Phototherapy: A Life Saving Technique for the Treatment of Hyperbilirubinemia of the Newborn -- Development of a System to Provide Treatment in Remote Regions of the World

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Physiologic jaundice (hyperbilirubinemia) affects millions of newborn babies worldwide. In developing countries, or areas without reliable electric power, life-saving phototherapy isn't always available. Excessive build-up of bilirubin in brain and nervous system tissue can occur, resulting in permanent brain damage or death (Kernicterus). Expeditious use of phototherapy can prevent kernicterus, thereby avoiding its devastating sequelae. This project involved the design and fabrication of the Baby Cure Phototherapy System. This system consists of two individual light boxes capable of providing phototherapy to the top and bottom of a single baby (tandem) or to the top of two separate babies. It uses 52 feet of high intensity blue LED lights (936 LED lights) capable of producing (per LED light box) 57 microwatts/square centimeter/nm or 20,200 Lux of blue light energy (spectral irradiance), over only a 5 nanometer wavelength range, at full output. This system was tested with the neoBLUE Radiometer (a gold standard) and results show this system can provide even "intense" (30 to 60 microwatts/square centimeter/nm) phototherapy treatments. The Baby Cure Phototherapy System was designed as a low cost, portable system capable of providing effective, reliable and safe phototherapy treatment to infants utilizing both On-Grid and Off-Grid power sources such as: Rechargeable 12 Volt DC batteries connected in series, portable electric generators, or 12 Volt automotive batteries connected to renewable energy sources such as solar, wind, or water power. It has an operational lifespan of 5.7 years (50,000 hours) and is easily transported. The Baby Cure Phototherapy System will save babies lives!

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