Sildenafil, sold as Viagra and other trade names, is a medication used to treat erectile dysfunction and pulmonary arterial hypertension.

Its effectiveness for treating sexual dysfunction in women has not been demonstrated.

Common side effects include headaches and heartburn, as well as flushed skin. Caution is advised in those who have cardiovascular disease. Rare but serious side effects include prolonged erections, which can lead to damage to the penis, and sudden-onset hearing loss. Sildenafil should not be taken by people who take nitrates such as nitroglycerin, as this may result in a severe and potentially fatal drop in blood pressure.

It acts by inhibiting cGMP-specific phosphodiesterase type 5 (PDE5), an enzyme that promotes degradation of cGMP, which regulates blood flow in the penis.

It was originally discovered by Pfizer scientists Andrew Bell, David Brown, and Nicholas Terrett.

Since becoming available in 1998, sildenafil has been a common treatment for erectile dysfunction; its primary competitors are tadalafil (Cialis) and vardenafil (Levitra).

Studies show that phosphodiesterase-V (PDE-V) inhibition reduces cerebral vasospasm (CVS) and improves outcomes after experimental subarachnoid hemorrhage (SAH). This study was performed to investigate the safety and effect of sildenafil (an FDA-approved PDE-V inhibitor) on angiographic CVS in SAH patients.

A2-phase, prospective, nonrandomized, human trial was implemented. Subarachnoid hemorrhage patients underwent angiography on Day 7 to assess for CVS. Those with CVS were given 10 mg of intravenous sildenafil in the first phase of the study and 30 mg in the second phase. In both, angiography was repeated 30 minutes after infusion. Safety was assessed by monitoring neurological examination findings and vital signs and for the development of adverse reactions. For angiographic assessment, in a blinded fashion, pre- and post-sildenafil images were graded as “improvement” or “no improvement” in CVS. Unblinded measurements were made between pre- and post-sildenafil angiograms. RESULTS Twelve patients received sildenafil; 5 patients received 10 mg and 7 received 30 mg. There were no adverse reactions. There was no adverse effect on heart rate or intracranial pressure. Sildenafil resulted in a transient decline in mean arterial pressure, an average of 17% with a return to baseline in an average of 18 minutes. Eight patients (67%) were found to have a positive angiographic response to sildenafil, 3 (60%) in the low-dose group and 5 (71%) in the high-dose group. The largest degree of vessel dilation was an average of 0.8 mm (range 0-2.1 mm). This corresponded to an average percentage increase in vessel diameter of 62% (range 0%-200%).

The results from this Phase I safety and proof-of-concept trial assessing the use of intravenous sildenafil in patients with CVS show that sildenafil is safe and well tolerated in the setting of SAH. Furthermore, the angiographic data suggest that sildenafil has a positive impact on human CVS [1].

1)
Washington CW, Derdeyn CP, Dhar R, Arias EJ, Chicoine MR, Cross DT, Dacey RG Jr, Han BH, Moran CJ, Rich KM, Vellimana AK, Zipfel GJ. A Phase I proof-of-concept and safety trial of sildenafil to treat cerebral vasospasm following subarachnoid hemorrhage. J Neurosurg. 2016 Feb;124(2):318-327. Epub 2015 Aug 28. PubMed PMID: 26314998.