





Components

	NAME	DESCRIPTION	AUDIENCE
	<i>Personalised medicine</i> teacher guide	This guide describes how to introduce students to new treatment options for melanoma and other cancers.	teachers
	<i>Melanoma: the road to personalised medicine</i> interactive story	This interactive story features a real patient's battle with melanoma. It describes developments in genetics and biotechnology that underpin personalised medical treatments for melanoma patients.	students
	<i>Treating melanoma</i> worksheet	Students interpret patient diagnostic data to choose appropriate melanoma treatments.	students
	<i>Cancer and the cell cycle</i> background sheet	This background sheet provides teachers with information about the eukaryotic cell cycle and genetic mutations commonly associated with cancer.	teachers

Purpose

Students gain an understanding of personalised medicine and how an individual's genetic information is used to diagnose and treat disease.

Outcomes

Students:

- understand personalised medicine makes use of an individual's genetic information to diagnose disease and plan the most effective treatment;
- recognise advances in our understanding of genetics, including the Human Genome Project, have led to progress in personalised medicine;
- interpret patient's genetic data from various diagnostic sources and understand decision-making behind associated medical treatments; and
- demonstrate ability to interpret information through exploration of an interactive story.

Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students work individually to interpret the interactive story, <i>Melanoma: the road to personalised medicine</i> .	working individually
Students complete the worksheet, <i>Treating melanoma</i> .	individually or as homework activity

Teacher notes

Students receive and interpret information through written and visual means, and are encouraged to progress through the story at their own pace, choosing which aspects to explore.

The story has a human-interest focus featuring the journey of real-life melanoma patient, Clinton Heal. His personal journey, from diagnosis through treatment, is uncovered alongside the larger story of genetic and biotechnological advances.

Technical requirements

The teacher guide and worksheet require Adobe Reader (version 5 or later), which is a free download from www.adobe.com.

The interactive story requires a modern browser (eg Internet Explorer 9 or later, Google Chrome, Safari 4.0+, Opera or Firefox) on computer or mobile device. It can be placed on a web or file-server and run either locally or remotely in a web browser. Javascript should be enabled for best results.

Image credits

Melanoma: the road to personalized medicine (interactive story)

- Clinton Heal portrait © Clinton Heal, melanomaWA, melanomawa.org.au
- 'Dark side of tanning' © Cancer Institute NSW 2014, used under licence
- mole types from Skin Cancer Foundation and National Cancer Institute (public domain)
- 'BRAF: From gene to cancer therapy' (video), CC-BY-3.0, yourgenome.org
- Dr Mark Shackleton portrait © Harry Perkins Institute of Medical Research
- 'Miseq sequencing machine' courtesy of Illumina Inc.
- 'Medicine bottle and pills' by adziohciek/shutterstock.com, used under licence
- 'PET scan before/after vemurafenib treatment' © G. McArthur and R. Hicks, Peter MacCallum Cancer Centre, Melbourne, Australia, used by permission

Treating melanoma (worksheet)

- 'Scientist loading an agarose gel for electrophoresis' by CanStockPhoto/phakimata, used under licence
- PET scans of patient 'Tim', used by permission. Based on patient 45 from Bollag, G. et al. (2010). Clinical efficacy of a RAF inhibitor needs broad target blockade in BRAF-mutant melanoma. *Nature*, 467, 596-599.
- PET scans of patients 'Sally' and 'Rob', used by permission. These images were originally published in Belhocine, T., Scott, A., Even-Sapir, E., Urbain, J.-L. and Essner, R. (2006). Role of Nuclear Medicine in the Management of Cutaneous Malignant Melanoma. *Journal of Nuclear Medicine*, 47(6), 957-967. © by the Society of Nuclear Medicine and Molecular Imaging, Inc.

Cell cycle, mutations and cancer (background sheet)

- 'Cancer cells' by Dr Cecil Fox/National Cancer Institute, [commons.wikimedia.org/wiki/File:Cancer_cells_\(1\).jpg](http://commons.wikimedia.org/wiki/File:Cancer_cells_(1).jpg)

banner image: 'Gel electrophoresis 2' by Mnolf. GFDL. commons.wikimedia.org/wiki/File:Gel_electrophoresis_2.jpg

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Associated SPICE resources

Gene expression 5: Personalised medicine may be used in conjunction with related SPICE resources to address the broader topic of gene expression and regulation.

DESCRIPTION	LEARNING PURPOSE
<p><i>Gene expression (overview)</i></p> <p>This learning pathway shows how a number of SPICE resources can be combined to teach the topic: gene expression and regulation.</p> <p>All resources use a human disease context, melanoma, which helps students relate to advances in biotechnology and our understanding of molecular genetics.</p>	
<p><i>Gene expression 1: Melanoma risk factors</i></p> <p>Students use an interactive learning object to investigate risk factors associated with melanoma developing.</p>	Engage
<p><i>Gene expression 2: Polymerase chain reaction</i></p> <p>Students simulate polymerase chain reaction in the classroom.</p>	Explore
<p><i>BioDiscovery activity (optional)</i></p> <p>Students attend the LotteryWest Biodiscovery Centre at the Harry Perkins Institute of Medical Research to participate in a SPICE-developed PCR laboratory activity. See <i>Gene expression (overview)</i> for details.</p>	Explore
<p><i>Gene expression 3: Measuring gene expression</i></p> <p>Students measure gene expression via a microarray simulation conducted in the school laboratory.</p>	Explore
<p><i>Gene expression 4: Regulating gene expression</i></p> <p>An animation explains how gene expression is regulated by complex molecular interactions. These processes are important in increasing organism adaptability, flexibility and complexity.</p>	Explain
<p><i>Gene expression 5: Personalised medicine</i></p> <p>Students explore an interactive story to discover how increased understanding of molecular biology and advances in biotechnology have led to development of personalised medical treatments for melanoma patients.</p>	Elaborate