Curriculum Design Pattern

Global Learning by Design

Name of Pattern **Steroid Pathway**

Date December 2014

Abstract

Pathways are a necessary part of many teaching curriculums and underpin key learning concepts.

Often students don't understand pathways and resort to rote learning techniques. Rote learning is useful to provide foundation knowledge, but does not support the application of knowledge for integrated learning.

In textbooks and PowerPoint slides we relate these pathways to changes that take place due to diseases. The development of two dimensional mind maps and similar aids for the integration of knowledge provide the network linking the static biochemical pathways with the clinical and analytical applications, but these traditional approaches are tedious and hinder the ability to teach clinical reasoning skills in the classroom.

The development of reasoning skills is essential for students, and the scientists and clinicians they will become, to fully interpret clinical results ie. in order to decide whether a specific change in pattern is consistent with the clinical presentation and laboratory results generated.

With RMIT University's reputation as a leader in both design and technology, we are uniquely placed to establish integrated and interactive learning. This steroid pathway provides a template to develop an integrated learning tool that can be applied broadly across courses and programs within and outside of RMIT University.

Learning Context

This pattern is designed to demonstrate how cause, effect, byproducts and other relevant information can be integrated and displayed to form a synergistic model that is easy to understand.

The type of cohort this pattern is applicable to are:

- Undergraduate students
- Masters students
- Early career professionals
- Scientists ongoing education

Rationale/Aim

In this project we plan to take the initial online pilot concept (developed by Ronda Greaves in the late 2000's) in conjunction with the published pathway and re-align them together as a synergistic, dynamic, responsive and interactive entity.

Effectively, we aim to create this pathway as a flowchart with specific "switches" turned on or off throughout the cascade to demonstrate a specific disease. Layered into the flowchart will be clinical and analytical links to explain the concept/s related to the specific interactive section of the chart. We will include clinical case examples and analytical information related to steroids, providing an integrated and interactive learning environment.

Learning Design

Student integration of knowledge with regards to the clinical - analytical aspects of steroid metabolism.

Recognition of the changes associated with common conditions related to inborn errors of steroid metabolism.

The process

Collate the relevant information relating to cause and effect

- Collate external weblinks
- Contact Copyright Management Service with regards to licensing rights to use externally derived information.
- Design a flowchart to demonstrate the cause, effect, byproducts and combined external links.
- Contact Digital Learning Futures for graphic and interactive design.

The challenges

- Tying together disparate information to demonstrate relevant factors, byproducts, cause and effect.
- Designing a coherent presentation of information that is easy to understand.

Conditions

- Correct interpretation of process
- Usage rights for external data
- Access to design expertise

Resources/Technology

1. Original pathway developed and published is the base primary resource for the project - Greaves RF, Jawilakar G, Hewitt J, Zacharin MR. A guide to understanding the steroid pathway: new insights and diagnostic implications. Clinical Biochemistry 2014; 47:5-15.
2. Online concept layout provided via PowerPoint slides.
3. Royal Society of Chemistry database of compounds (ChemSpider) URL links will be used for the basic compound structure - eg. Testosterone link is http://www.chemspider.com/Chemical-Structure.5791.html?rid=fd966386-73e9-4854-8581-2c9ef50f4b55
4. Analytical processes, including mass Spectrometry patterns of specific steroids related to clinical disease will be developed by RG and NT.
5. Information related to enzyme and genetics will be sourced from URL links with the Enzyme Commission (EC) number as determined by the International Union of Biochemistry and Molecular Biology. eg. the enzyme 21 hydroxylase EC number is 1.14.99.10 and can be linked to URL http://www.genome.jp/dbget-bin/www_bget?enzyme+1.14.99.10, which provides detail of the role of the enzyme and genetic information.
6. De-identified clinical scenarios will be provided from the collated resources of RG and MZ. These will also be interactive using the basic example developed by Dr Ann Read - file:///H:/CASE%20STUDIES/Ann's%20education%20files/endocrinology/case%208.htm. These examples are provided in the shared Google Drive.
7. Steroid Pathways website: https://emedia.rmit.edu.au/steroidpathways/

Outcomes

An integrated understanding of clinical and analytical pathways.

Keywords

WIL, online, clinical, analytical, interactive pathways, case studies, analytical techniques, endocrinology, disorders of sex development (DSD), metabolism, steroidomics, mass spectrometry, congenital adrenal hyperplasia (CAH)