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Timing, Bonding, And Trauma:

Applications from Experience-Dependent Maturation and Traumatic Stress Provide Insights for Understanding Environmental Origins of Disease

by

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Excerpt pp 35-40: Risk Factors for Asthma Before, During and After Birth

Dear Readers,

This is an excerpt from a book chapter I wrote for Nova Science publishers about risk factors for asthma in 2007. This particular section presents studies showing increased risk from stressful events in pregnancy, birth and infancy. Much more research has emerged since then that further supports these findings, and I write about this on my chronic illness blog. Other sections of the chapter describe the science explaining how such factors have been found to affect the developing brain, immune system, gut and other biological functions and more. There are also sections on similar risk factors for asthma and inflammatory bowel disease (IBD). Email me for a copy of the entire chapter.

Sincerely,
Veronique

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Asthma

Asthma is a disease that can begin at any time in life, although approximately 50% of cases develop in childhood [1]. The biggest stimulant of asthma symptoms is allergy (atopy), and a positive family history also influences risk. A large percent of individuals have no family members with the disease, however, and many individuals have normal responses to allergy testing [1]. Environmental factors clearly play a role in affecting risk for asthma, and because of its predominance in childhood, it is hypothesized that risk is affected by events in early life [2-5].

Three primary characteristics comprise asthma: bronchial hyperirritability, airway obstruction that is at least partially reversible, and airway inflammation [1]. Of the three, bronchial hyperirritability fits a pattern consistent with our understanding of long-term reactivity to context-related cues following traumatic stress. This is demonstrated by the finding in asthma that bronchi are highly reactive to many kinds of stimuli, respond rapidly and in a dose-related manner to these stimuli, and return only gradually to pre-exposure levels, which can take weeks [1]. Airway hyperresponsiveness is also an indicator of severity of asthma, and is associated with greater impairment of lung function, risk for persistent asthma lasting into adulthood, and risk of relapse after remission [6]. In contrast, although intensity of the inflammatory response affects bronchial reactivity, inflammation bears no relationship to disease severity or *level* of airway reactivity, and similar populations of inflammatory cells are found in people without symptoms, suggesting that they are nonspecific markers of atopy [1]. Markers of inflammation could, on the other hand, reflect predisposition to risk.

EVENTS AROUND BIRTH

Events During Pregnancy and Birth

Asthma is increased with maternal mental and physical health complications during pregnancy [2, 7], labor and delivery, and neonatal illness or health problems in the first week of life [2]. Risk is also increased with preterm delivery [2, 8-13], threat of early labor [2, 7], and malposition or malpresentation of the baby [2], perhaps because irregular fetal position is associated with an increased risk for assisted delivery or represents an existing problem in the prenate. All of these risk factors are associated with risk for greater asthma severity in adulthood [2], perhaps because of fetal programming changes occurring during critical periods [2, 7].

Hyperemesis in pregnancy [7] and antenatal hemorrhage [14] are also risk factors for asthma.

Asthma risk increases with APGARS less than 9 and 10 at 1 and 5 minutes in one study [4], and less than 7 at 5 minutes in another [11]. Respiratory effort and evidence of good oxygenation and circulation are important parts of the APGAR score, which reflects levels of fetal wellbeing at birth. The use of supplemental oxygen or the need for positive

pressure ventilation at birth, which mechanically assists respiration in fetal distress, are also associated with increased risk for asthma [11].

Complicated Delivery Such as With Forceps and Cesarean

Risk for asthma is increased with assisted deliveries such as vacuum extraction, forceps, breech extraction [4], and cesarean section [4, 7, 15, 16]. In a population based study of 8000 cohorts born in Finland in 1966, cesareans were associated with a 40% increase in risk for onset of asthma by age seven [4, 16] as well as doctor-diagnosed persistence or recurrence of asthma at 31 years of age [15]. These relationships suggest an association between cesarean delivery and asthma severity [15].

In a Norwegian study, asthma progressively increased over time. From 1967-75 the incidence per 1000 individuals was 1.5; between 1976-1984 the rate was 3.31, increasing to 6.9 from 1985-1993 [7]. The strongest association between asthma and pregnancy complications (such as cesareans) was found in the youngest cohort, suggesting greater importance of pregnancy-related complications with earlier age of onset. The increasing incidence of asthma was proposed to be influenced by exposure to risk factors that were changing over the study period [7]. Xu et al. [15] have suggested that increasing incidence of asthma coincides with rates of cesarean deliveries, which increased from 5% in 1966 to 25% in 1997 in neighbouring Finland and which have changed by similar amounts in other countries, such as the United States [17].

Cesareans have been proposed to affect risk for asthma because of functional and structural changes that occur in the lungs at birth [10]. Cesareans are also known for their association with increased respiratory problems in the newborn [10, 18]. These respiratory problems may be due to differences in physical mechanisms associated with mode of delivery, such as the fact that fluids are gradually squeezed out of the baby's lungs during the process of vaginal delivery, which does not occur with abdominal deliveries [10]. It has also been proposed that cesarean delivery affects risk for asthma by altering intestinal microflora, thereby influencing immune system development (for a review see Bager [10]).

Birth Weight

Risk for asthma is higher with low birth weight [3, 4, 11, 13, 19, 20] and increases with decreasing birth weight [21]. Low birth weight has been associated with reduced lung function in adults, but not with wheeze [22]. In addition, low birth weight appears to have a larger effect on risk for asthma onset prior to 5 years of age [3].

Bonding Disruptions: Mother-Baby Separation (Emotional & Physical)

A series of serendipitous events led one researcher to explore the role of bonding disruptions in risk for asthma [23-25]. When hypnotherapy was unsuccessful in reducing symptoms of severe asthma in an 8-year-old girl who was on multiple medications, including multiple annual steroid bursts, and who had frequent emergency room visits, her mother asked to continue counseling for herself [25]. After admitting she felt shame because she did not feel love for her daughter, the mother described a series of difficult events during pregnancy and birth. Brief hypnosis helped the mother process her residual

feelings about the pregnancy and birth and to imagine a corrective birth experience. Three months later, the mother reported that her daughter's severe asthma had resolved the day of the reparative session, when she also stopped needing medications as well as emergency room visits. The mother also said that she now felt love for her daughter [25].

Following this event, Madrid [24] began exploring the association between asthma and disruptions in maternal-infant bonding, finding that bonding failures were three times more frequent in asthma than in controls [26]. Bonding disruptions that were found to be predictive of asthma included a) prenatal factors such as emotional problems during pregnancy, b) early separation at birth, such as delay in holding the baby, and c) stressful life events in the first year of life, including maternal emotional problems, and death in the family. A survey was developed, which draws from existing research [27] to assess risk for bonding disruptions (see Table 1) [24].

Madrid and colleagues then conducted two studies evaluating the efficacy of hypnosis as a means of addressing bonding disruptions as a potential new treatment for asthma. In the first study, asthma resolved completely or nearly completely in five of six asthmatic children aged 6 months to 12 years [24]. The two infants achieved complete remission. All mothers were treated, along with brief hypnotherapy with the four older children, and improvement was found on each of 18 variables studied. As with the initial case, asthma resolution either occurred on the day that the mother's emotional issues were addressed, or did not occur at all.

Case studies identify factors contributing to bonding disruptions in Madrid et al.'s research. Risk factors included preeclampsia, preterm labor followed by newborn intensive care with delayed discharge occurring after the mother went home, abandonment by the father during pregnancy, separation from the father after birth of the child, relationship and financial stressors, difficult labor, teen pregnancy, consideration of abortion early in one woman's pregnancy, and lack of emotional support. Two mothers who had stressful pregnancies bonded with their babies at birth only to experience bonding disruptions when relationships with their partners became distressing. Although a few children experienced brief recurrences of their symptoms, these events appeared to be related to emotional or physical separation, such as when the 8-year-old with severe asthma visited her father (who was separated from her mother) [25]. Symptoms resolved with reunions or with an additional treatment session.

In a second study [28], 12 of 15 children aged 1-14 years improved with treatment of the mother alone. Ten of these children had complete remissions, and eight of them stopped needing medications. As with the first study, asthma resolution occurred on the same day as maternal recovery. The five children who did not experience complete remission were the older children aged 9 years or older, and the authors hypothesized that older children may have experienced additional stressors in their lifetimes to perhaps render treatment of bonding disruptions at birth insufficient as a form of treatment. Citing Klinnert [29], Madrid et al. speculate that the influence of bonding disruptions on asthma may relate to factors involving stress or quality of maternal caregiving during development of the HPA axis or immune system [24]. Events associated with non-bonding in this second study

included recent miscarriages, marital problems, cesarean deliveries, illness in the mother or child, physical separation at birth, homelessness, and emotional problems. In both studies, experiences of maternal emotional distress far outweighed instances of physical separation [24, 28].

In these studies, hypnotherapy appeared to help the mothers resolve their anger, grief, despair, and other emotions regarding events surrounding their nonbonding experiences in childbirth. One possible mechanism for this effect is that hypnotherapy fosters states of altered consciousness [30], which can provide different routes for accessing and altering the intensity of traumatic procedural (unconscious) memories and their context-related cues [31]. Given the improvement in most of the children, treatment may have resolved maternal emotional states associated with disruptions in maternal regulation that originally prevented bonding, and/or allowed the innate maternal-infant drive for bonding to occur, which improved and increased psychobiological regulation for the child while simultaneously removing the sources threat. Reasons for decreased responses in the older children could include a) lack of efficacy in addressing all nonbonding related events, b) lack of success in addressing the impact of other stimuli that had become additional perpetuating factors for altered regulation, such as exposure to additional stressful or traumatic events, c) childhood experiences of traumatic stress outside of the bonding relationship (painful procedures, accidents, etc), d) initiation of symptoms during a critical period other than birth, or e) decreasing dependence on maternal psychobiological regulation with age.

Breastfeeding

Decreased risk for asthma has been associated with having ever been breastfed [5, 20], as well as with longer duration of exclusive (> 4 months) [32, 33] or any breastfeeding (> 6 months) [19]. Longer duration of breastfeeding conveys increasing protection in a dose-response relationship [12, 13] and delays the age of onset of asthma [12] as well as early but not late onset transient wheezing [19]. Longer duration of exclusive breastfeeding [34] and ever breastfeeding appear to be protective for asthma in the first 2 years of life, and breastfeeding may buffer risk to delay onset [13] or reduce severity in individuals with existing predisposition to risk. Duration of breastfeeding for more than 6 months has also been found to reduce the probability of developing asthma in individuals who are at low risk due to a lack of family history [35]. In addition, any breastfeeding also reduces the risk for development of asthma in children exposed to tobacco smoke [20]. Increased risk for asthma is also associated with shorter duration (< 4 months) of breastfeeding [32].

Contradictory findings have also been identified, however, in which longer durations of breastfeeding have been associated with increased risk for late-onset wheezing [19], and asthma [6, 36]. Longer duration of exclusive breastfeeding has also been associated with greater risk of wheezing and asthma in the small percentage of older children (6 to 13 years old) with allergic asthma whose mothers also had asthma [34]. In one of these studies [6], however, the authors explain that although they referred to their findings as "exclusive breastfeeding," most babies were probably given formula prior to discharge from the maternity hospital as part of a routine practice in the nursery. This may be the case in other studies as well. Although control subjects appeared to be protected from risk

through shorter exposures to breastfeeding in the above study, it is not known which subjects nor how many were actually exposed to supplemental feedings. Increased risk for asthma is associated with bottle feeding [3], the introduction of nonhuman milk before 4 months of age even with continued breastfeeding [12], and absence of exclusive breastfeeding [33]. It would be interesting to explore whether there were differences in exposure to formula feeding in the nursery between groups in this study [6]. Time spent in the nursery would be more likely to occur with pregnancy, labor, and delivery complications, poor initial health of the baby (requiring nursery care), and other potentially stressful perinatal events.

Differences in study outcomes regarding the effects of breastfeeding on risk for asthma appear to reflect complex interactions between multiple environmental events, which may include maternal physiological states and psychobiological regulation. Possible contributions to risk for asthma with increases in breastfeeding include the finding that infants who are bottle-fed have higher autonomic lability, as demonstrated by greater sympathetic reactivity during stress and higher vagal tone after stress. Exclusive breastfeeding, on the other hand, buffers the sympathetic response to stress [37].

Breastfeeding is also associated with increases in maternal baseline levels of parasympathetic activity, as documented by measures of vagal tone on heart rate, and these effects are dose-related [37]. Sympathetic tone mediates bronchodilation whereas vagal tone facilitates bronchoconstriction [38], suggesting the possibility that breastfeeding may in some cases accentuate pre-existing states of predisposition to high vagal or low sympathetic tone in individuals at risk for asthma. Psychophysiologist Stephen Porges proposes that up-regulation of parasympathetically mediated immobility responses facilitates bronchoconstriction as a means of maximizing energy conservation in the face of extreme threat [39-41].

Other means by which breastfeeding may influence risk include the possibility that breast milk and breastfeeding represent context-related cues, which may soothe or trigger infant responses to stress according to the nature of the experience that occurred when breastfeeding was initiated. Elements in breast milk may also influence risk for asthma, either as context-related cues or due to direct physiological effects. Breastfeeding in the first days postpartum provides antibodies and other factors affecting the immune system (in colostrum), and breast milk differs according to mode of delivery, parity, time of day, meal times, maternal smoking [18], as well as with maternal disease such as asthma [34]. Maternal illness and use of medications may also influence infant physiology and immune function [34].

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