

# Chapter 5

## Stem cells – facts and fiction

Stem cells feature heavily in the media, but unfortunately the media does not always paint the correct picture. Complete the activities below to highlight any misconceptions students might have about any facet of stem cell research and use. These activities might also be used to survey student opinions and interest in a certain area of stem cell work, which can lead on to discussions and debates. Teachers can also use these activities as a lead in to chapter 6 tasks.

### Activity 5.1 Opinion poll activity

In this activity teachers can use a readymade polling presentation to demonstrate the general consensus on a number of stem cell issues. Teachers can also ascertain student opinions on the different issues at the same time. This activity is very useful for initiating discussion on many stem cell related issues.

### Activity 5.2 Stem cells – fact or fiction

This activity aims to help clarify some common misconceptions associated with stem cells.

### Activity 5.3 Commonly asked questions about stem cells

This activity is designed to assist teachers. The table lists a number of commonly asked questions and the links to activities within this resource kit that may assist with the delivery of these concepts.

### Activity 5.4 Newspaper splash – stem cells in the media

Use this activity to encourage thinking and discussion on a number of stem cell related topics.

### Activity 5.5 Stem cell tourism

This activity aims to highlight the growing trend of medical tourism and that many stem cell based medical practices being offered are experimental.



# Activity 5.1

## Stem cell opinion poll

### Purpose

There are many sides to an issue. In this activity students will have to formulate their own opinions on different issues surrounding stem cell work.

### Class time

15–20 minutes (more may be required for discussion and polling results).

### Resources required

- PowerPoint presentation *Stem cell opinion poll* for displaying statements or printed copy to read aloud.
- Signage for around the room: Yes (agree, in favour), No (disagree, not in favour), Don't know (unsure, undecided). See readymade placards at the end of the PowerPoint presentation.

Note: The PowerPoint presentation *Stem cell opinion poll* is available through the same link provided to access the Teachers' Kit, or by e-mailing [info@stemcellcentre.edu.au](mailto:info@stemcellcentre.edu.au).

### Student knowledge outcomes

- To think about and consider their own opinion on the different issues associated with stem cell research.
- To observe that public opinion on topical issues can change over time.

### Student skills outcome

Thinking, forming an opinion, evaluating knowledge.

### Prior knowledge

- What stem cells are and how they are derived (i.e. embryonic stem cells are derived from excess IVF embryos).
- Difference between embryonic stem cells and adult stem cells.
- Difference in potency of stem cells (pluripotent and multipotent).

### Common misconceptions

- Opinions about issues relating to stem cells never change. Once people disagree, they always disagree.  
*Fact: Not necessarily. As new technologies develop, people become more aware and informed about the processes involved. Opinions on many issues change over time. However, for some members of the community the use of human embryos in research will always remain objectionable.*

### Further Resources

- Information on the ethics of stem cell research can be found on the Stem Cell Channel:  
<http://www.stemcellchannel.com.au>

### References

The polling report: <http://www.pollingreport.com/science.htm>

Biotechnology Summary Report:

<http://www.biotechnology.gov.au/assets/documents/bainternet/Biotechnologysummaryreport20070720190245.pdf>

Health and Medical Research Opinion Poll: [http://thankyouday.org/content/documents/e\\_OpinionPoll2006.pdf](http://thankyouday.org/content/documents/e_OpinionPoll2006.pdf)

Roy Morgan Research: <http://www.roymorgan.com/news/polls/2006/4036>

### Teacher directions

This survey (or an adaptation of) can be used at the start of the topic on stem cells to ascertain student opinions and knowledge of stem cells before the teaching unit. The poll can be run again at the conclusion of the teaching unit. Evaluate whether student opinion changes after they are well informed about stem cells. Share this information with the students and discuss how public opinion can be skewed by misinformation on certain topics.

## Instructions

1. Ensure there is a clear space in the room for students to be able to move to one of four corners. In three areas of the room, place the following placards found at the end of the PowerPoint presentation.
2. Designate a student as the class recorder; alternatively the teacher can do this. Discuss how the class opinions are going to be recorded (i.e. a table on the board).
3. Display the PowerPoint or read out the opinion poll questions. Have students move to the corner of the room to the statement that relates to them.
4. Record the number of students at each corner in the table. Work out the percentage of student opinions. (This can be done once the students are seated or as they are going.) To work this out take the number of students at each opinion and divide that number by the total number of students in the class. Multiply the answer by 100 to get the percentage.

**Note: as this is a sensitive area, a private ballot is an alternative to students expressing their opinions openly.**

5. Show the students the polled results on the board and see how their opinions compared.
6. Use the following questions are either a group discussion or for students to complete in their workbooks.

## Points for discussion and evaluation

- How did the class data compare to the polled data in the presentation?
- How did the recent data compare to the opinions in the earlier (pre 2003) data?
- Consider and discuss:
  - Would there be a difference in opinion after people were provided with more information about stem cells and therapeutic cloning?
  - Would there be different opinions in Australian data versus US data?
- How might opinions on these issues best be surveyed in the population?
- Construct your own survey about the general issues and misconceptions relating to stem cells and survey students from another class or year level. Poll the results and compare to your class results.



## Activity 5.2

# Stem cells – fact or fiction

### Purpose

There are often misconceptions about topical issues. When people learn more about a particular issue and keep well informed, the facts and fiction surrounding an issue can be understood. Students should learn to be able to disseminate information in the media and think critically about information that they are exposed to.

### Class time

10–15 minutes

### Resources required

- Handout 5.2 Stem cells – facts and fiction.

### Student knowledge outcomes

- To think about and identify the misconceptions associated with stem cell work.
- To identify facts and fiction regarding stem cell issues.

### Student skills outcome

Thinking, forming an opinion, evaluating knowledge, thinking critically.

### Prior knowledge

- What stem cells are and how they are derived (i.e. embryonic stem cells are derived from excess IVF embryos).
- Difference between embryonic stem cells and adult stem cells.
- Difference in potency of stem cells (pluripotent and multipotent).

### Common misconceptions

- As outlined in the activity – answers where a statement is fictitious.

### Further Resources

- Information on the ethics of stem cell research can be found at: <http://www.stemcellchannel.com.au>.
- See also previous chapters of this resource.

### Teacher directions

Below is a quiz on some facts and fiction surrounding stem cells. Students are to state whether they think the statement is a fact or fiction. If it is fiction, students are to explain why the statement is incorrect. Use this activity as revision or to start a class discussion or to ascertain the topics that students might like to construct a presentation about (see chapter 6).



# Handout 5.2

## Fact or fiction

For each statement state whether it is 'fact' or 'fiction'. If it is fiction, briefly explain why.

	Statement	Fact or fiction? Explain.
1	Stem cells can give rise to every cell in the body.	
2	All stem cell research destroys embryos.	
3	A pluripotent stem cell can give rise to every cell in the body, except for placental cells.	
4	Tissue stem cells come only from adults.	
5	IVF embryos cannot be made just to produce stem cells.	
6	Spare organs can be grown in a dish.	



# Handout 5.2

## Fact or fiction

### – Teacher copy

For each statement state whether it is 'fact' or 'fiction'. For each statement briefly explain the science. If it is a fictitious statement briefly explain why.

	Statement	Fact or fiction? Explain.
1	All stem cells can give rise to every cell in the body.	Fiction. Only pluripotent stem cells can make any cell in the body. Pluripotent stem cells include embryonic stem cells, iPS cells and embryonic stem cells made using SCNT.  Tissue (adult) stem cells are multipotent and can usually only make the tissue from which they are derived.
2	All stem cell research destroys embryos.	Fiction. Only the acquisition of hESC results in the destruction of embryos. Embryonic stem cells made from both excess IVF embryos and those made via SCNT result in the destruction of an embryo, which is legal under license in Australia.
3	A pluripotent stem cell can give rise to every cell in the body, except for placental cells.	Fact. An example of pluripotent stem cells are hESC.
4	Tissue stem cells come only from adults.	Fiction. Adult or tissue stem cells come from specialised tissue. Children also have specialised tissues which contain adult stem cells. These stem cells are often referred to as multipotent stem cells as they have a more restricted ability to grow into other cell types.
5	IVF embryos cannot be made just to produce stem cells.	Fact. The creation of a human embryo is to be for the express purpose of making a life and assisting a couple to have a baby. IVF embryos that are no longer required by a couple for infertility treatment can be donated to research. Australian scientists have been able to use donated IVF embryos for stem cell generation since 2002.
6	Spare organs can be grown in a dish.	Fiction. Although this sounds useful for research and transplant purposes, this currently cannot be done. Organs are very complex structures made up of many different types of cells. At present scientists are trying to better understand how to grow each type of cell from stem cells and are yet to be able to coordinate the complex development required to make an organ.



# Activity 5.3

## Commonly asked questions about stem cells

### Purpose

This activity is mainly to assist teachers. Students often have questions relating to stem cell use and research. This activity lists some commonly asked questions that are answered in this kit. See the table for a list of activities related to commonly asked student questions that can be used to answer these questions.

### Commonly asked questions that have activities within this kit that can be used in the classroom

Commonly asked questions	Activity in this kit
Is there a method or technique used to manipulate cultured stem cells to form a specific cell e.g. a blood cell or a nerve cell?	Chapter 3.5: How are stem cells specialised into different cell types.
How are adult cells, such as skin cells, made to become like embryonic stem cells?	Chapter 3.4: Reprogramming cells.
Are there other ways to obtain stem cells other than from embryos?	Chapter 2: Types of stem cells.
What are some of the benefits of stem cell research?	Chapter 4: Stem cell use now and in the future.
What does the process of obtaining embryonic stem cells involve?	Chapter 2: Types of stem cells and chapter 3: Techniques for obtaining and specialising stem cells.
What is the difference between embryonic stem cell and other stem cells?	Chapter 2: Types of stem cells and chapter 3: Techniques for obtaining and specialising stem cells.
Why is stem cell research controversial?	Chapter 3: Techniques for obtaining and specialising stem cells, chapter 4 Stem cell use now and in the future, chapter 5 Stem cells – facts and fiction and chapter 6 It's stem cells – the issues.
Is all stem cell research controversial?	Chapter 4: Stem cell use now and in the future and chapter 5 Stem cells – facts and fiction



# Activity 5.4

## Headline splash

### – stem cells in the media

#### Purpose

Stem cells commonly feature in the media. Using these headline splash pages, discuss the real issues surrounding stem cell facts and fiction.

#### Class time

15–20 minutes

#### Resources required

- Headline splash pages.

#### Student knowledge outcomes

To think about and identify the facts and misconceptions associated with stem cell work in the media.

#### Student skills outcome

Thinking, forming an opinion, evaluating knowledge.

#### Prior knowledge

- What stem cells are and how they are derived (i.e. embryonic stem cells are derived from excess IVF embryos).
- Difference between embryonic stem cells and adult stem cells
- Difference in potency of stem cells (pluripotent and multipotent).

#### Common misconceptions

- The media always presents all sides of an issue and always provides readers with all the information.

*Fact: Not true, unfortunately. In the media, very controversial issues usually sell newspapers, so the media is driven by results. To find the whole truth about an issue, students must of the information that is being presented to them in the media.*

#### Further Resources

- Information on the stem cell research can be found at: <http://www.stemcellchannel.com.au>.

#### Teacher directions

The two headline splash pages below show a number of ways in which stem cells are portrayed in the media. Below are some suggestions of how to use these diagrams:

Activity	Description
Headline splash – tuning in	In pairs or small groups, distribute one of the four headline splashes. Ask students to write down what they think about one or a number of the headlines. They can write down some thoughts about how the phrases made them feel or speculate about what they think it means. Is it fact or fiction? Are there any ways in which the headline could be misrepresenting the facts?
What is it about?	Select a headline that may be familiar to students. Ask them to write down what they already know. Write an article that might accompany the title. This can be brief or can be expanded into a research task.
Think – pair – share	Students think about the headlines in general or select one in particular, pair up with the person next to them and share their thoughts. Ask them to share some of their discussions with the rest of the class.

Cut out the headlines	<ol style="list-style-type: none"> <li>1. Divide students into groups and distribute one headline to each group. Ask the student groups to discuss and record their interpretation of the article and present their thoughts with the rest of the class.</li> <li>2. Cut out all or some of the headlines and ask groups of students to sort the headlines into fact or fiction.</li> </ol>
There are two sides to every story	Are there two sides to any of these headlines? Ask students to pick one/ a couple of the headlines and list the pros and cons associated with that headline.
Editorial	Ask students to select a headline and research that area of stem cell science. Students could present their research as an editorial. Use the web to locate other articles about a similar issue involving stem cells.
Writing about stem cells	Using the headlines, complete one of the writing exercises in chapter 6 on one or more of the headlines shown.

## Breakthroughs and Cures

# GROW NEW BREASTS

Scott McMillen  
MELBOURNE SCIENTISTS ARE HOPEFUL TO BRING  
"GROW NEW BREASTS" TO THE MARKET. THE  
TECHNIQUE INVOLVES TAKING A SMALL SAMPLE OF  
BREAST TISSUE FROM A WOMAN WITH BREAST  
CANCER AND USING IT TO GROW NEW BREAST  
TISSUE IN A LABORATORY. THE NEW BREAST  
TISSUE IS THEN TRANSPLANTED INTO THE  
WOMAN'S BREAST. THE TECHNIQUE IS  
CURRENTLY BEING TESTED ON MONKEYS.  
Copyright Page 18

## Stem cell cancer cure hope

Dental & Medical News: Stem Cells Grow Replacement Tooth in Mouse

# Grow your own heart

Stem-Cell-Coated Contact Lenses Are Curing the Blind

## Breakthrough in

## liabetes research

## Alzheimer's hope

MELBOURNE scientists are hoping to find a treatment for Alzheimer's disease through stem-cell research.

The team would use

## STEM CELL CRYSTAL BALL

# Grow your own organs

## Science Fiction



## MailOnline

No men OR women needed: Scientists create sperm and eggs from stem cells

## Rabbit penis grown in laboratory

Glowing monkeys 'to aid research'

## HEALTH

Raelian leader says cloning first step to immortality

Weird True Freaky

Artificial sperm takes men out of equation

The Counter-Mail April 09, 2008 01:08am

## Daily Telegraph

Scientists create 'monstrous' human-cow hybrid

Stem cells turned into glow-in-the-dark blood cells

# Handout 5.4 Headline Splash

**Stem cell cancer cure hope**

**Researchers find way to improve body's tolerance of stem cells**

Found in bone marrow: the Mr Fixit of stem cells

**Parkinson's cure closer**

# Adult stem cells research fuels debate

**The Daily Telegraph**

Scientists create 'monstrous' human-cow hybrid

**Stem cell method offers new hope**

**TOP STORIES**

Thursday, April 3, 2008

Stem cells save two brothers

Doctors: China's Stem-Cell Therapy for Kids Is Risky

**Breakthrough in diabetes research**

Scientists change a skin cell into an immune system cell

**Pre-birth stem cell discovery**

Stem cell breakthrough for diseases

An embryonic disaster?

Stem cells could aid in healing the heart



# Activity 5.5

## Medical tourism – not always a happy holiday

### Purpose

With stem cells featuring prominently in the media, people with diseases and disorders become hopeful that a cure is 'just around the corner'. However in reality many stem cell 'cures' are still being researched or are still being evaluated in clinical trials. However, with the concern for a loved one's quality of life, many people try and find a 'quick fix'. Many companies around the world claim that they have stem cell cures for many disorders, often charging a large sum of money. People travel overseas and pay thousands of dollars in the hope that they will be cured. However, these treatments are unproven and experimental and their potential benefits and dangers are both unknown.

This activity aims to highlight the growing trend of medical tourism and that many medical practices using stem cells currently unproven.

### Class time

15–20 minutes

### Resources required

- Handout 5.5 Medical tourism – not always a happy holiday.
- NB Questions 6 and 7 in this activity are similar. Teachers may wish to give students the option of either pick a specific question or get students to do both (i.e. one in class and one for homework to consolidate key concepts).

### Student knowledge outcomes

- To be aware that some organisations claim to have medical cures for diseases using stem cells, but this is not always the case. A large number of these treatments being offered have not been proven to be safe and effective.
- Not everything on the internet or in advertisements is absolutely true. The internet is an unregulated medium. Students need to think critically about information they are exposed to.
- Further public education is necessary for members of the public to become aware of the potential dangers of medical tourism.

### Student skills outcome

Thinking, reading comprehension, forming an opinion, evaluating knowledge.

### Prior knowledge

- What stem cells are and how they are derived (i.e. embryonic stem cells are derived from excess IVF embryos).
- Difference between embryonic stem cells and tissue stem cells.

### Common misconceptions

- Material on the internet is always truthful and up to date.

*Fact: Unfortunately this is untrue. People need to be discerning when looking for information on the internet and in advertisements, especially to do with their health. New treatments that sound too good to be true often are. Patients should talk to their doctor before embarking on expensive, unproven treatments using stem cells.*

### Further Resources

- ASCC Patient Handbook: [http://www.stemcellcentre.edu.au/For\\_the\\_Public/Patient/Handbook.aspx](http://www.stemcellcentre.edu.au/For_the_Public/Patient/Handbook.aspx)
- International Society of Stem Cell Research (ISSCR) website on unproven stem cell therapies: <http://www.closerlookatstemcells.org>
- Lindvall, O and Hyun, I (2009) Medical innovation versus stem cell tourism. Science 324 (1664) pg 1664-1665. Found at: <http://www.sciencemag.org/cgi/content/full/324/5935/1664#related-content>

## References

Patient Handbook from the Australian stem cell centre:  
[www.stemcellcentre.edu.au/For\\_the\\_Public/StemCellsInSchool.aspx](http://www.stemcellcentre.edu.au/For_the_Public/StemCellsInSchool.aspx)

## Background teacher information

The following is an excerpt from the Australian Stem Cell Centre Patient Handbook 2009.

Stem cell science shows much promise for the future treatment of a wide range of diseases and conditions.

Stem cells have had high levels of media and public attention but much of the research is still in early stages. There is good cause for hope, but progress is slower than the media often suggests.

Stem cell research is progressing with bone marrow transplants now part of standard clinical practice and growing clinical research and clinical trials encompassing mesenchymal, skin, corneal, cartilage and other stem cell types.

Clinics around the world are offering stem cell treatments but some of these treatments are offered outside the mainstream medical research environment – and are marketed directly via the internet. These providers often charge a considerable sum of money for these untested treatments.

The scientific and medical community is concerned that some treatments are being offered to patients before they have been proven safe and effective. Some of the experimental therapies on offer may pose significant health risks for patients including infection, immune system rejection and possibly cancer later in life.

Stem cell treatments, like any treatment, need to be proven safe and effective before they are accepted into practice. Testimonials from former patients are not scientific proof of safety and effectiveness.

Independent clinical trials approved by government regulators, publication and peer review assessment in international scientific journals, and replication of results by other laboratories are the only sources of evidence that can be relied upon to confirm a treatment is safe and effective.

Direct internet marketing is criticised by the general medical and scientific community as it allows providers to make claims that are not substantiated by scientific evidence.


Many of these practitioners guard their treatment methods and processes tightly which is contrary to the mainstream scientific premise of peer review which encourages transparency.

Sources of cells can be aborted foetal tissues, cord blood, embryonic stem cells or adult stem cells. Knowing the source of the stem cells or tissues being used in the treatment is vital.

Stem cells from another person are likely to be rejected if they are not matched. To reduce the risk of rejection patients may be instructed to take drugs that suppress the immune system. Suppression of the immune system can make patients susceptible to disease and infection.

**Embryonic stem cells** are of great interest to scientists because in their undifferentiated state they are pluripotent, meaning they can **become any cell in the body**. Therefore, embryonic stem cells introduced to a patient, in an undifferentiated state, may also have the potential to become tumours or pre cancerous cells.

Before embarking on any treatment individuals are encouraged to **discuss** all options with their **doctor** or **specialist.**



## Activity 5.5

# Stem cell tourism – not always a happy holiday

Stem cell science shows **much promise** for the future treatment of a wide range of diseases and conditions. Stem cells have had high levels of media and public attention but **much of the research is still in early stages**. There is good cause for hope, but progress is slower than the media often suggests. **Stem cell research is progressing** with bone marrow transplants now part of standard clinical practice and growing clinical research and clinical trials encompassing mesenchymal, skin, corneal, cartilage and other stem cell types.

Clinics around the world are offering stem cell treatments but some of these treatments are offered **outside the mainstream medical research environment** – and are marketed directly via the internet. These providers often charge a considerable sum of money for these untested treatments.

**Medical travel** (also known as medical tourism, health tourism or global healthcare) is not a new phenomenon but it is becoming increasingly commonplace. Medical travel is when a patient chooses to seek treatment in another country, either for cost or availability reasons. Virtually every type of health care, including plastic surgery, orthopaedic surgery, reproductive treatments, psychiatry, alternative treatments, convalescent care and dentistry are available. Some medical travel is simply a means of getting access to a widely accepted treatment at a cheaper price, or for unproven treatments generally not offered in a patient's home country. Many patients opting for these treatments do so because they feel they have no other alternative treatments available. Some treatments available overseas have little, or no scientific or medical justification and therefore remain unproven and potentially unsafe.

### What can stem cells be used to treat?

In reality, the range of diseases for which there are proven treatments using stem cells is quite small and the only established stem cell therapies are those of the blood system involving transplants of haematopoietic stem cells (usually from bone marrow but with cord blood as an alternative) to reconstitute the blood. All other medical procedures involving stem cells are still currently considered 'experimental' or 'unproven'. Within the 'experimental' category, there are some promising clinical trials in the adult stem cell field in areas such as corneal, mesenchymal, skin and cartilage and some embryonic stem cell research is moving closer to clinical trials.

### What is a clinical trial?

Clinical trials are where new treatments, drugs and devices are tested in volunteer patients, to see whether they are safe and effective. Clinical trial research is conducted by experienced medical staff under experimental conditions. All clinical trials must be approved by an independent Ethics Committee that monitors the conduct of the trial and be conducted within the guidelines set out by the Therapeutic Goods Administration (TGA) in Australia or an equivalent overseas regulatory body.

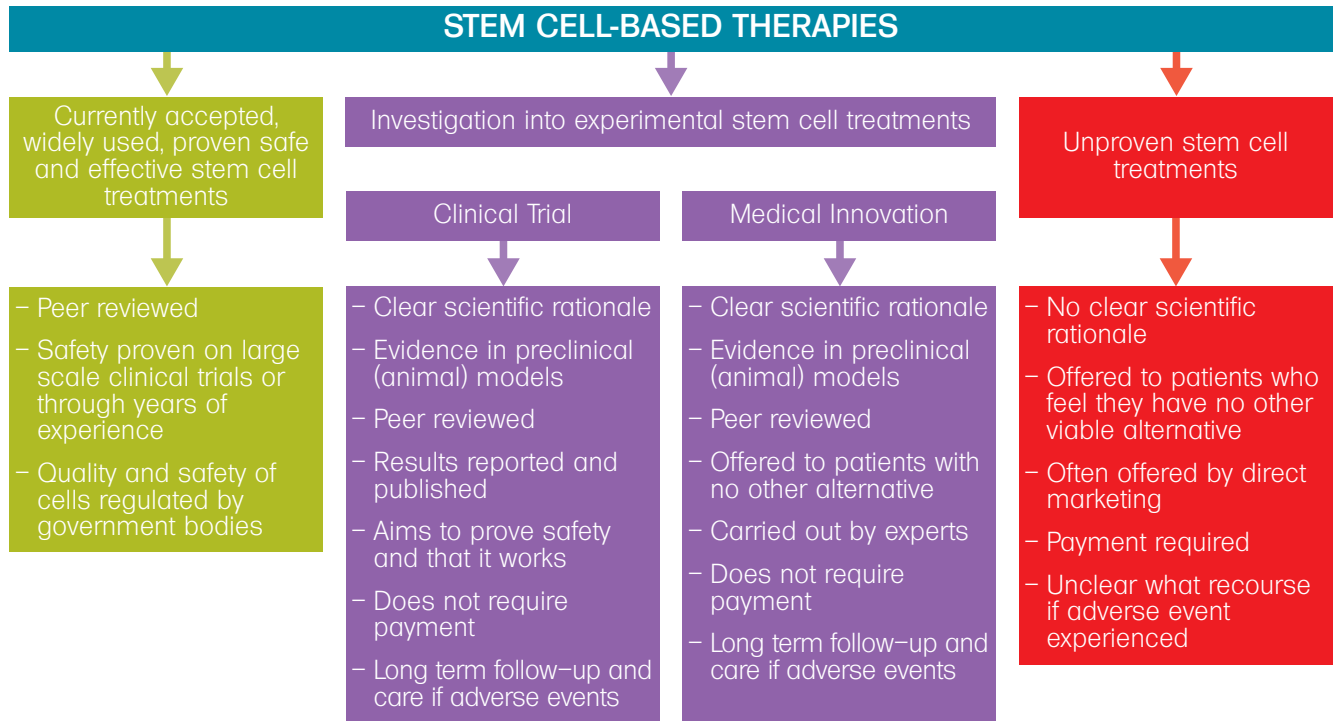
The idea is usually to determine whether a new treatment is safe and effective, and then to publish the results in a peer reviewed journal so that the broader scientific community and patient community can benefit from this knowledge. Peer review is when a therapy or treatment is independently assessed by expert professionals in the field to validate its safety and efficacy measures. Clinical trials must be evaluated and approved from a scientific perspective by a clinical research committee made up of scientific peers, and by an Ethics Committee made up of a range of people including scientific peers, general public and sometimes clergy. Recently, there has been a requirement that all clinical trials must be listed on a recognised registry so that the international community is aware of trials being run at other sites. Ideally clinical trials should be double-blind placebo based trial. This means that the clinicians and patients involved do not know if they are receiving the new experimental therapy, or the placebo. This lowers what is known as the 'placebo-effect' when someone receiving treatment feels they are getting better, and spontaneously shows improvements.

All pharmaceutical treatments in use today had to be proven effective and safe in clinical trials before they could be made available for widespread use within the community. A high quality clinical trial will be one which the proposed treatment has undergone extensive prior investigation in the laboratory and in animal studies and will have shown a strong repeatable effect. It is also worth noting that patients are not required to pay in order to participate in a clinical trial.

A treatment or therapy is 'proven' when it has been approved by appropriate government regulatory bodies. In Australia this would be the TGA. Approval is given when extensive testing has demonstrated that the treatment is safe or has an acceptable risk to benefit ratio. Testimonials from patients who have undergone a particular treatment are not scientific proof that a treatment works.

The diagram below outlines what is a clinically accepted, investigational/experimental or unproven stem cell treatment.

## DEVELOPMENT OF SAFE STEM CELL TREATMENTS



### Review questions

1. What are the currently accepted and routinely practiced stem cells therapies?
2. Define the term 'medical tourism'.
3. Why might a person opt to travel overseas seeking medical treatment?
4. What factors would make a high quality clinical trial?
5. A medical researcher wants to develop and make available a stem cell therapy involving skin stem cells which would aid in the treatment of second degree burns. Outline the process that she would need to undergo to make the therapy proven.
6. Imagine you are a scientist working at the Australian Stem Cell Centre. You receive an inquiry from a gentleman who is considering travelling overseas to seek treatment for his daughter who has a spinal cord injury. He has asked you whether an advertisement he found on the internet claiming be able to treat spinal cord injuries offers hope to himself and his daughter. Write a response to the gentleman outlining information he should take in to consideration and what else he should consider before thinking about travelling overseas for medical treatment.
7. Design a simple fact sheet that informs patients about the potential dangers of medical tourism. In your fact sheet outline what a patient should look for when seeking good quality medical treatments.



# Activity 5.5

## Stem cell tourism – not always a happy holiday – Teacher copy

### Review questions:

1. What are the currently accepted and routinely practiced stem cells therapies?

Bone marrow transplants and cord blood transplants to reconstitute the blood. (i.e. replenish blood cell supplies)
2. Define the term 'medical tourism'.

Where patients opt to travel overseas to seek treatment for cost or availability reasons.
3. Why might a person opt to travel overseas seeking medical treatment?

Because they are unhappy with their current treatment options in their country and believe that for financial reasons, or because of experimental treatments they have heard of, they should pursue options overseas.
4. What factors would make a high quality clinical trial?

Ideally, a clinical trial should be a double-blind placebo trial, meaning that both clinicians and the patients in the trial do not know if they are receiving the new experimental treatment, or placebo. A trial on a pharmaceutical product or procedure that is conducted by experienced personnel under regulated conditions. It has ethics approval and has been approved by a medical governing body, such as the TGA in Australia. The drug or procedure has undergone extensive experimentation (e.g. animal testing) and the results have a strong repeatable effect. The results are reviewed and published in a medical journal and are also reviewed by a clinical research committee and an Ethics Committee. Patients are not required to pay to participate in a clinical trial.
5. A medical researcher wants to develop and make available a stem cell therapy involving skin stem cells which would aid in the treatment of second degree burns. Outline the process that she would need to undergo to make the therapy proven.

She would need to get ethics approval for the testing. She would need to perform the tests under experimental conditions and by experienced staff. She would have to perform many experiments which would show repeatable results. She would have to publish the findings in a peer reviewed journal and the therapy would have to be approved by a committee of peers and also by an ethics committee. She would then have to seek approval from a government regulatory body, such as the TGA in Australia.
6. Imagine you are a scientist working at the Australian Stem Cell Centre. You receive an inquiry from a gentleman who is considering travelling overseas to seek treatment for his daughter who has a spinal cord injury. He has asked you whether an advertisement he found on the internet claiming be able to treat spinal cord injuries offers hope to himself and his daughter. Write a response to the gentleman outlining information he should take in to consideration and what else he should consider before thinking about travelling overseas for medical treatment.

Student answers will vary. Students will need to use the information provided plus use their own knowledge of medical treatments they have encountered, such as treatments performed by a doctor in a hospital or a registered medical clinic, etc. The response should include the following: does the organisation offering the treatment have details of a proven clinical trial? Does the organisation have ethics approval for the therapy? Is the therapy identified as experimental? Who will be conducting the therapy (i.e. a doctor)? Where will the therapy take place? What are the risks involved? What are the known side effects? How much will it cost? What are the success rates? Where are these published? What happens if there is a complication (an adverse event)?
7. Design a simple fact sheet that informs patients about the hazards of medical tourism. In your fact sheet outline what a patient should look for when seeking good quality medical treatments.

Student answers will vary. The fact sheet should contain similar information to that outlined in the answer to question 6.