Medical Shunt and Valve for Regulating Bodily Fluids, Especially Cerebral Spinal Fluid

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Technology description

No way currently exists to prevent or cure hydrocephalus, which is the abnormal accumulation of cerebral spinal fluid (CSF) in the brain. The most effective treatment involves surgical insertion of a shunt to move excess CSF from the brain into the venous system or other receptive cavities. Most shunts contain valves that open when the pressure difference across the valve reaches a predetermined amount. However, gravity-induced pressure changes caused by a re-positioning of the head can open the valve even in the absence of CSF buildup, resulting in excess siphoning of CSF from the brain. UW-Madison researchers have now created a shunt with a new type of ventriculoperitoneal valve that does not allow undesired siphoning of CSF. The shunt includes an inlet port, an outlet port and a fluid channel in between. It also contains a valve located between the two ports and a valve-actuating member, such as a piston, which holds the valve closed.

As CSF accumulates, it puts pressure on the piston, which is held in place by a circumferential rubber skirt that acts as a spring. When the pressure reaches a predetermined level, a channel within the piston aligns with the fluid channel, allowing CSF to flow from the head through a catheter. The valve is designed so that the piston responds to the build-up of CSF, but not to changes in CSF flow due to gravity. Thus, the valve opens only in response to intracranial pressure, eliminating the problem of gravity-induced siphoning seen in conventional shunts.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a shunt with a new type of ventriculoperitoneal valve that does not allow undesired siphoning of CSF.

Application area

Treating hydrocephalus

Advantages

Only the actual pressure of CSF buildup causes the valve to open, eliminating undesired siphoning of CSF.

Valve can be set to respond to different levels of pressure.
Ports allow attachment of ventricular and peritoneal catheters of varying lengths.
Offers a completely enclosed design, minimizing tissue in-growth and encapsulation
Device is completely non-metallic, avoiding imaging artifacts.
Device’ s small size and low profile avoid unnecessary protrusion and erosion through the skin.
Suture tabs/wings may be added to the shunt’ s exterior, allowing it to be sutured in place to prevent shunt migration.
Radio-opaque markers or other tags may be added to facilitate status checks via X-ray or other diagnostic imaging techniques.

Institution

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