THESE MANIFOLDS WERE 3D PRINTED WITH A MATERIAL CALLED PLA

WHAT IS PLA?

PLA (polylactic acid) is a fully biodegradable vegetable-based thermoplastic consisting of renewable raw materials and is commonly used for 3D printing due to its ease of use. It is often used in food handling and medical implants that biodegrade within the body over time.

IS PLA TOXIC?

Not in solid form. PLA is a biodegradable plastic made from renewable resources such as corn starch or sugar cane. It is not derived from any petroleum refinement process. It can be toxic if burned or ingested as a liquid form, but it needs to reach temperatures of 300-320 degrees Fahrenheit (150-160 degrees Celsius). Like most plastics, it has the potential to be **toxic** if inhaled when heated or burned and/or absorbed into the skin or eyes as a vapor or liquid (i.e. during manufacturing processes).

HOW DOES PLA REACT IN WATER?

PLA will absorb water, meaning water molecules diffuse between polymer chains causing minor volumetric swelling. Tests have shown that after 3yrs submerged in water, PLA has only degraded by about 10%.

HOW STRONG IS PLA?

PLA has similar mechanical properties to ABS plastic, which is used in many consumer devices with injection molded parts. It is slightly more brittle, and has a lower melting temperature, so parts made with PLA should not be used in applications where the environment exceeds 110-145 degrees Fahrenheit (45-62 degrees Celsius).

HOW LONG CAN I USE THIS PART ON MY VENTILATORS?

As part of our validation process, the respiratory therapists confirmed that they would change these parts as often as the regular circuits for the ventilators, which is often weekly, or however often is standard protocol at your facility. These are meant as a last resort and should be considered one time use, and changed as frequently as you see fit.

HOW ARE THESE PARTS MADE?

The PLA material comes in a twine-like spool and is fed by the printer into a hotend that melts the plastic to be printed. Software translates the 3D model into a series of 2-dimensional cross-sectional layers for the printer to read, and the printer creates the part layer-by-layer by extruding the melted plastic into the proper geometry.

ARE THERE RISKS TO USING 3D PRINTED PARTS?

For certain applications, yes. 3D printed parts are not considered to be food safe as the layer-by-layer manufacturing process makes the parts slightly porous, which can be a site for bacteria cultivation. Additionally, the twisting/torsional strength of 3D printed parts is lower than molded plastic parts, as the parts are weaker at the individual layer interface.

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To Who it May Concern,

This ventilator manifold adapter made in mass with 3D printers is an idea that I believe is a game changer for the crusade against this pandemic. This adaptor essentially allows one ventilator to be able to ventilate 2-4 patients. This SOLVES the ventilator shortage problem quickly, cheaply, and effortlessly.

We were given the adaptors to test at the Rose Medical: with the ICU staff (medical doctors including: pulmonologist, hospitalist, and infectious disease) and Respiratory therapy team. We found these adaptors are easy to figure out with placement for circuit configuration, impact resistant, do not impede the filtration system of the ventilator, and allow for oxygenation and ventilation of multiple patients. The medical team at Rose Medical Center deemed this product to be able to be used to ensure increased availability of mechanical ventilation to keep up with the amount of patients that may require it.

Placing more than one patient on a ventilator is NOT the NORM as is the current pandemic we are in. Although, this complicates adhering pulmonary compliance of different patients to one ventilator, the manifold adaptor BUYS US TIME FOR A PATIENT TO GET BETTER AND NOT DIE.

As of today the FDA is allowing alternative respiratory devices to treat COVID-19. I believe this adapter makes it so we do not have to choose who lives or dies, but increases the availability of ventilation to the patients that are in need.

Please do not hesitate to reach out if needed.

Sincerely,

Jeffrey C. Lewis, MD
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