ENHANCING GROWTH AND DEVELOPMENT

At least a dozen studies from around the world have now established that preterm infants gain more weight after being given a period of massage therapy during their hospital stay. Others have also documented an increase in bone mineralization, bone density, bone length and increased head circumference. Other studies have documented the positive effects of massage therapy on full term infants including: lesser irritability and less sleep disturbance. The challenge for this field of research is to find potential underlying mechanisms that may be contributing to these growth effects and changes in behavior so that massage therapy might be adopted into hospital practice for preterm and full-term infants. In addition, finding cost-effective ways to deliver the massage, for example teaching the parents infant massage, may enhance the possibility of massage therapy being adopted into practice.

In this chapter, studies on underlying mechanisms and parent delivery of massage are reviewed. In the first study we were able to demonstrate a more cost-effective massage therapy, that is that massage therapy had positive effects on weight gain in preterm infants after only 5 days of therapy as opposed to the 10 day therapy period that had been previously used by researchers. In the second study we report enhanced vagal activity and gastric motility in preterm infants receiving massage therapy. The vagus (one of the 12 cranial nerves) is noted to have extensive branches to various organs in the body including the gastrointestinal tract. The gastrointestinal system is thought to be affected by the vagus in two ways. The vagus is thought to help release food absorption hormones such as glucose and insulin and to stimulate gastric motility or movement of the wall to facilitate food absorption. In this study we reported that vagal activity and gastric motility were both enhanced by massage therapy which, in turn, would be expected to contribute to the weight gain in preterm infants.

In study 3, we report the results of a research in which parents delivered the
massage to their full-term newborns from day one to the end of the first month. Here we found that those infants gained more weight and gained more length as well as performed better on the Brazelton Neonatal Behavior Assessment Scale by the end of the month that the parents provided the massage. This study highlighted the potential cost-effectiveness of parents rather than therapists delivering the massage. Parents could be taught by massage therapists in infant massage classes and then the parents could continue the massages at home. In study four, we taught parents again to deliver the massage therapy, but this time with infants and toddlers, in an attempt to reduce sleep disturbances. Massage therapy was once again shown to be effective in reducing sleep disturbances.

**Study 1: Stable preterm infants gain more weight and sleep less after five days of massage therapy**

A number of studies have shown that the 10-day massage therapy protocol introduced by Field and her colleagues (1986) promotes weight in preterm infants. The average daily weight gain in these studies was 28% to 47% greater in the massage groups despite similar formula and caloric intake.

The 10-day massage therapy protocol also alters the distribution of sleep and awake states. Across studies, the massaged preterm infants spent more time in active alertness and showed better performance on the Brazelton exam at the end of the treatment period. Furthermore, the massaged preterm infants were discharged between 3 and 6 days sooner than the control infants, accounting for lower hospital costs.

The first 10-day massage study, Field and colleagues (1996) suggest that the weight gain advantage for the massage group first emerged after 5 days of treatment. The goal of the current study was to examine the effects of 5 days of massage therapy on the weight gain and sleep/awake behavior of preterm infants. Showing that an abbreviated protocol is beneficial warrants the continued use of massage therapy for hospitalized preterm infants who are being discharged earlier from intermediate care nurseries and at lighter weights.

**METHOD**

**Participants.** A random stratification procedure was used to assign infants to either the massage therapy group (n = 16) or the control group (n = 16). All infants were medically stable and were not receiving IV fluids, oxygen, phototherapy, antibiotics, or gavage feeds at the start of the study.

**Procedure.** The massage therapy protocol used by Field et al. (1986) was also used for this study. Massage therapy was begun on the day following the study assignment, and it was continued for 5 consecutive days. As in, previous studies, the first 15-minute massage occurred approximately one hour after the morning feeding, the second about one half hour after the midday feeding and the third approximately 45 minutes after the completion of the second stimulation period.

Each treatment session consisted of 5-minutes of tactile stimulation, followed by 5 minutes of kinesthetic stimulation, and concluded with another 5-minute period of tactile stimulation. The therapist warmed his/her hands prior to the start of treatment and remained silent during the 15-minute interval.

During tactile stimulation, the infant was placed in a prone position and was given
moderate pressure stroking with the flats of the fingers of both hands. Five one-minute intervals, consisting of six 10-second periods of stroking, were applied to the following body regions: (a) from the top of the infant’s head, down the back of the head to the neck and back to the top of the head; (b) from the back of the neck across the shoulders and back to the neck; (c) from the upper back down to the buttocks and returning to the upper back (contact with the spine was avoided); (d) simultaneously on both legs from the hips to the feet and back to the hips; and (e) both arms simultaneously from the shoulders to the wrists.

For the kinesthetic phase, the infant was placed in a supine position. Each of the five one-minute segments consisted of six passive flexion/extension movements lasting approximately 10 seconds each. These “bicycling-like” movements of the limbs occurred in the following sequence: (a) right arm, (b) left arm, (c) right arm, (d) left leg, and (e) both legs simultaneously. Nursing notes were examined daily for weight gain.

Sleep/awake behaviors were coded via live observations at the same time on the pre-assignment and last days of the study. That both observations occurred at the same time controlled for the potential effects that circadian rhythm or environmental factors (e.g., reduced lighting at night) have on preterm infant behaviors. Furthermore, day 5 observations occurred approximately 90 minutes after the days first massage, thus allowing sufficient time for any immediate treatment effects on behavior to subside. A standardized behavior coding system was used that included the following states; (1) non-REM sleep; (2) active sleep without REM, (3) REM sleep; (4) drowsy; (5) quiet alert; (6) active alert; (7) crying. The 30-minute observations were recorded on a lap top computer using a program that records the percent time (% time) the infant spent in each behavior state. Observers were trained to 85% interrater-agreement.

RESULTS and DISCUSSION

On average the massage therapy group gained 26g more per day than the control group, suggesting a 53% greater average daily weight gain (see Figure 1). The massage group also spent less time sleeping on the last day than the control group (53% versus 81%), which can be viewed as a positive effect, possibly reflecting acceleration in the developmental course of sleep/wake patterns in preterm infants.