

PART 3

Our Body: The Universe Within

at the Puyallup Fair

Studying the Body

Have you ever thought about how your body works? Do you wonder how you are able to do simple activities like run, breathe and eat? We use our bodies every day, but we often take for granted how complex and special they are. Our bodies are made up of amazing systems, and it is important that we understand how they work. The more we learn about our bodies, the better we will be able to take care of them. And through science's commitment to learning about bodies, many injuries and diseases are now treatable, and we are all able to live longer and healthier lives. *Our Body: The Universe Within* is an exhibit that teaches ordinary people about the extraordinary details of the body. The fee-based exhibit contains more than 200 real human bodies and specimens, and literally goes “under the skin” to show their inner makeup. Visitors to this exhibit at The Puyallup Fair can get an up-close, three-dimensional look of the human body as a whole and of each major system of the body. If you want to be a doctor, scientist, athlete or artist — or if you are just curious about how the body works — you will be amazed by *Our Body: The Universe Within* exhibit.

While exhibits like *Our Body: The Universe Within* are relatively new, doctors and scientists have been studying human specimens for years. When working with real human bodies in the past, the first challenge was to prevent the body from decay. Decaying begins when certain cell enzymes are released after death. It is furthered when all normal body functions have shut down, and the body no longer has a way to fend off bacteria and other microorganisms. Slowly, the microorganisms feed off the body's fats and liquids and eventually break the body down.

The Power of Plastic

In the last century, the preferred method of keeping bodies from decaying has been to embalm them. This involves injecting a chemical called formaldehyde into the body. Formaldehyde has many unique qualities, including the ability to kill most bacteria and to harden the body. However, there are many disadvantages in this method of preservation. First, formaldehyde is a toxic chemical, and high amounts are needed to preserve bodies for an extended length of time (1-2 years). Also, it has a strong odor, making it unpleasant to work with. Finally, in order for organs to maintain their normal shape, fluids cannot be drained from the body. However, these fluids cause the brain to decay more rapidly. Polymer impregnation was invented to resolve problems associated with embalming and has become an important tool for studying bodies. However, embalming is still used for funerals and medical study due to its low cost and fast processing time.

How Does Polymer Impregnation Work?

The human bodies featured in the *Our Body: The Universe Within* are preserved using polymer impregnation. This method of preservation uses liquid plastics to keep everything from delicate tissues to organs to the body's structure intact. This is a breakthrough in the way people are able to study human specimens.

Polymer Impregnation Process

Water and lipid tissues are replaced by curable polymers, including silicone, epoxy and polyester-copolymer in a four-step process.

1. The first step of polymer impregnation is fixation. This simply means that the body is embalmed in order to halt decomposition.
2. After any necessary dissections take place, the specimen is placed in a bath of acetone. Under freezing conditions, the acetone draws out all the fluids and replaces them inside the cells.
3. The specimen can then be placed in a bath of liquid polymer, such as silicone rubber, polyester, or epoxy resin. By creating a vacuum, the acetone boils and vaporizes. As it leaves the cells, it draws the liquid polymer in behind it, leaving a cell filled with liquid plastic.
4. The plastic must then be cured — either with gas, heat, or UV light — in order to harden it. A specimen can be anything from a full human body to a small piece of an organ.

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Be sure to check out next week's article *Systems of the Body*.

Gate admission is free for students! The Puyallup Fair offers free tickets to most schools in western Washington, so if you're a student just ask your teachers or principal for your ticket. Last year, schools in the Puget Sound region received a total of 750,147 free passes to the Puyallup Fair.

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