APPENDIX

APPENDIX A

Comparison of Current Source Density and Surface Laplacian Methods

The following is a mathematical comparison of the Current Source Density (CSD) method and the surface Laplacian, which shows that the equations for the two methods differ by only a constant factor. CSD is calculated using the equation

$$v_{CSD} = G[v_1(t) - v_0(t) + v_2(t) - v_0(t) + v_3(t) - v_0(t) + v_4(t) - v_0(t)] \qquad (A.1)$$

where G is a constant representing system gain, $v_0(t)$ is the center electrode and $v_1(t)$, $v_2(t)$, $v_3(t)$, and $v_4(t)$ are the four specified orthogonal electrodes.

The surface Laplacian is represented by the following equation:

$$L_S = [v_1(t) + v_2(t) + v_3(t) + v_4(t) - 4v_0(t)] / d^2 \qquad (A.2)$$

$v_0(t)$ is again the center electrode and $v_1(t)$ - $v_4(t)$ are the four orthogonal electrodes. d is the distance between center electrode and each of the four orthogonal electrodes.

Let us rearrange Equation A.1,

$$v_{CSD} = G[v_1(t) + v_2(t) + v_3(t) + v_4(t) - v_0(t) - v_0(t) - v_0(t) - v_0(t)]$$

$$= G[v_1(t) + v_2(t) + v_3(t) + v_4(t) - 4v_0(t)]$$

If G equals $1/d^2$ then,

$$v_{CSD} = [v_1(t) + v_2(t) + v_3(t) + v_4(t) - 4v_0(t)] / d^2 = L_S$$

If G does not equal $1/d^2$, then v_{CSD} and L_S differ only by a constant.