

**EXPERIMENTAL LICENSE PROGRESS REPORT OF  
THE ALFRED MANN FOUNDATION  
November 16, 2012**

As required under the experimental license renewal granted on November 16, 2009 (Call Sign WD2XLW; File No. 0228-EX-RR-2009), the Alfred Mann Foundation for Scientific Research (“AMF”) submits this semi-annual progress report on the experimental operation of the medical micropower network (“MMN”) system. AMF continues to make progress with its innovative system. AMF has implemented and continues to implement improvements that will enhance the radio communication performance and reliability of the MMN devices, including the following:

1. AMF has continued a comprehensive characterization and analysis of the MMN system, resulting in dramatic overall system reliability improvements. The local indoor and outdoor environment was surveyed along with multiple other locations so as to determine certain inter-symbol interference effects. Experiments were conducted with man-made sources of interference, such as cell phones, to test system immunity; body model simulations were performed to determine the electromagnetic field of the implant and master control unit (“MCU”) antennas and its dependency on their gain patterns.
2. Wireless communication reliability tests were performed both indoors and outdoors with the latest MMN system. Quantitative data was collected using the Wolf Motor Function Test where multiple devices were submerged in simulated tissue (phantom) inside small plastic bags and strapped to a volunteer to mimic a real application. This demonstrated significant improvement on communication reliability.
3. A dozen different sized and shaped MCU antennas were fabricated and tested in a real-world environment. AMF continues to perform additional antenna testing and development to improve antenna diversity to allow further reduction of signal dropout.

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4. AMF continues to improve the firmware protocol to facilitate smooth signal reacquisition by the implants with the goal of working toward a human clinical study.

Table 1 below specifies the four channels implemented in the MMN hardware.

**Table 1 – Radio Channel Frequencies (MHz)**

|                              | <b>Lower Edge</b> | <b>Center</b>               | <b>Upper Edge</b> |
|------------------------------|-------------------|-----------------------------|-------------------|
| Band 1                       | 413.919           | 416.405                     | 418.891           |
| Band 2                       | 426.349           | 428.835                     | 431.321           |
| Band 3                       | 438.779           | 441.265                     | 443.751           |
| Band 4                       | 451.209           | 453.695                     | 456.181           |
| <b>Guard bands 7.458 MHz</b> |                   | <b>Band Width 4.972 MHz</b> |                   |