Bovine Hemoglobin in Place of Human Blood in Jehovah's Witness: A Case Report

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A 65 year old female Jehovah's Witness was transferred to our hospital for ischemic stroke after undergoing hysterectomy for vaginal bleeding at an outside hospital. She had suffered hypoxic brain damage following exsanguinating uterine bleeding and refused to receive blood transfusions. Upon admission to our hospital even though she was hemodynamically stable and external signs of bleeding had ceased, progressive hemodilution and inability to transfuse red cells combined to drop her hemoglobin to 4.7g/dl. At this point, hemorrhagic shock had led to progressive mental decline and coma associated with MRI-documented cerebral hypoperfusion with multi-infarct.

Management at this point included maximizing erythropoiesis by the bone marrow, including Darbopoetin, iron sucrose, vitamin B12 and folate. Intubation to reduce oxygen requirement was performed and consultation from hematologist was obtained. A decision was made to use compassionate SANGUINATE. This product, created by Prolong Pharmaceuticals, is a PEGylated carboxyhemoglobin bovine. The functional components of SANGUINATE are: Carbon mono-oxide, bovine hemoglobin, and polyethylene glycol. PEGylated carboxyhemoglobin bovine works by first releasing carbon monoxide from the hemoglobin molecule which then permits the binding and transfer of the oxygen molecule. The ability of Sanguinate to actively transfer oxygen to hypoxic tissue is based on it p50 value of 7-16 mm Hg (normal Hb p50: 26). This low p50 allows Sanguinate to unload the oxygen molecules in ischemic tissues which has an even lower p50 of below 5. It is theorized to inhibit vasoconstriction, decrease extravasation, limit reactive oxygen species production, enhance blood rheology, and deliver oxygen to the tissues.

It is not currently approved by FDA but it is available for compassionate use from the manufacturer. Animal models of cerebral ischemia, peripheral ischemia, and myocardial ischemia have demonstrated SANGUINATE's efficacy in reducing myocardial infarct size, limiting necrosis from cerebral ischemia, and promoting more rapid recovery from hind limb ischemia. In a Phase I trial, three cohorts of eight healthy volunteers received single ascending doses of 80, 120, or 160 mg/kg of SANGUINATE. Two volunteers within each cohort served as a saline control. There were no serious adverse events. Serum haptoglobin decreased, but did not appear to be dose related. The T1/2 was dose dependent and ranged from 7.9 to 13.8 h. SANGUINATE was found to be safe and well tolerated in a Phase I clinical trial, and therefore it will advance into further clinical trials in patients.

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