
DIABETES AND YOU

A unit of work for the NSW Stage 4-5 Science Syllabus.

INTRODUCTION

This unit on diabetes has been developed using the NSW Stages 4-5 Science Syllabus, by a team from four major groups:

- NSW science teachers
- OTEN
- Garvan Institute of Medical Research
- Genetics Education Program of NSW

The team realises the importance of genetics and the impact that associated technology will have in the future. They believe it is important to educate young students in genetics and molecular biology to allow them to develop a better understanding of this field of science. Consequently this will enable students to make well informed decision in the future.

The assistance of the NSW Department of Education and the NSW Board of Studies is gratefully acknowledged for their guidance and support in developing this unit.

FRAMEWORK STATEMENT

In this unit of work, students take on the role of a science communicator, whose task is to improve the awareness and understanding of diabetes (diabetes mellitus) in the 'community'. For the purpose of this unit, the 'community' can be considered to be the school community. As a science communicator, the students need to-

- collect accurate information on the incidence and causes of diabetes
- develop their scientific understanding of the basis for diabetes
- develop an understanding of the social issues involved in diabetes
- be able to disseminate this information in an effective manner to the 'community'

RATIONALE

Diabetes was chosen as the main focus as there is a high incidence of disease in the Australian population. Approximately 100 000 people in Australia suffer from Type 1 diabetes, often developed in childhood. Type 2 diabetes develops mainly in adults, and with an estimated 800 000 people with the disease in Australia, occurs more frequently than Type 1. Within any school, it is highly possible that there will be students who have diabetes or else have family / friends who have diabetes. Type 2 diabetes is increasing in incidence, particularly in developed countries like Australia where high calorie

diets and a more sedentary lifestyle have an influence upon the risk of developing Type 2 diabetes. For all these reasons, diabetes is a relevant issue for students.

The approach of the unit will assist students in developing a conceptual understanding of homeostasis as illustrated by diabetes. Students should appreciate the concept that both genes and the environment contribute to diseases such as diabetes. As a result, students have the ability to influence the affect the environment plays on their own personal well-being. Students can discuss the implications of how genetic information may be used in our society and how medical technology can provide a better quality of life for people with disease. These issues are reinforced by requiring students to communicate what has been learnt to a new audience; the school 'community'.

PRESCRIBED FOCUS AREAS

A student will gain knowledge and understanding of:

- Applications and uses of science.
- History of science.

A student-

4.3 Identifies areas of everyday life that have been affected by scientific developments.

5.3 Evaluates the impact of applications of science on society and the environment.

5.5 Analyses how current research might affect people's lives.

Values and attitudes-

5.26 Recognizes the role of science in providing information about issues being considered and in increasing understanding of the world around them.

Students will learn about:

4 / 5.1 History of science:

e) Describe historical cases where developments in science have led to the development of new technologies.

f) Describe historical cases where development or improvements in technology have transformed science.

4 / 5.3 Applications and uses of science to:

a) Identify and describe examples of scientific concepts and principles that have been used in technological developments.

b) Discuss, using examples, the positive and negative impacts of applications of recent developments in science.

c) Identify and describe examples where technological advances have impacted on science.

d) Give reasons why society should support scientific research.

By studying the historical advances made in technology, it's possible to trace the developments made in insulin production which, in turn, have impacted on how diabetes is managed. For example, the important step forward made when the gene for insulin was identified and cloned has had a particularly strong impact. Students should realise the work scientists have done in developing a greater understanding about diabetes.

RESOURCES

General

Diabetes Australia

CSIRO Genetic Engineering Education Kit

“The New Genetics” workshop run by the NSW Genetics Information Service

Books

Essential science Bk. 3 by Ken Hopley & Bruce Stavert

Science Spectrum Bk. 3 by Graham Coghill and Paul Wood

The World of Science Bk. 4 by D.A. Heffernan & M. S. Learmonth

Web sites

www.warner-lambert.com/info/basicfacts.html

www.jdfa.org.au/

www.idi.org.au/

www.aba.asn.au/

www.genetics.com.au

www.garvan.org.au

Diabetes the basic facts

Juvenile Diabetes Foundation Australia

International Diabetes Web Site

Australian Biotechnology Association

Genetics Education Program of NSW

Garvan Institute of Medical Research

PRESUMED KNOWLEDGE

4.8.1 Cell Theory

- Identify that living things are made of cells.
- Identify and describe the functions of: nucleus, cytoplasm, cell membrane, cell wall, chloroplast.
- Identify that nutrients and oxygen move in and waste move out of cells.
- Distinguish between unicellular and multicellular organisms.

4.8.4 Multicellular Organisms

- Identify that tissues, organs and organ systems in multicellular organisms consist of different types of cells.
- Explain why multicellular organisms require specialised organs and systems.

4.8.5 Humans

- Describe the role of the digestive, circulatory, excretory, skeletal and respiratory systems in maintaining humans as functioning organisms.
- Describe the nutritional requirements for maintaining humans as functioning organisms.

PREPARATION OF THE CLASS

Students often have an enormous amount of knowledge gained from television, family, peers and environment. It would be useful to start by assembling the collective knowledge of the class. It provides a statement to the class of where they are starting in their investigation of diabetes. This can be referred to during the course of the unit, and at the end of the unit will assist in providing a measure of what the students have achieved. It will identify areas of misconception and reinforce their existing knowledge.

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