Lydia Stow

Making Men Into Fish

While searching through the videos I was immediately inclined to choose “Undersea Medicine”. As a student who has interests in the various medical fields and human anatomy, I was excited to learn about the health challenges divers face in the underwater environment. Learning about the different methods we have been able to use which allow us to adapt to these challenges overtime was interesting as well; it intrigued me to research this further. I find health and medicine fascinating; the complex makeup of the human anatomy and physiology as well as the unique conditions and diseases make health an ever-changing field. Health never ceases to hold my interest and I was excited to learn about undersea medicine.

For divers, the ability to survive for prolonged periods of time in frigid water and breathe underwater like fishes are two of the major health obstacles they encounter. Overtime, however, we have been able to reduce these obstacles. Dry suits are effective in providing protection from the cold as well as protection from contaminated water. Likewise, oxygen tanks can supply the divers with the required oxygen needed to survive in the underwater environment. The current solutions, however, are far from ideal. New and innovative solutions are becoming a reality every day and will improve the ease to which the divers can explore the undersea world.

The solutions we currently implement reduce the hindrance that divers experience. The solutions, however, have their own drawbacks; these drawbacks are especially relevant for navy divers. The weight of the oxygen tanks makes them cumbersome and difficult for divers to use while trying to maneuver in unsafe waters. The limited oxygen supply has also become an issue regarding oxygen tanks; with the leading concern for divers being apnea. Unlike the oxygen tanks, dry suits have proven to be quite an effective solution with the only drawback being the potential for tears which render the suit useless. This is a concern that is relevant to navy divers more so than other divers because of the conditions they must submit themselves to; swimming in hazardous waters can greatly increase the risk of tearing the dry suit.

The future goals of Dr. Sandra Chapman and the Office of Naval Research will offer solutions with limited drawbacks. Their innovative technology will be able to provide naval divers with ample oxygen minus the hindrance of the oxygen tanks. Using water electrolysis, the process of splitting water to obtain the oxygen, researchers will be able to equip divers with the ability to breathe underwater without the need for extra oxygen. The oxygen they require will be supplied via the water that surrounds them. Engineers are focusing on a design which will enable divers to simply wear a mask which has water electrolysis built in. Water electrolysis, however, requires ultra-pure water; something which is not available in waters that navy divers must dive in. Water electrolysis will require more research and development before we can provide this product to our navy divers.

Dr. Chapman’s research also includes the concept of modifying the bacteria microbiome on the outer layer of skin to operate as temperature control for navy divers; engineering the bacteria to generate heat in response to cold water temperatures or vice versa. Maintaining heat while diving is a concern for many divers being that water conducts thermal energy 25 percent more than air; leaving the divers at risk for hypothermia and other life-threatening conditions. This research would allow divers to maintain body heat while in frigid water without the need of a dry suit. Researchers and engineers are exploring ways in which this can be performed and accomplished; however, this is a new concept and will take time to further develop.

Dr. Sandra Chapman's research was inspiring to me as well as her perspective on innovation. She believes in modifying the current human physiology to design equipment that will enable divers to transition from land to sea with minimal hindrance, eliminating excess equipment such as oxygen tanks, dry suits, and other obstructive materials. Dr. Chapman is passionate in her goal to equip navy divers with abilities like that of Aquaman; she is always searching for new innovative ways to give our divers the advantage in the water. Her creative and out of the box thinking is admirable and inspiring. Being able to explore the unexplored is truly an amazing opportunity.

I wish to pursue a career in medicine as a registered nurse. I will be able to help others as well as understand what type of research is needed in the medical field. Understanding what is needed is the first step in being able to formulate solutions. While medicine has developed significantly over time, there is always something that could be done in a way which provides more favorable results and ensures better care for the patient. Certain procedures we currently practice seem crude, that is, however, because we have yet to discover a more effective way in treating the condition. This is something which needs to improve; providing less intrusive surgery methods and more effective treatments are advancements I would love to see implemented in the future.

The field of health and medicine has limitless amounts of new research and discovery. Future research has the potential to allow navy divers to survive in water with little to no equipment. For example, because the spleen stores red blood cells, the cells that carry oxygen, engineering could be used to provide an oxygen reserve for divers. Heat generating gels also have potential to provide temperature control; the gels would have to adhere to the skin and be impervious to water. With the technology we have now it is hard to imagine we will ever be able to design or engineer gills for humans. Nevertheless, I believe eventually it will be possible or at least something similar; possibly some type of embedded filtration or electrolysis system which enables above water breathing as well as underwater.

Technology that is being developed today will significantly change our lives in the future. Advances in medicine have already enabled individuals with heart failure or cancer to have, if you will, a second chance at life. With continued research we could see a future in which cancer is treated with nanobots that are programmed to destroy and remove the cancerous mass. Surgeries can be performed seamlessly by robots, eliminating the human error, which will result in significantly safer procedures. Future research will involve engineering exoskeletons which will provide soldiers and navy personnel with practical physical advantages. In the year 2040, I imagine these things will be possible and commonplace as well as many more advances in medicine and technology which we are just now discovering.