

# The Supply Chain: Logistics of Life

(Year 8 - Ages 13-14)

## Lesson 3 of 9

### Lesson Overview

Lesson Title:	The Supply Chain: Logistics of Life
Year Level:	Year 8 (Ages 13-14)
Lesson Duration:	60 minutes
Key Focus Areas:	Logistics, Ischaemia Time, Technology, Innovation.
Curriculum Links:	<p>Australian Curriculum – Health and Physical Education (Foundation)</p> <ul style="list-style-type: none"><li>• <u>AC9S8H02</u>: Investigate how scientific knowledge is used to solve problems... and the new possibilities created through advances in science. (Focus on transplant tech)</li><li>• <u>AC9TDE8P01</u>: ...Sequence and document steps in a design process... (Focus on logistics/systems mapping)</li><li>• <u>AC9HP8P10</u>: Plan and implement strategies... to enhance health... (Understanding health systems)</li></ul>

### Learning Intentions

- Analyze the logistical constraints of organ transplantation, specifically Ischaemia Time (viability outside the body).
- Map the sequence of events in the "Donation Supply Chain" to understand the need for rapid coordination.
- Investigate how new technologies (Machine Perfusion, Bioprinting) are solving the problems of time and supply.
- Evaluate the ethical and scientific impact of moving from a "scarcity" model to a "regenerative" model of medicine.

### Success Criteria

- Create a timeline showing the "Shelf Life" of different organs (Heart = 4-6 hours, Kidney = 24 hours).
- Explain why a heart transplant requires a "Sprint" (speed) while a tissue transplant allows for a "Marathon" (storage).
- Describe one future technology (e.g., Warm Perfusion) and how it improves upon the current method (Ice Storage).
- Use technical terms like Ischaemia, Perfusion, and Logistics correctly.



# Teaching Sequence

Work through this lesson in the following sequence:

Duration	Part	Focus
10 minutes	Part A: The Logistics Hook	Video (Heart in a Box) & Introduction to "The Clock."
15 minutes	Part B: The Viability Clock	Data Analysis: Graphing the time limits of organs.
20 minutes	Part C: The Supply Chain	Sequencing the journey & The "Perth to Brisbane" Challenge.
15 minutes	Part D: Future Tech	Innovation investigation (Perfusion vs. Bioprinting).

## Part A: The Logistics Hook (10 minutes)

### Step 1. The Video

- Play: Clip of the Transmedics Organ Care System (Heart beating in a box).
- Ask: "What is happening here? Why is it better than a box of ice?" (It's alive, warm, functioning).
- Say: "Today we look at the race against time. For 50 years we used ice. Now, we use robots."

## Part B: The Viability Clock (15 minutes)

### Step 1. The Data

- Whiteboard: List the times: Heart (4h), Liver (12h), Kidney (24h).
- Concept: Define "Ischaemia" (Lack of blood flow).
- Activity: Students complete Part 1 of the Logbook (Bar Graph).

### Step 2. Sprint vs. Marathon

- Discuss: "Why is a Heart Transplant a 'Sprint'? Why is a Tissue Transplant a 'Marathon'?" (Tissues don't need immediate blood flow; they can be banked).

## Part C: The Supply Chain (20 minutes)

### Step 1. The Sequence (Part 4)

- Activity: Students sequence the 5 steps of the Supply Chain (Identification -> Matching -> Retrieval -> Transport -> Implantation).



## Step 2. The Scenario (Part 2)

- Problem: The Perth to Brisbane Heart (6 hours travel vs. 4-6 hours viability).
- Discussion: Ask students to vote.
  - Answer: In the real world, this is usually Declined (Too risky). Or, they use a private jet to shave minutes off. Machine Perfusion would make this trip possible.

## Part D: Future Tech (15 minutes)

### Step 1. The Innovation

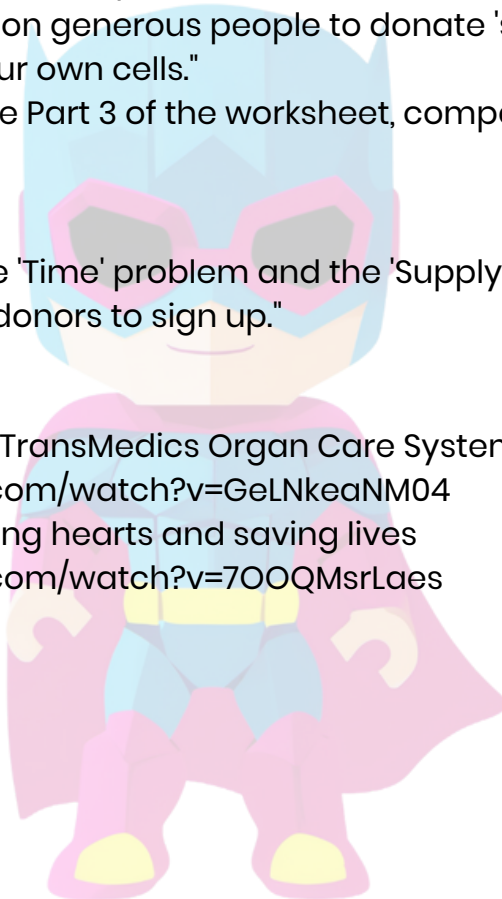
- Visual: Show an image of a 3D Bioprinter.
- Explain: "Currently, we rely on generous people to donate 'spare parts.' In the future, we might print them using your own cells."
- Activity: Students complete Part 3 of the worksheet, comparing Old (Ice) vs. New (Machine/Print).

### Step 2. Conclusion

- Say: "Science is solving the 'Time' problem and the 'Supply' problem. But until we can print hearts, we still need donors to sign up."

### Links for Video Hook:

- Play the "Heart in a Box" – TransMedics Organ Care System demonstration
  - <https://www.youtube.com/watch?v=GeLNkeaNm04>
- How a little box is preserving hearts and saving lives
  - <https://www.youtube.com/watch?v=7OOQMsRLaes>



## Differentiated Learning

- Extension:
  - Students research the cost difference between "Ice" and "Machine Perfusion." Does the benefit justify the cost? (Economic ethics).
- Learning Support:
  - Provide the "Viability Times" pre-printed on the worksheet so students don't have to copy from the board, focusing only on the graphing.

## Teacher Reflection

- Did the students grasp the urgency of "Ischaemia Time"?
- Was the "Perth to Brisbane" scenario effective in showing the limitations of geography?
- Did the "Future Tech" section inspire curiosity about biomedical engineering?

## Assessment

- Worksheet (Part 2): Assess critical thinking/problem solving. Did they identify the risk of the time limit?
- Worksheet (Part 4): Check the logical sequencing of the donation process.

## Additional Notes:

This lesson engages the "Tech/Engineering" minds in the class. It validates that saving lives isn't just about doctors; it's about pilots, coordinators, engineers, and inventors. It highlights that Donation is a Team Sport.

