Animal Study

Research on recovery from brain injury using EMPowerplus is taking place at the prestigious Canadian Centre for Behavioral Neuroscience, Alberta, Canada. This research, some now completed (based on a Masters Thesis), is soon to be published and is shared here with permission from Celeste Halliwell. This research showed that EMPowerplus enhanced recovery in brain injured Long Evans Rats.

From a total of 103 animals thirty-eight two to four day old rats received frontal lesions, or the removal of the frontal lobes of their brain. Twenty three of this group were supplemented with EMPowerplus. Twenty-four two to four day old rats received posterior parietal lesions or removal of the parietal region of the brain. Fourteen of this group were supplemented with EMPowerplus. Both the control and supplemented rats underwent testing for performance in behavioral and skill challenges.

Behavioral Findings:

- The supplement completely reversed the cognitive spatial deficit and partially reversed the motor deficits in the medial frontal lesion animals, and reduced the cognitive deficits in the posterior parietal lesion animals.
- Control rats on the other hand experienced continued severe cognitive spatial deficits from the frontal lesions and posterior parietal lesion controls showed no recovery.
- In the Morris Tank Test "The Rats with frontal lesions were impaired at the task, and this impairment was reversed with the supplement treatment, suggesting a complete recovery of function."
- The investigators have never seen any other treatment that facilitated recovery from posterior parietal lesions.

Anatomical Findings:

- "The supplement treatment significantly increased cortical thickness in both the lesion and control animals"
- "Animals that received the supplement… had larger nuclear areas and many more cells than in the no treatment group."

Figure 1 Standard Lab Diet

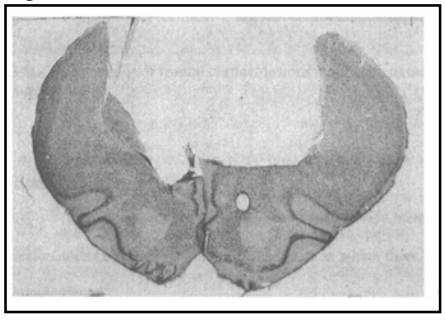


Figure 2 EMPower Test Diet

Figure 1 Cross Section: Showing lack of cortical re-growth in the surgically induced brain lesion control group on standard lab diet.

Figure 2 Cross Section: Showing cortical re-growth in a rat with a surgically induced brain lesion on the EMPower test diet.

Figure 3 Standard Lab Diet

Figure 4 EMPower Test Diet

Figure 3 Dorsal View: Showing a normal control rat brain in the standard lab diet group.

Figure 4 Dorsal View: Showing a normal control rat brain in the EMPower test diet group.

Figure 5 Standard Lab Diet

Figure 6 EMPower Test Diet

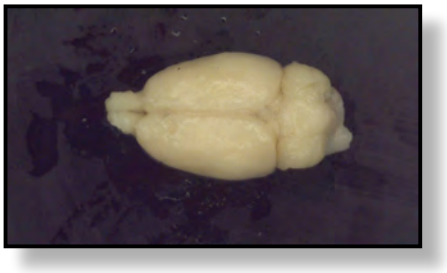


Figure 5 Dorsal View: Showing a surgically induced frontal lobe lesion in the standard lab diet group.

Figure 6 Dorsal View: Showing re-growth following a surgically induced brain lesion in the EMPower test diet group.

Figure 7 Cross sectional view of Standard Lab Diet lesion control Group

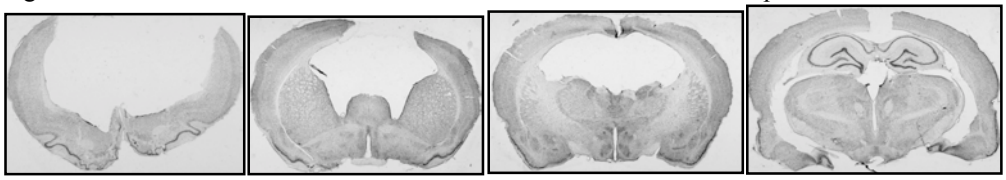


Figure 8 Cross sectional view of EMPower Test Diet lesion Group

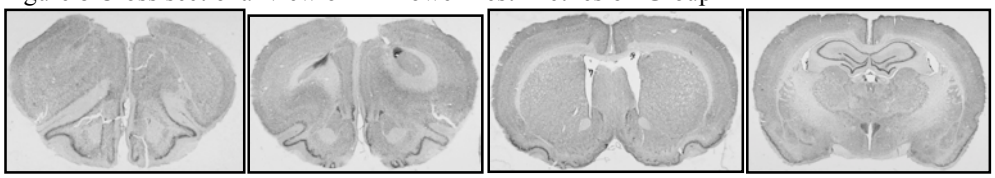
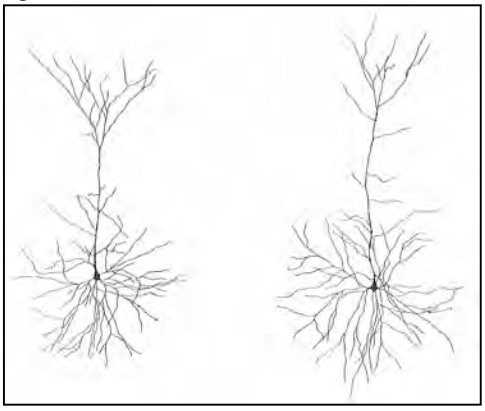


Figure 8

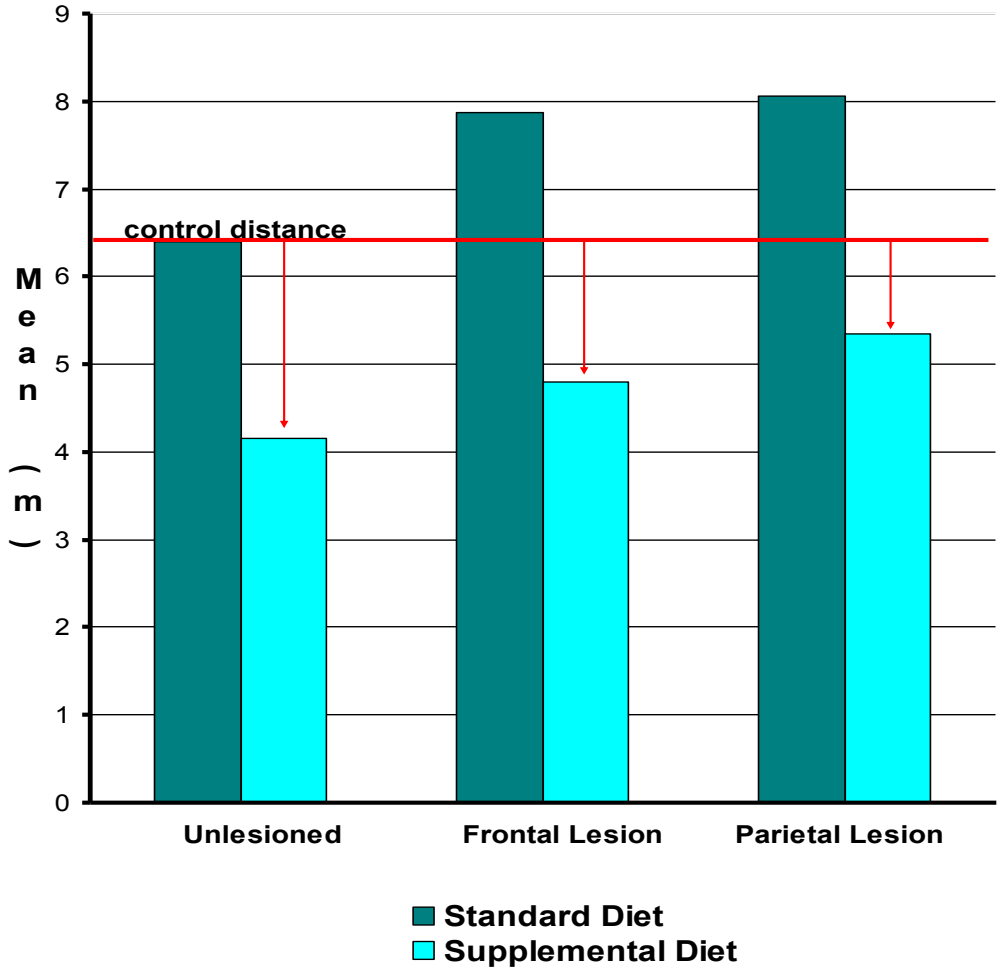
Figure 9



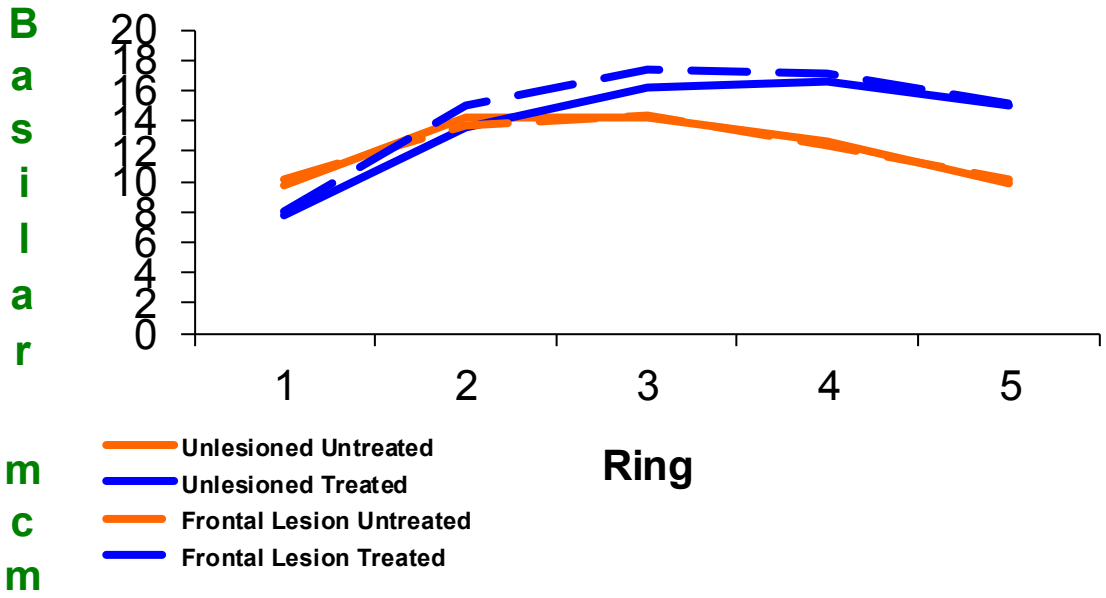
Larger and more complex branched dendritic endings like those seen in Figure 9 are typical of those seen unfailingly in animals supplemented with EMPowerplus.

Surgically-induced parietal lobe brain lesion in an **unsupplemented** control rat. Re-growth of a surgically induced parietal lobe brain lesion following supplementation with **EMPowerplus**

Improved Cognitive Function Due to Supplementation
in Normal, Frontal & Parietal Lesioned Rats
as a Function of Distance Reduction
in the Morris Water Tank Test



Dendritic Growth (Frontal Lesion, Basilar)



Scholl analysis estimates the amount and distributions of dendrite material by counting numbers of intersections of dendrites with an overlay of concentric rings centered at the soma.[5]

CL W. Dendritic Reorganization in Pyramidal Neurons in Medial Prefrontal Cortex after Chronic Corticosterone Administration. *Journal of Neurobiology*. 2001;49:245-253.

Halliwell C, Kolb B. (2003). Diet can stimulate functional recovery and cerebral plasticity after perinatal cortical injury in rats. *Soc Neuro Abs*. 29:459-411.

Abstract

Early cortical injury has been attributed to the consequential effects of various factors, such as alcohol, drug addiction, smoking, and inadequate nutrient intakes during periods of pregnancy and lactation, or delivery of infants by forceps, and premature deliveries. These are only a few examples of circumstances, or "injury", that may result in disorders ranging from mild learning difficulties to aggressive behavior. Injury to the cortex during the early years of development has been known to result in poor behavioral outcome into adulthood. Presently, the most common

form of treatment includes a pharmacological agent, which may be accompanied with behavioral modification therapies supported by families. As an alternative form of therapy towards the treatment of early cortical injury, choline and a vitamin and mineral supplement (EM Power+) were used to determine the possibilities of nutrition intervention in an animal model. The injuries were incurred by aspiration lesion at days three, (Exp.l) and four, (Exp.2) and lesions were localized to the midline medial frontal cortex in some rats, while a different group of rats received lesions in the posterior parietal cortex. The pre and postnatal choline treated animals showed favorable results for the medial frontal lesions, and the postnatal vitamin supplement treated animals showed favorable results for treatment in both medial frontal and posterior parietal lesions. All animals were tested in adulthood indicating that nutrition intervention is very beneficial for alleviating some of the functional deficits commonly seen from early cortical injury.