# Grade 11

## Stem cells and heart disease

Students will learn how stem cells are used in basic research and their potential for tissue regeneration in a heart disease model.

**BIOlab Experiences** Students will learn cell culturing technique and observe live stem cells with a microscope. Students can participate in a heart dissection to isolate the aortic valve for stem cell regeneration.

Time required
Half day (2.5h)

Heart disease is the leading cause of death worldwide. Lifestyle choices represent significant risk factors for the likelihood of events like heart attacks and strokes in Canada. Grade11 students are learning how integral the cardiovascular system is in maintaining systemic homeostasis. We demonstrate with visuals and hands on dissection the changes a heart undergoes after heart attack; from cell behaviour to tissue and organ restructuring and the potential for heart failure. Risk factors, and possible treatments are discussed such as surgery, transplant and stem cell therapy.

| Specific Learning Outcomes Addressed | | What students will experience in the BIOlab |
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| B11-1-06 | Identify life processes that individual cells, as well as complex organisms, need to manage. | Students learn how scientists maintain homeostasis for live cells in culture dishes. |
| B11-3-16 | Investigate and describe conditions/diseases associated with transportation and/or respiration in the human body. | Students learn that heart disease has any forms. Heart attacks and resulting conditions are discussed in detail from symptoms to organ characteristics to cellular behavior and tissue remodeling. |
| B11-1-01<br>B11-3-17 | Increase awareness of personal wellness, as well as personal and family health history.<br>Identify personal lifestyle choices that contribute to cardiovascular and respiratory wellness. | Risk factors for heart disease such as lifestyle choices (diet, substance use, physical activity, and sleep), environmental (stress, environmental chemicals) and family history or genetic pre-disposition are discussed. |
| B11-3-06 | Compare the structure and function of blood vessels. | Throughout dissection, major blood vessels and their differences are noted |
| B11-6-05 | Describe how technology has allowed us to control our wellness, and describe the ethical dilemmas that the use of technology can create. | Pacemakers, stent insertion, angioplasty, ablation of nervous tissue in tachycardia |