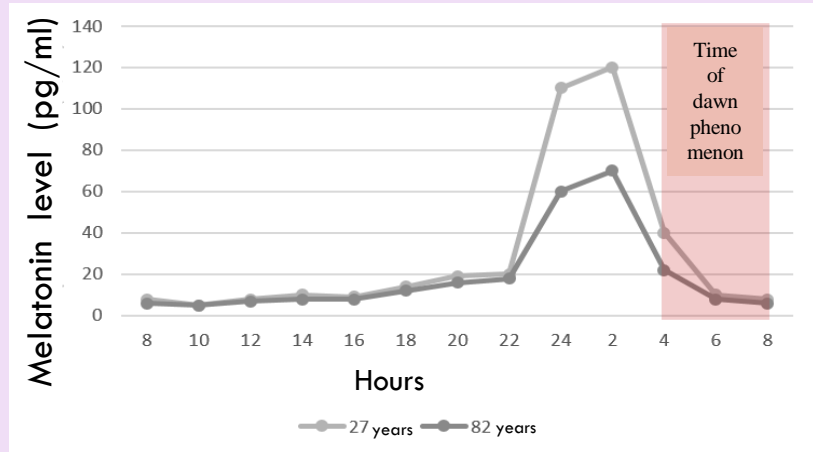
- The ANDSystem, developed at the Institute of Cytology and Genetics SB RAS, allows to automatically build associative molecular genetic networks associated with complex phenotypic characters and biological processes. Analysis of molecular-genetic networks can improve understanding of the mechanisms of glucose variability.

**Input:** Texts of scientific articles from PubMed system.

Documents ⇒ Translations into standardized text

Text is splitted on the sentences

**ID 538 Type Disease**
Glaucoma Simplex
Glaucoma, Compensated
Glaucoma, Compensative
Glaucoma, Open Angle
Glaucoma, Open-Angle
Glaucoma, Pigmentary
Glaucoma, Simple
open -angle glaucoma
open angle-glaucoma
open-angle glau coma
Open-Angle Glaucoma
open-angle glaucomas
open-angle-glaucoma
simplex glaucoma

Mesh_MN – C11.525.381.407
Mesh_UI – D005902

Dictionaries of objects names → Object mapping in sentences

Linguistic templates → Extraction of relations between objects

**A** activity was increased by **B**
**A** associated with **B**
**A** stimulated the release **B**

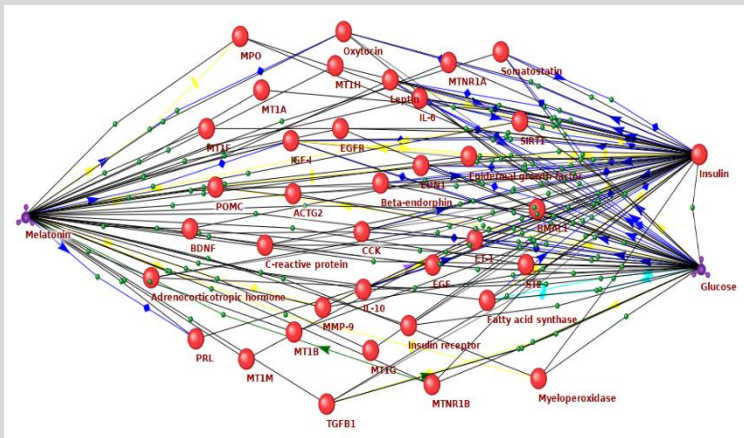Storage and visualization of the extracted relationships

# Analysis of molecular-genetic networks by ANDSystem revealed that melatonin is a key regulator in the network of glucose variability related to circadian rhythm.
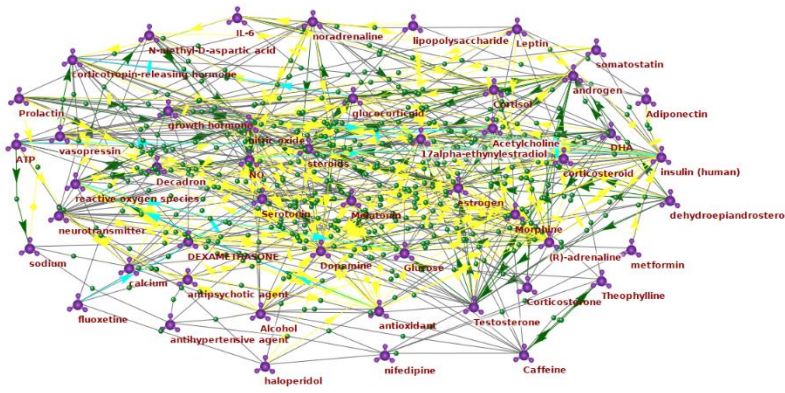


According to ANDSystem, 49 objects are associated with circadian rhythm, hyperglycemia, and hypoglycemia, including hormones, growth factors, cytokines, chemical substances, and metabolites.



Analysis of molecular-genetic networks showed that melatonin is able to regulate insulin and glucose levels. This regulation requires participation of a large number of intermediary genes and proteins.



Analysis of the network showed that melatonin and its precursor serotonin possessed the highest values of betweenness centrality. Melatonin plays a key role in maintaining sleep-wake cycles. It is interesting that at 4-8 o'clock in the morning there is a sharp decline in the concentration of melatonin and at the same time some patients with diabetes show dawn phenomenon.

## ACKNOWLEDGMENT

# THANK YOU FOR YOUR ATTENTION!