

## Physiology and Research of KANGAROO CARE

Kangaroo Mother Care (KMC) has been variously defined, but two essential components are skin-to-skin contact (SSC), and breastfeeding (BF). From the biological perspective, in the immediate newborn period of Homo sapiens, skin-to-skin contact represents the correct "habitat", and breastfeeding represents the "niche" or pre-programmed behavior designed for that habitat.

### RESEARCH ON SSC

In the uterine habitat, oxygenation is provided through the placenta and the cord, as well as warmth, nutrition and protection. These are the four basic biological needs. Parturition (birth) represents a "habitat transition". In the new habitat, the basic needs remain the same. Research over the last ten years provides strong support for the contention that newborn itself in the skin-to-skin habitat, not the mother or the health services, provides these basic needs.

**Oxygenation** has been shown to improve on SSC, to the extent that KMC is used successfully to treat respiratory distress. The breathing becomes regular and stable, and is coordinated with heart rate. When removed from incubator and placed SSC, oxygen saturation may rise slightly, or the percentage of oxygen provided to maintain good saturation can be lowered.

**Heart Rate** is increased when placed SSC. Though we can regard this increase as being within the clinically normal range, what is seen is actually a return to the physiologically normal heart rate, the lower rate being due to "protest despair behavior". Infants removed from incubators and placed SSC show a rise in temperature and a dramatic drop in glucocorticoids, as predicted by the "protest- despair response". Mothers are able to control the infant's temperature within a very narrow range, far better than an incubator. To accomplish this, her core temperature can rise to two degrees Centigrade if baby is cold, and fall one degree if baby is hot. Skin-to-skin contact is better than incubator for rewarming hypothermic infants.

**Self-attachment** refers to the phenomenon that full-term undrugged infants, left on their mother's chest and undisturbed, will all breastfeed spontaneously within one hour, with no help at all. But this behavior is dependent on SSC. Mother and infant should NOT be separated. The stimulations the newborn gives the mother during SSC elicit caregiving and protective behaviors from the mother. The baby's legs kicking on the mother's abdomen cause the mother's uterus to contract strongly, preventing post-partum bleeding.

**Nutrition** is improved, both with respect to the mother's ability to breastfeed, and with respect to the newborn's utilization of the feed. The volume of mother's milk is greatly increased, and the

frequency of feeds provided likewise. Even without the increased milk, with the vagal stimulation the infant receives, the gut is better able to use the milk provided, and grows faster.

**Immunity** is improved, demonstrable even 6 months later. Preemies seem to have poor immune systems, and are susceptible to allergies, infections and feeding problems in the first year of life. Early SSC dramatically reduces these problems.

**Infections** are reduced when SSC and exclusive breastfeeding are firmly introduced. Necrotizing enterocolitis (a potentially lethal and very costly disease to treat) has been dramatically reduced in many units following a KMC program.

In no published paper is a single adverse outcome reported for KMC. Positive effects on the mother are better bonding, healing of emotional problems associated with premature birth, among others.

## **BREASTFEEDING**

Breastfeeding is a behavior based on hindbrain functions that regulate hormones, autonomic functions and the somatic system. Key to understanding breastfeeding behaviors in the transitional and newborn periods is "state organization".

**State Organization** refers to the ability to control the level of arousal, or of being awake. A scale of state organization can be described varying from deep sleep to hard crying, each being associated with particular behaviors and conditions. For breastfeeding an infant should be in an awake state, and should thereafter be in quiet sleep for optimal development. KMC has profoundly beneficial effects on the state organization of newborns.

**"Suckling"** is the "chewing movement" an infant makes on the nipple. Quite apart from suckling as a means to ingest food, this behavior has essential effects. Suckling stimulates the back of the palate, and results in intense vagal stimulation, which is vital for the general wellbeing of the baby. Suckling releases hormones similar to morphine in the brain, and gives powerful pain relief to infants. While it was observed that ability to suck on a bottle only started at 34 weeks post conception age, recent research has shown that suckling from the breast is possible at 28 weeks. Suckling is a myographically distinct behavior from sucking, and research on sucking on bottles of premature infants shows it clearly to be stressful. Premature infants are unable to coordinate their breathing and their swallowing.

## **BREAST MILK AND IMMATURITY**

Compared to that of other mammals, human milk is extremely thin in terms of protein, fat and carbohydrate contents. Protein in particular. In olden days, protein was measured in terms of “nitrogen”, the assumption being that the majority of the nitrogen was a constituent of proteins. For a cow, protein nitrogen is 98%. For a human however, it is only 75%, and the non-protein nitrogen (NPN) is full quarter of the content. What human milk lacks in terms of concentration, it makes up for in terms of variety, well over two hundred NPN compounds have been found. These are related to the evolutionary immaturity of the newborn.

## **NEUROSCIENCE AND STRESS**

The primary violation, the worst-case scenario, to any newborn is separation from its habitat/mother. This applies to Homo sapiens as fully as to other mammals studied. “Protest-despair” behavior is a stress reaction, and the hormones related to this have been extensively studied. At high levels, these hormones are intrinsically neurotoxic to the brain, particularly areas of the hindbrain, and any area, which may be already a little hypoxic. SSC has been shown to markedly reduce these levels.