## Overview

### Type 2 Diabetes: A complex disease of gene and environment interactions

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<th>Lesson</th>
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| Lesson 1  
Why study type 2 diabetes? | By reviewing data and asking questions, students are challenged to consider how to make a difference in the tremendous growth of type 2 diabetes (t2d) in the last 15 years. Students are introduced to different types of diabetes, risk factors, and treatment and prevention options. | 90 min. | • Silent Chalk Talk introduction to unit themes  
• PowerPoint presentation illustrating the dramatic increase in t2d |
| Lesson 2  
Where is glucose in food? | Students learn that glucose is the major energy source for most living organisms, including humans, and perform an experiment with two digestive enzymes to determine whether glucose is present in three types of milk. | 90 min. | • Pencil/paper model of carbohydrates  
• Lab activity using lactase and sucrase to demonstrate the release of glucose through the breakdown of carbohydrates in foods. |
| Lesson 3  
Where do calories come from in your diet? | Students examine food labels to learn where calories come from, and use an activity calculator to determine durations of physical activity required for balancing calorie intake. Students learn that t2d can be prevented, and that factors contributing to a person’s risk include access to good nutrition and exercise. | 50 min. | • Food label calculations to determine calories from fat, carbohydrates and protein  
• Activity calculator to determine the amount of physical activity needed to balance caloric intake |
| Lesson 4  
Glucose in balance | Through a blood glucose homeostasis model using a game board and pasta pieces, students learn that blood glucose levels need to be maintained within specific ranges. Students learn that body systems work together to maintain this range, and t2d can develop over time if the mechanisms that maintain blood glucose levels are challenged and eventually fail. | 90 min. | • Game board model of glucose homeostasis with accompanying PowerPoint presentation |
| Lesson 5  
Anatomy of type 2 diabetes | Students develop a detailed human body poster that shows how various organs and body systems are impacted by high blood glucose levels that can occur with t2d. Students also learn about classes of medications for t2d and their physiological targets. | 50 min. | • Visual demonstration of amounts of sugar in different sized drinks  
• Full body posters with organs and body systems represented |

### Call to Action

**Please provide student groups time to work together on their Call to Action products**
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| **Lesson 6**  
Introduction to multifactorial traits | Students examine some of their own traits and discuss whether each trait is determined by genes, the environment, or a combination of both. Students are introduced to a variety of both genetic and environmental factors that may contribute to the development of type 2 diabetes. | 50 min. | • Revisit Silent Chalk Talk posters  
• Genetic traits inventory and class histogram  
• Genetic/Environmental factors Venn diagram |
| **Lesson 7**  
Environmental and genetic risk factors | Students dive more deeply into environmental and genetic risk factors for type 2 diabetes and consider how these factors interact to reduce or increase risk. Students simulate genetic predisposition to assess risk and weigh how access to resources and personal choice may increase or decrease risk factors over time. | 90 min. | • Bean simulation to determine genetic risk  
• Pencil/paper risk tally to determine environmental risks  
• Research risk cards |
| **Lesson 8**  
Who decides? | Students are introduced to a variety of viewpoints concerning the rising rates of type 2 diabetes and obesity, and consider how public health policies may, or may not, change individual behaviors. Students participate in an issue-driven **Structured Academic Controversy** and learn how to use an ethical framework to help justify their position on an issue. | 90 min. | • Stakeholder viewpoint cards  
• Structured Academic Controversy  
• Introduction to ethical perspectives of Respect for Persons, Justice, Doing Good, and Doing No Harm |
| **Final Assessment**  
Call to Action products | Students synthesize and apply their learning throughout the unit by creating a project that addresses a specific diabetes-related problem and contributes to a solution. Successful **Call to Action** projects will implement direct, meaningful, and relevant actions in order to make a contribution towards combatting diabetes within the students’ communities. | 150 min. | • Final installment of Silent Chalk Talk posters  
• Creation of group or individual projects |
| **Appendix** | The appendix to **Type 2 Diabetes** unit contains a mix-and-match set of resources to augment student understanding of this topic and create thoughtful **Call to Action** products. The resources include additional science content and student support materials. | -- | • PPT slide deck with t2d research data  
• Links to newspaper and research articles  
• Worksheets to scaffold student reading  
• Structured discussion strategies |