Diabetes Mellitus, type 1
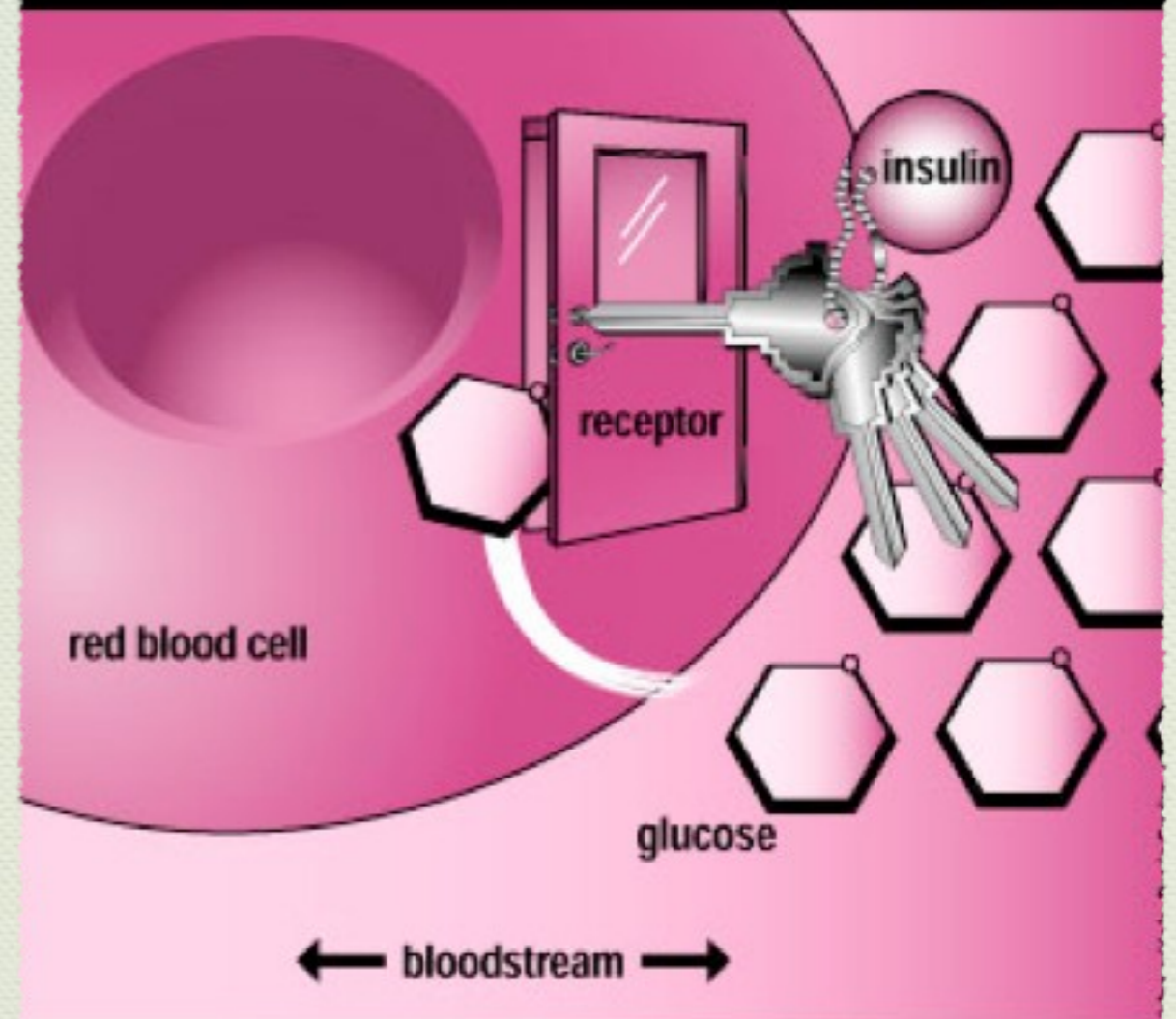
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Prof. Brutlag - BIOC 118Q - Autumn 2010

Pro
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The disease

- 23.6 million people in the U.S. affected (7.8% of population)

- Previously known as "Juvenile Diabetes"

- Defect in insulin secretion or action

- Can lead to blindness, kidney failure, heart disease, and nerve damage

- Increased thirst

- Increased urination
- Weight loss
- Fatigue
- Nausea
- Blurred vision
- Slow-healing infections
- Numbness, tingling, and pain in the feet

Symptoms

- Increased thirst

- Increased urination

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Diagnosis

- Fasting blood glucose:

  - Overnight fasting and through urine analysis

  - Normal fasting plasma glucose levels are less than 100 milligrams per deciliter (mg/dl).

  - Fasting plasma glucose levels of more than 126 mg/dl on two or more tests on different days indicate diabetes.

  - A random blood glucose test can also be used to diagnose diabetes. A blood glucose level of 200 mg/dl or higher indicates diabetes.

Classical treatment

- Monitor blood glucose

- Healthy diet

- Insulin therapy

- Kidney and pancreas transplants

Genetics

- Complex trait

- Inherited risk and environmental effect

- About 18 regions of the genome linked with type 1 diabetes (IDDM1 to IDDM18)

- Most well studied is IDDM1, which contains the HLA genes that encode immune response proteins.

New diagnoses and therapies

◈ Beta cells transplant

◈ Improved control of glucose and blood pressure and the use of specific antihypertensive drugs called ACE inhibitors and ARBs prevent or delay the progression of kidney disease to kidney failure.

◈ Genetically engineered human insulin in a variety of formulations, e.g., rapid-acting, intermediate acting, and long-acting insulin, etc.

◈ Future of diabetes: Predict, preempt, and personalize

◈ Recent studies:

Immune System Genes Show Links to Type 1 Diabetes

Long-Term Type 1 Diabetes 'Survivors' Give Clues to the Disease

Resources

- MedlinePlus

- NCBI Genetics Home Reference

- NCBI OMIM Database

- American Diabetes Association

- The Genetic Landscape of Diabetes

- National Institute of Health