



# ASMR Medical Research Week<sup>®</sup> 2008

## Victorian Secondary Schools Medical Research Quiz

### 1. Medical Researchers.



*A Nobel Prize Medal*

**Australian scientist Sir Macfarlane Burnet won the 1960 Nobel Prize in Physiology or Medicine for**

- A) the discovery of acquired immunological tolerance
- B) the discovery of penicillin
- C) the discovery of the specificity of cell mediated immune defense
- D) discovering the role of *Helicobacter pylori* in stomach ulcers

### 2. Medical Researchers

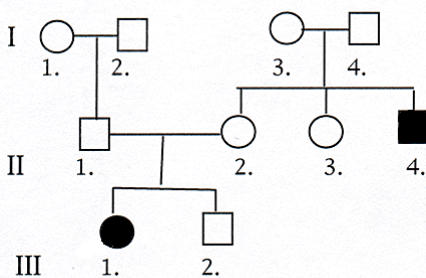


*Australian medical research leads the world in many fields.*

**Which of the following medical research discoveries was not made by Australian scientists**

- A) The vaccine for cervical cancer prevention
- B) The link between smoking and lung cancer
- C) The bionic ear
- D) The treatment of peptic ulcer by antibiotics

### 3. Genetics



*A human pedigree showing individuals affected by inheritance of a DNA mutation.  
Circles=female, square=male, dark=affected*

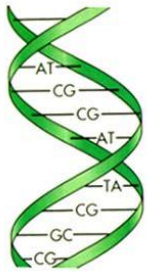
**In this family tree a gene mutation is passed from one generation to the next. Can you determine which inherited disorder is most likely to be shared by this family?**

- A) Huntington disease
- B) Nyctalopia
- C) Bernard-Soulier syndrome
- D) Wiscott-Aldrich syndrome

### 4. Genetics

**What is the chance that individual I.2 carries the gene mutation?**

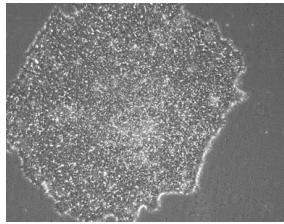
- A) 0%
- B) 25%



The DNA double helix

- C) 50%
- D) 100%

### 5. Stem Cells

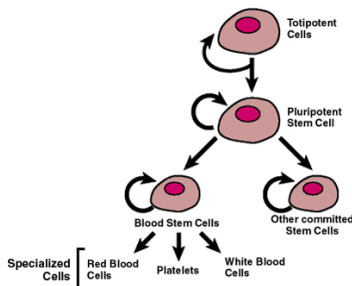


Human embryonic stem cells *in vitro*

Human skin cells can be reprogrammed to form pluripotent stem cells

- A) in science fiction movies only.
- B) with the use of embryonic fibroblast co-culture.
- C) with the addition of growth hormones *in vitro*.
- D) using molecules that are found in human embryonic stem cells.

### 6. Stem Cells



Stem cells self-replicate and differentiate into specialized cell types

In a recent clinical trial, Type 1 diabetes was treated successfully with stem cells isolated from

- A) pre-implantation embryos
- B) embryonic pancreas
- C) umbilical cord blood
- D) embryonic stem cell lines

### 7. Health



Airborne pollen is the cause of hayfever

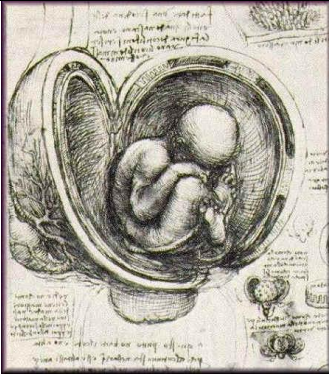
Hayfever is an allergy triggered by the pollen of some grasses. In order to reduce the number of Australians affected by hayfever, Australian scientists have

- A) designed a drug that breaks down pollen proteins in the stomach before they provoke an immune response.
- B) designed a drug that downregulates the expression of certain pollen proteins.
- C) created a genetically modified ryegrass that does not produce pollen.
- D) created a genetically modified ryegrass in which certain pollen proteins are downregulated.

### 8. Health

The fetal programming hypothesis proposes that

- A) Poor nutrition of the fetus affects adult health
- B) Human behavior is partly inherited
- C) Fetal growth factors can alter maternal metabolism
- D) Children begin to learn the sound of their parents voice in utero



*The anatomy of the human fetus by Leonardo Da Vinci( circa 1510).*

### 9. The Scientific Method

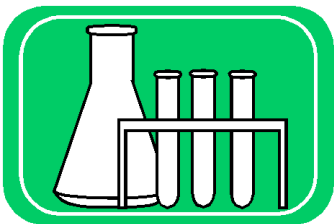


*All new human drugs and therapies are tested by clinical trial. Ongoing Australian trials are listed at ANZCTR.*

**Claudia claimed that a tropical animal protein supplied by her naturopath was effective in lowering blood pressure. As evidence of her claim, Claudia, who had hypertension, said that she felt much better after the treatment and had much more energy. In comparison to a credible scientific investigation, how is Claudia's inference flawed?**

- A) A Lack of an appropriate way to measure the effect of the treatment.
- B) Lack of appropriate controls and lack of an appropriate way to measure the effect of the treatment.
- C) Lack of randomization, lack of replication, and lack of an appropriate way to measure the effect of the treatment.
- D) Lack of replication and lack of appropriate controls.

### 10. The Scientific Method



*Can another researcher repeat your experiment and get the same result?*

**Andy, a man diagnosed with Parkinson's Disease, suspected that electromagnetic radiation at his workplace (a TV broadcasting station) may be to blame. Which of the following statements would lend greatest support to Andy's suspicion?**

- A) A survey of workers at the TV station reveals many cases of Parkinson's Disease in men of the same age as Andy.
- B) The incidence of Parkinson's Disease is higher among the workers at Andy's workplace than among workers at TV stations with low electromagnetic radiation.
- C) The national average incidence of Parkinson's Disease in men of Andy's age is lower than that among workers at Andy's workplace.
- D) There is no history of Parkinson's Disease in Andy's family.

### 11. Molecular Biology

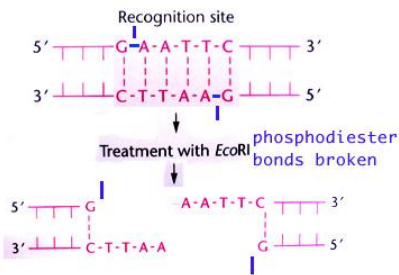
acatttgcttctgacacaactgtgttc  
actagcaacctcaaacagacacccatgg  
tgcattc.....

*Human beta globin sequence  
NM\_00518*

**The Human beta-globin gene encodes a RNA molecule of 626 nucleotides length. If this RNA was reverse transcribed into DNA and cut with the restriction endonuclease EcoR1, the smallest DNA sequence fragment would be**

- A) 212 nucleotides
- B) 414 nucleotides
- C) 106 nucleotides
- D) 53 nucleotides

## 12. Molecular Biology

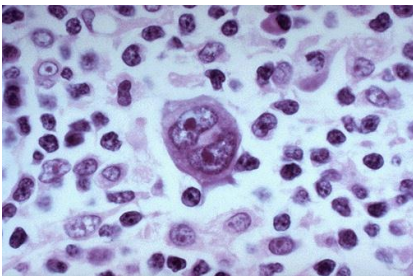


*Restriction endonuclease enzymes recognize and cut DNA at specific sequences*

**What is the last amino acid encoded by the longest DNA fragment following EcoRI cutting of the human beta-globin DNA?**

- A) Alanine
- B) Glutamic acid
- C) Lysine
- D) Isoleucine

## 13. Blood

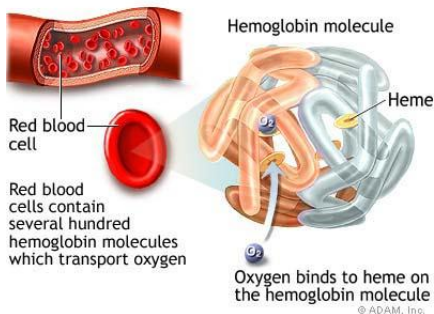


*White blood cells with a megakaryocyte in centre of field*

**Platelets are**

- A) absent in people with hemophilia.
- B) found in high numbers in packed red blood cell transfusions.
- C) predominantly formed in the thymus gland.
- D) reduced in number in patients with severe liver disease.

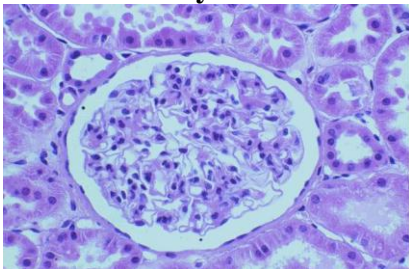
## 14. Blood



**Rh negative disease**

- A) Is caused by fetal blood which is negative for the Rh antigen
- B) Results in destruction of maternal red blood cells
- C) Can be prevented by injection of Rh antibodies into the mother
- D) Can be treated by maternal blood transfusion

## 15. The Kidney

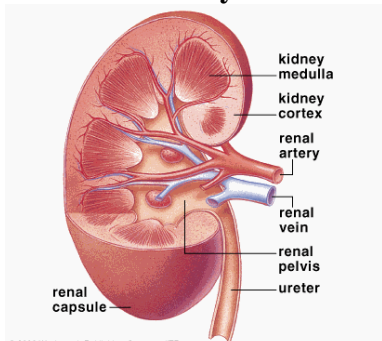


*A histological section of normal human kidney tissue*

The kidney tissue section shown opposite has a large round structure in the middle. The structure is most likely

- A) a glomerulus
- B) a kidney stone
- C) a proximal tubule
- D) a tumor

### 16. The Kidney

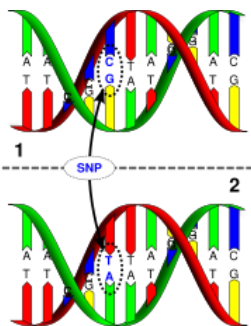


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**In Australia in 2006, the approximate number of patients receiving dialysis for end-stage renal disease was**

- A) 500
- B) 16,000
- C) 1,750
- D) 3,100

### 17. Medical technology

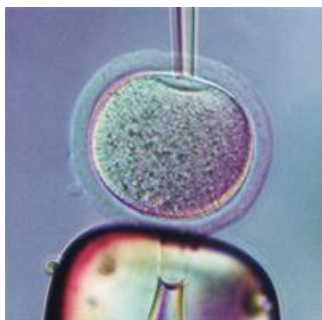


*A single nucleotide polymorphism (SNP)*

**SNP's (Single Nucleotide Polymorphisms) are single letter changes in the DNA code. Which of these statements about SNP's is incorrect?**

- A) A SNP in non-coding DNA can change gene expression levels
- B) Most SNP's have been linked to disease
- C) By looking at a patients SNP's, we can tailor drug therapies to individual patients
- D) By looking at SNP's, we will be able to predict susceptibility to specific diseases

### 18. Medical technology

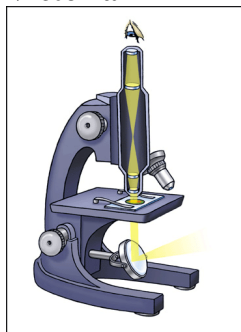


*Somatic cell nuclear transfer (SCNT).*

**Which Australian state or territory was the first to pass legislation approving the use of somatic cell nuclear transfer for medical research?**

- A) The A.C.T.
- B) Queensland
- C) Tasmania
- D) Victoria

### 19. Medical Research in Victoria




**In addition to this quiz, The Australian Society for Medical Research, Medical Research Week<sup>®</sup> 2008 includes a number of other activities for Victorian secondary school students. Which of the following is not an ASMR MRW activity:**

- A) The gene technology access centre
- B) Tertiary career nights at Monash and Melbourne University
- C) Science in the cinema
- D) Medical researcher visits to Victorian regional schools

### 20. Medical Research in Victoria

**The Victorian government is supporting the growth of medical research in 2008 by providing funding for**

- A) a doubling of the existing Walter and Eliza Hall Institute of

 <p><b>Victoria</b> The Place To Be</p> <p><i><a href="http://www.business.vic.gov.au/">http://www.business.vic.gov.au/</a></i></p>	<p>Medical Research</p> <p>B) establishment of the The Australian Regenerative Medicine Institute at Monash University</p> <p>C) a new Australian Centre for Neuroscience and Mental Health Research</p> <p>D) all of the above</p>
<p><b>Please direct your any queries to the ASMR quizmaster at <a href="mailto:adam.hart@med.monash.edu.au">adam.hart@med.monash.edu.au</a></b></p>	<p><b>Many Thanks to Belinda Griffiths for assistance with production and editing of the 2008 quiz.</b></p>

**Some health, science and medical research websites**

[Molecular Biology of the Cell](#)

<http://www.betterhealth.vic.gov.au/>

<http://www.abs.gov.au/>

<http://www.health.gov.au/>

<http://www.abc.net.au/science/>

<http://www.science.org.au/nova/index.htm>

[http://en.wikipedia.org/wiki/Main\\_Page](http://en.wikipedia.org/wiki/Main_Page)

<http://www.ncbi.nlm.nih.gov/sites/entrez>

<http://rna.lundberg.gu.se/cutter2/>

**ASMR 2008 QUIZ Answers and Web links:**

1. A)

[http://nobelprize.org/nobel\\_prizes/medicine/laureates/1960/burnet-bio.html](http://nobelprize.org/nobel_prizes/medicine/laureates/1960/burnet-bio.html)

2 B)

3 B)

<http://www.ncbi.nlm.nih.gov/sites/entrez?db=omim>

4 C)

5 D)

[http://www.ncbi.nlm.nih.gov/pubmed/18287077?ordinalpos=7&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed\\_ResultsPanel.Pubmed\\_RVDocSum](http://www.ncbi.nlm.nih.gov/pubmed/18287077?ordinalpos=7&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum)

6 C)

[http://www.ncbi.nlm.nih.gov/pubmed/17426276?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed\\_ResultsPanel.Pubmed\\_RVDocSum](http://www.ncbi.nlm.nih.gov/pubmed/17426276?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum)

7 D)

8 A)

9 C)

10 B)

11 A)

<http://www.ncbi.nlm.nih.gov/entrez/>

<http://rna.lundberg.gu.se/cutter2/>

12 B)

<http://ca.expasy.org/tools/dna.html>

13 D)

14 C)

15 A)

16 B)

<http://www.anzdata.org.au/anzdata/AnzdataReport/30thReport/Ch01StockandFlow.pdf>

17 B)

18 D)

<http://www.ncbi.nlm.nih.gov/About/primer/snps.html> 18

19 A)

<http://www.asmr.org.au/MRWVic.html>

20 D)

[http://www.business.vic.gov.au/BUSVIC/STANDARD/1001/PC\\_61419.html#IntNav3](http://www.business.vic.gov.au/BUSVIC/STANDARD/1001/PC_61419.html#IntNav3)