References & Additional Resources

- 1. Ovarian Histology -- An article showing and explaining every stage of the ovarian cycle. Histology@Yale. www.medcell.med.yale.edu/histology/ovary_follicle.php
- 2. Detailed Ovarian Anatomy -- An article providing information on female reproductive anatomy. Sokol, E. "Clinical Anatomy of the Uterus, Fallopian Tubes, and Ovaries." Glowm, July 2010, <u>https://www.glowm.com/section_view/heading/Clinical+Anatomy+of+the+Uterus,+Fall</u> <u>opian+Tubes,+and+Ovaries/item/1</u>
- 3. Infertility -- An article listing causes of female infertility. "What Causes Female Infertility?." <u>https://web.stanford.edu/class/siw198q/websites/reprotech/New%20Ways%20of%20</u> Making%20Babies/Causefem.htm
- 4. Menstrual Cycle -- Articles going through the phases of the menstrual cycle. Wakim, S. and Grewal, M. '22.7: Menstrual Cycle.' *Biology LibreTexts*, Libretexts, 16 June 2020, <u>https://bio.libretexts.org/Bookshelves/Human_Biology/Book: Human_Biology %20(W</u> akim_and_Grewal)/22:%20Reproductive_System/22.07: Menstrual Cycle

Menstrual_CycleWatson, S. 'Stages of Menstrual Cycle." Healthline, 23 October 2010, <u>https://www.healthline.com/health/womens-health/stages-of-menstrual-cycle</u>

- **5. Endometriosis -- An article explaining every aspect of endometriosis.** Han, L. and Garcia, R. "Endometriosis." Pathology Outlines, 16 March 2020, http://www.pathologyoutlines.com/topic/uterusendometriosis.html
- 6. Polycystic Ovary Syndrome -- An article going through all aspects of endometriosis.

"Polycystic ovary syndrome." *Genetics Home Reference*, NIH. <u>https://ghr.nlm.nih.gov/condition/polycystic-ovary-syndrome</u>

7. Cancer and Fertility -- The first article explains the impact that cancer and cancer treatments have on females. The second article describes a way to prevent the spread of ovarian cancer cells.

"How Cancer and Cancer Treatment Can Affect Fertility in Females." American Cancer Society, 6 February 2020. <u>https://www.cancer.org/treatment/treatments-and-sideeffects/physical-side-effects/fertility-and-sexual-side-effects/fertility-and-women-with-cancer/How-cancer-treatments-affect-fertility.html</u>

Artificial Ovaries

Baier, A. "Nano-delivered Therapy Inhibits Spread of Ovarian, Uterine Cancer Cells." USF Health, 24 July 2019.

https://hscweb3.hsc.usf.edu/blog/2019/07/24/nanodelivered-therapy-inhibits-spreadof-ovarian-uterine-cancer-cells/

8. Artificial Ovaries -- These articles explain the current strides being made in artificial ovary development.

Mullin, E. "Bioengineered Ovaries Can Survive in Mice. Humans Are Next." Medium, 20 September 2018. <u>https://medium.com/neodotlife/artificial-ovariesf84ecc7beb6a</u>

"Mouse implanted with ovaries made by 3D printer gives birth, offering new hope for infertile women." National Post, 18 May 2017, <u>https://nationalpost.com/health/mouse-implanted-with-ovaries-made-by-3dprinter-gives-birth-offering-new-hope-for-infertile-women/</u>

"Researchers create prosthetic ovaries using gelatin and a 3D printer." National Post, 16 May 2017, <u>https://www.ctvnews.ca/health/researchers-createprosthetic-ovaries-using-gelatin-and-a-3d-printer-1.3415835</u>

9. Scientific Papers of Artificial Ovaries - -Articles describing the methods used to create artificial ovaries.

Dolmans, M. and Amorim, C. "FERTILITY PRESERVATION: Construction and use of artificial ovaries" *Reproduction*, BioScientifica, 12 November 2019, <u>https://rep.bioscientifica.com/view/journals/rep/158/5/REP-18-0536.xml</u>

Kim, J., Perez, A., Claflin, J., David, A., Zhou, H., and Shikanov, A. "Synthetic hydrogel supports the function and regeneration of artificial ovarian tissue in mice." Nature, 7 July 2016, <u>https://www.nature.com/articles/npjregenmed201610</u>

10. The Patent for Artificial Ovaries--The current patent for artificial ovaries.

"US10479980B2 – Artificial ovary. https://patents.google.com/patent/US10479980B2/en

Next Generations Science Standards Alignment

HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Authors

Lesson idea from Carolyn Botz, final product developed by Meghan McGraw as a project for 99-520, section O Development of Biomedical Engineering Educational Outreach Activities for Middle and High School Audiences

Sources Consulted

- AFIP. "Outer Cortex Is Collagenized with Several Follicle Cysts Arrayed beneath It." *Polycystic Ovary Disease*, Pathology Outlines, 2012, www.pathologyoutlines.com/topic/ovaryPCO.html
- Baier, A. "Nano-delivered Therapy Inhibits Spread of Ovarian, Uterine Cancer Cells." USF Health, 24 July 2019. <u>https://hscweb3.hsc.usf.edu/blog/2019/07/24/nano-delivered-therapyinhibits-spread-of-ovarian-uterine-cancer-cells/</u>
- "Cardiac Surgery Operating Room." *Surgery*, Wikipedia, 2014, <u>https://upload.wikimedia.org/wikipedia/commons/2/2e/Cardiac_surgery_operating_room.jpg</u>

Dictionary.com, www.dictionary.com/

- Dolmans, M. and Amorim, C. "FERTILITY PRESERVATION:Construction and use of artificial ovaries" *Reproduction*, BioScientifica, 12 November 2019, https://rep.bioscientifica.com/view/journals/rep/158/5/REP-18-0536.xml
- Garcia, Alexandra. "Oogenesis Labeled." *Ovary*, Wikipedia, 2020, <u>https://en.wikipedia.org/wiki/File:Oogenesis_Labeled.svg</u>
- Gleadall, A. et al. "Figure 6." *Review of additive manufactured tissue engineering scaffolds: relationship between geometry and performance*, Burns and Trauma, 3 July 2018, <u>https://burnstrauma.biomedcentral.com/articles/10.1186/s41038-018-0121-4#Fig6</u>

"Filter." Wikimedia, https://upload.wikimedia.org/wikipedia/commons/thumb/3/37/Filter.svg/1016px-Filter.svg.png

- Han, L. and Garcia, R. "Endometriosis." Pathology Outlines, 16 March 2020, http://www.pathologyoutlines.com/topic/uterusendometriosis.html
- Hill, Mark. "Monkey- Ovary Primordial Follicle." Ovary Development, Embryology,
- 2010, www.embryology.med.unsw.edu.au/embryology/index.php/Ovary_Development
- Hill, Mark. "Ova44he." *Ovary Development*, Embrology, 2010, www.embryology.med.unsw.edu.au/embryology/index.php/Ovary_Development

Histology@Yale. www.medcell.med.yale.edu/histology/ovary_follicle.php

- "How Cancer and Cancer Treatment Can Affect Fertility in Females." American Cancer Society, 6 February 2020. <u>https://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-sideeffects/fertility-and-women-withcancer/How-cancer-treatments-affectfertility.html</u>
- Human Eggs, <u>www.sizes.com/people/eggs.htm</u> .
- Keeffe, Jillian. "What Are Tissue Engineering Scaffolds?" *Wisegeek*, 2020, <u>www.wisegeek.net/what-are-tissue-engineeringscaffolds.htm</u>.

Artificial Ovaries

Kershner, Kate. "Why Do We Experiment on Mice?" *HowStuffWorks Science*, HowStuffWorks, 30 June 2020, <u>www.science.howstuffworks.com/innovation/scientific-experiments/experiment-onmice.htm</u>.

- Kim, J., Perez, A., Claflin, J., David, A., Zhou, H., and Shikanov, A. "Synthetic hydrogel supports the function and regeneration of artificial ovarian tissue in mice." Nature, 7 July 2016, <u>https://www.nature.com/articles/npjregenmed201610</u>
- Laronda, M., et al. "Follicles Attached to Corners of Pores in Filament Scaffolds." *A bioprosthetic ovary created using 3D printed microporous scaffolds restores ovarian function in sterilized mice*, PubMed, 16 May 2017, <u>https://pubmed.ncbi.nlm.nih.gov/28509899/</u>
- Meirow, D., et al. "Cortical Fibrosis and Blood-Vessels Damage in Human Ovaries Exposed to Chemotherapy." *Cortical Fibrosis and Blood-Vessels Damage in Human Ovaries Exposed to Chemotherapy. Potential Mechanisms of Ovarian Injury*, Research Gate, 2007,

www.researchgate.net/publication/6481366 Cortical fibrosis and bloodvessels da mage_in_human_ovaries_exposed_to_chemotherapy_potential_mechanisms_of_ov arian_injury.

- "Micrograph of Endometriosis of the Ovary." *Endometriosis*, Libre Pathology, 2010, <u>www.librepathology.org/wiki/Endometriosis</u>.
- "Microscope." PNG All, 2016, www.pngall.com/microscope-png/download/15108.
- "Mouse implanted with ovaries made by 3D printer gives birth, offering new hope for infertile women." National Post, 18 May 2017, <u>https://nationalpost.com/health/mouse-implanted-with-ovaries-made-by-3dprintergives-birth-offering-new-hope-for-infertile-women/</u>
- Mrabet, J. "Bioreactor Principle." *Bioreactor*, Wikipedia, 2009, <u>https://en.wikipedia.org/wiki/Bioreactor#/media/File:Bioreactor_principle.svg</u>
- "Mucinous Lmp Ovarian Tumour Intermed Mag." *Ovarian Cancer*, Wikipedia, 2009, www.en.wikipedia.org/wiki/Ovarian_cancer
- Mullin, E. "Bioengineered Ovaries Can Survive in Mice. Humans Are Next." Medium, 20 September 2018. <u>https://medium.com/neodotlife/artificialovaries-f84ecc7beb6a</u>
- "Ovaries." You and Your Hormones, 2018, www.yourhormones.info/glands/ovaries/
- Parker, D. "Baby (4396868797)." WikiMedia Commons, 2009, https://upload.wikimedia.org/wikipedia/commons/2/2e/Baby.jpg
- "Polycystic ovary syndrome." *Genetics Home Reference*, NIH. <u>https://ghr.nlm.nih.gov/condition/polycystic-ovary-syndrome</u>
- "Researchers create prosthetic ovaries using gelatin and a 3D printer." National Post, 16 May 2017, <u>https://www.ctvnews.ca/health/researchers-createprosthetic-ovaries-using gelatin-and-a-3d-printer-1.3415835</u>

Artificial Ovaries

- Roldofa, K. "The Steps of Regenerative Medicine." *Tissue Engineering*, Wikipedia, 30 September 2008, <u>https://en.wikipedia.org/wiki/Tissue_engineering</u>
- Takizawa, Peter. "Secondary Follicle." Histology@Yale, <u>http://medcell.med.yale.edu/histology/female_reproductive_system_lab/16</u> <u>secondary_follicle.php</u>
- Slomianka, Lutz. "ova20he." *Blue Histology*, The University of Western Australia, 2009, <u>www.lab.anhb.uwa.edu.au/mb140/</u>.
- Sokol, E. "Clinical Anatomy of the Uterus, Fallopian Tubes, and Ovaries." Glowm, July 2010,

https://www.glowm.com/section_view/heading/Clinical+Anatomy+of+the+Uterus,+Fa llopian+Tubes,+and+Ovaries/item/1

- "Tissue Engineering: How It Works". Spring 2020, <u>file:///C:/Users/violi/Downloads/Tissue%20Engineering-%20How%20it%20Works.pdf</u> . PowerPoint Presentation
- "US10479980B2 Artificial ovary." https://patents.google.com/patent/US10479980B2/en
- Wakim, S. and Grewal, M. '22.7: Menstrual Cycle.' *Biology LibreTexts*, Libretexts, 16 June 2020,

https://bio.libretexts.org/Bookshelves/Human_Biology/Book:_Human_Biology_%20(Wakim_and_Grewal)/22:%20Reproductive_System/22.07:_Menstrual_Cycle

- Watson, S. 'Stages of Menstrual Cycle." Healthline, 23 October 2010, https://www.healthline.com/health/womens-health/stages-of-menstrual-cycle
- "What Causes Female Infertility?." <u>https://web.stanford.edu/class/siw198q/websites/reprotech/New%20Ways%20of%20</u> <u>Making%20Babies/Causefem.htm</u>
- Winslow, T. "Reproductive System, Female, Anatomy." Salpingo-Ovarian & Peritoneal, National Cancer Institute, 8 June, 2018, <u>https://training.seer.cancer.gov/ovarian/intro/</u>