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Soon, Artificial Blood

Made of polyethylene glycol

Blood supply (or lack thereof) is a real medical issue today, as there are never enough donors. A new research carried out at by a team led by Joseph DeSimone, a chemical engineer the University of North Carolina at Chapel Hill, could partially solve the problem, as NewScientist notes.

Red blood cells transport oxygen to body tissues via the bloodstream, while also removing the toxic carbon dioxide. These cells squeeze in through blood vessels of just 3 micrometers wide in order to carry forth these gas exchanges. However, in case of disorders like malaria and sickle cell disease, red blood cells are not able to deform to make the exchange.

Making artificial red blood cells has proven difficult, mainly due to their small size and the properties required (like the ability to bind various gases and to become deformed). But this research team has obtained tiny sacks of the polymer polyethylene glycol just 8 micrometers wide, matching the size of the human red blood cells, which can change their shape in order to cross the tiniest capillaries.

"Polyethylene glycol is biologically benign, but binds easily with other substances, which makes it ideal for carrying cargo through the blood," said DeSimone.

The bags could be filled with a hemoglobin-like molecule to transport oxygen and carbon dioxide to and out of the tissues. The bags could also be used to transport drugs or be employed as contrast agents for scanning technologies like magnetic resonance imaging, PET or ultrasound. The bags have been already injected in mice without producing any "adverse side effects", but more research remains to be done.

Other researches

In 2007, a team from the Sheffield University created artificial blood made of plastic, not a long-term substitute for the real stuff but a substitute in emergencies like injured soldiers and crash victims, as it helped keep them alive until a transfusion with biological blood could be carried out. That type of artificial blood – having the composition of runny honey – is easy to carry, cheap, does not require refrigeration and can be kept for longer periods of time (even months) at room temperature. It is sterile and can be administered to any patient, regardless of his/her blood type.

This artificial blood is made of millions of plastic molecules that have an iron atom at their core, like hemoglobin. Biological blood can be refrigerated and stored for just a little over a month. Moreover, care has to be taken to ensure that the transfusion matches the patient's blood group and that it's free of germs.

In 2007, a Newcastle University team was performing tests to develop substitute blood, using as a starting point the clear blood encountered in lugworms and that would have been 40 times more effective in carrying oxygen than normal blood is.

