

Preterm Baby Care Guidebook

Happiness that Grows Bigger
and Bigger,
We Wish You that Happiness



CONTENTS

004	Publisher
006	Preterm Baby Hospitalization and Discharge
008	Causes of Preterm Birth
010	Preterm Baby Inpatient Treatment and Surgery
026	Preterm Baby Care After Discharge
041	Projects to Provide Support for Inpatient Treatment Costs
	The Story of Preterm Baby Rayul Bae
046	Preterm Baby Rehabilitation Treatment
048	Preterm Birth and Cerebral Palsy
050	Cerebral Palsy Symptoms and Treatment
057	The Right Posture and Exercises for Rehabilitation
070	Projects to Provide Support for Rehabilitation Treatment Costs
	The Story of Preterm Baby Juho Choi
076	Preterm Baby Nutrition
088	Preterm Baby Parenting Assistance
108	Preterm Baby Q&A
124	Introduction to <Baby Dasom> Project
126	The Beautiful Foundation

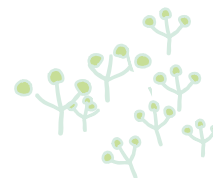
In Publishing this Preterm Baby Care Guidebook

Happiness that Grows Bigger and Bigger, We Wish You that Happiness

With the mission of helping all preterm babies grow healthily and helping the families of premature babies not to be frustrated with adversity, the premature baby support project, <Baby Dasom>, which began in 2004, has reached its 15th anniversary.

The first step into the world is a wondrous occasion for everyone. However, it is also a step that is beyond the power of preterm babies who find themselves gasping for air through the treatment apparatus inside a cold incubator as they have to fight to survive each day. In addition, the anxiety of the family that watches the preterm baby who continues the struggle with his or her frail little body deepens.

<Baby Dasom> may not be able to understand all of the difficulties faced, but this booklet was published with the intention of having it serve as a guidebook that may provide some help for parents raising a preterm baby. It was published to provide expert information on preterm baby care, to help relieve some of the anxieties and to provide information on the necessary treatment for preterm babies.



Babies who come into the world a little early overcome the struggles of being tiny at birth,
And they are our precious children that will grow up strong with our love and prayers

Over the past decade, a total of 40,000 guidebooks on preterm birth have been published across four editions and have been distributed to families and institutions that need the information. This 5th edition has reorganized the information on parenting that has been provided so far and we have added the topic of psychological support for the families of preterm babies, the importance of which has recently come into the spotlight, and we have endeavored to provide more diverse and abundant information on caring for families who are caring for preterm babies.

Just as <Baby Dasom> has done thus far, we want to be a powerful source of support for the families of preterm babies. We will continue to believe that preterm babies have possibilities and potentials within them, and we will work together with the families of preterm babies to help them grow into strong and healthy toddlers.

In addition, we would like to express our gratitude to the writing staff - Gisu Kim, Hyewon Kim, Prof. Sonmun Shin, nutritionist Seonyeong Ahn, and manager Hyojeong Shim - for their efforts in publishing the guidebook providing families with education on caring for preterm babies.

Beautiful Foundation <Baby Dasom>



Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

Preterm Baby Hospitalization and Discharge

Causes of Preterm Birth
Preterm Baby Inpatient Treatment and Surgery
Preterm Baby Care After Discharge

Preterm Baby Hospitalization and Discharge¹

Cheil Hospital
Department of Pediatrics
Professor Sonmun Shin

Causes of Preterm Birth

Why was my baby born early?

The term 'premature baby' is one that is uncomfortable to hear and that no parent wants to attach onto their child like a second name. There are people who misinterpret the words 'premature baby' and assume that there is something wrong with the baby and that it is not normal. Medically, a baby who is born at less than 37 weeks of pregnancy, which includes 36 weeks and 6 days, is referred to as a 'premature baby'.

There are many people who think that a premature baby will be underdeveloped for the whole of his or her life. They think that the baby will be somehow lacking compared to other babies. However, it is common for babies born as 'premature babies' to be as healthy as other babies. It is an emotional ordeal for a mother to be separated from her baby for a while in the neonatal intensive care unit as soon as the baby is born, but if after receiving treatment in the intensive care unit, most of the babies will grow up to be healthy. Some people opt to use the word 'preterm' instead of 'premature' to avoid using a word that suggests that the baby is underdeveloped. However, medical books often use the term "premature".

Premature babies are placed into one of three categories depending on their birth weight. Babies with a birth weight less

¹ This manuscript is an excerpt from Professor Shin's professor's book, "Raising Preterm Babies to Be Strong" (Munsa Hyeon).

than 2,500 grams are referred to as low birth weight (LBW) babies. Babies with a birth weight less than 1,500 grams are referred to as very low birth weight (VLBW) babies. And babies with a birth weight less than 1,000 grams are referred to as extremely low birth weight (ELBW) babies. Now that even babies with a low birth weight have a good chance of survival, they have been put into categories and the categories have been named. However, for the purpose of this booklet, we have decided to use the word 'preterm' as we feel that it is the most objective term.

Causes of Preterm Childbirth

No mother thinks that her baby is going to be born early, and indeed, no mother wants their baby to be born early. However, sudden preterm birth is caused by the inability to continue the pregnancy until the expected due date. Causes of preterm birth can be due physical problems with the fetus, the placenta or womb, or an illness being experienced by the mother.

Factors that increase the risk of preterm birth



Fetus

- ◆ **Fetus-related causes:** Fetal distress syndrome, twins, hemolytic disorder, hydrops fetalis



Mother

- ◆ **Problems with the placenta:** Placenta insufficiency, placenta previa, abruption of placenta
- ◆ **Problems with the womb:** Uterine bursitis, incompetent cervix
- ◆ **Maternal illness:** Toxemia, chronic illness in maternity, infection, drug use (cocaine)



Other

- ◆ **Other:** Premature rupture of membrane, polyhydramnion, trauma

What's going to happen to my baby now?

Preterm babies spend a few months in intensive care while they grow in the hospital before they are then reunited with their mother. Because it is a special situation that requires the baby to be admitted to the intensive care unit, the baby has to spend some time away from his or her mother. The time spent in intensive care is to make up for the time not spent in the mother's womb.

Preterm Baby Inpatient Treatment and Surgery

In the neonatal intensive care unit ...

Because preterm babies require special medical treatment immediately upon birth, they are taken away to the Neonatal Intensive Care Unit' or 'Newborn Intensive Care Unit' without being able to spend any time with their mother. When this happens, some parents may be confused and worried while not quite knowing what to do.

Because preterm babies require various kinds of medical attention immediately upon birth, most hospitals allow the baby's parents to spend a very short time with the baby. And parents are generally only allowed to see the baby after the baby has received the urgent medical treatment he or she needs. The time immediately after birth is a crucial time for the health of preterm babies.

When you meet your little baby again, the baby will likely have various devices attached to his or her body. In particular, the beeping sound coming from the cardiac monitor can be quite upsetting for some parents.



Neonatal Intensive Care Unit

This is an inpatient unit where the baby stays until he or she is discharged from the hospital. In this room, there are incubators instead of hospital beds. Your baby will be treated inside one of these incubators.

In addition to the incubators, there are infant care systems with radiators attached, medical ventilators, patient monitors (monitors for newborn babies), IV injection devices, transilluminators, light therapy apparatus, respiration masks and bags, etc. Such equipment may be attached to your baby via cords and tubes, so your baby may appear as though he or she is lying amongst a lot of equipment. But these devices are keeping your baby alive and well.

Incubator

Incubators are special beds that play an important role in adjusting temperature and humidity because newborn babies cannot maintain their own body temperature, their skin is thin and they lose a lot of hydration. It also acts as an isolated ward that protects newborn babies against germs. In some cases, very small babies may have difficulty maintaining their body temperature with the incubator alone, so a heat shield (such as a plastic lid) may be used in the incubator or a cap or clothing may be put on the baby to help maintain his or her body temperature.

Infant Intensive Care Treatment Table

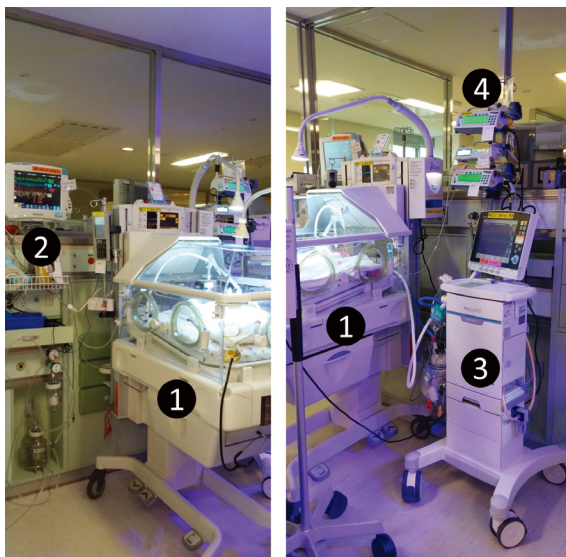
The infant intensive care treatment table with a radiator attached is a special bed that a preterm baby lies on while receiving various kinds of medical treatment. The height and angle of the bed on which the baby is lying can be adjusted, and there is a radiator attached at the top to maintain the baby's body. There are also lighting facilities and light therapy equipment for treating the baby.



Medical Ventilator

Also known as a medical respirator, the medical ventilator is a device that helps the baby to breathe. The device pushes air into the baby's lungs and then makes the baby breathe it out again as the lungs of preterm babies are often not developed enough to allow them to breathe on their own.

This is a device that makes the baby breathe at a rapid rate of over 300 times per minute if using the medical ventilator is insufficient in cases where the baby's lungs are extremely underdeveloped.



Preterm baby in intensive care. There are various kinds of equipment set up around the baby.

- 1 Incubator (a bed for preterm babies that maintains the baby's body temperature and prevents infection)
- 2 Monitor (a device that continuously measures the baby's heart rate, respiratory rate, blood pressure, oxygen saturation, etc.)
- 3 Medical ventilator (a device that helps preterm babies to breathe as their lungs are not developed enough to breathe by themselves)
- 4 IV injection device (a device that gives a very precise amount of injection solution)

Patient monitor (neonatal monitor)

There is a monitor at the head of the baby incubators showing several graphs. This device is a patient monitor (neonatal monitor) that shows the baby's heart rate, breathing pattern, blood pressure, and oxygen saturation as graphs and figures. This monitor was created to allow doctors and nurses to understand several areas of the baby's condition at once. It is set up so that an alarm is sounded to alert the medical team if there are even slight changes in the baby's condition so that they may respond and provide the baby with the treatment he or she needs right away. It is the sound that can sometimes be heard when you go to visit your baby. Parents may worry about what's happening every time the alarm is sounded, but actually, the alarm is often sounded when nothing is wrong and the baby has just moved his or legs arms or legs. So, please don't be too startled whenever you hear the alarm sounding.

Injections / Solution Injector

It is very difficult to give small babies injections. So it is necessary to insert a very thin needle into the baby's thin blood vessels in order to supply injection solutions. Of course, because the medications and solutions are provided slowly in small quantities, they can't just be given in the same way as Ringer's solution that adults are given. A solution injector is used to inject tiny amounts of solution into the baby's blood vessels. So, when a baby is in a serious condition, the amount of each medication/solution being provided needs to be adjusted individually and the solution injector allows five or six medications/solutions to be connected and administered together at the same time. During the first few days when the umbilical cord of a baby has not yet fallen off, a small tube called a catheter is inserted into the blood vessels in the umbilical cord to measure blood pressure, and solution is also administered this way too. The blood vessels of babies are so thin that sometimes injected solutions can leak out, causing the skin to become scarred, which may need to be treated later. Of course, this is not due to the needle being inserted improperly.



Jaundice

Sometimes, jaundice occurs in newborn babies, making their skin appear yellow. This phenomenon is treated with a light therapy device. Small babies are more susceptible to jaundice, so this light therapy device is attached so that they can be treated while in an incubator or infant intensive care treatment table.

Hardships that your baby may experience

Respiratory Distress Syndrome

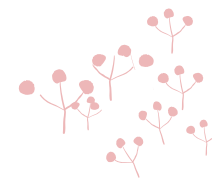
The first hardship that your baby may experience is respiratory distress syndrome. When babies are in their mother's womb where there is absolutely no air, they go through a difficult time adjusting to breathing air easily like adults. This is because when preterm babies breathe air into their lungs, the air doesn't stay inside the lungs and the lungs keep shrinking, causing the baby to have to breathe in hard on every breath. So every time the baby breathes in, the bottom of the baby's chest goes inward, causing the baby to make a grumbling sound, and the baby's skin turns blue.

The reason for this is that there are less surfactants in the baby's lungs, which are not fully developed. Surfactants are produced rapidly around 35 to 36 weeks of pregnancy, so when air travels into the lungs, the shape can be maintained just like soap bubbles don't burst and stay the way they are. However, when surfactants are lacking, the alveoli shrink again.



A baby with a tube attached to connect a medical ventilator

To induce artificial ventilation, an endotracheal tube (a) is inserted into the airway, and another tube (b) is connected to the artificial ventilator for breathing. The tube that provides the baby with nourishment (c) goes into the baby's mouth and down to the stomach.



Endotracheal Tube

A tube called an endotracheal tube is inserted into the baby's airway to help the baby to breathe. (Endotracheal tube refers to a tube that is inserted into the baby's airway via the mouth.) Because the tube goes into the airway and not the esophagus, the baby's cries cannot be heard. By connecting the endotracheal tube to the medical ventilator, the baby's breathing is facilitated. This means that the baby is provided with artificial respiration for a while.

Surfactants

In addition to the medical ventilation therapy, the baby will be treated with surfactants, which are lacking in the preterm baby's lungs. Lung



surfactants have been developed as a medicine, making it easier for babies to get over their first roadblock in life. Once breathing becomes less difficult, the degree of medical ventilation is gradually reduced, the endotracheal tube is removed, and a tube is inserted into the baby's nose to start 'continuous positive airway pressure' (CPAP) treatment, which helps the baby to breathe.



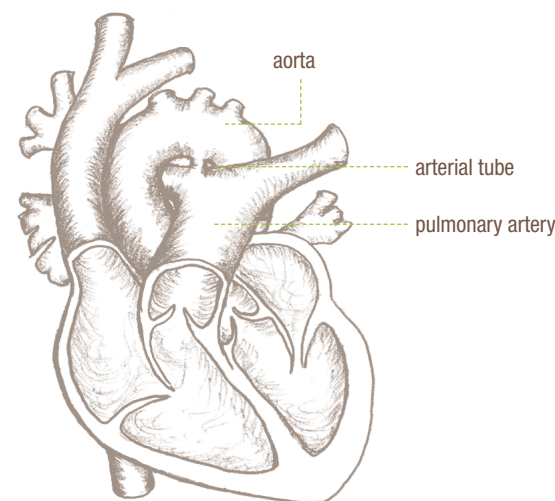
A baby being given CPAP treatment through the nose

Pneumothorax (Collapsed Lung)

During this treatment for respiratory distress syndrome, there are times when air leaks from the baby's lungs leading to a pneumothorax (collapsed lung). When air enters the lungs, the lungs do not stretch evenly - some parts are stretched too much while other parts are not stretched enough - and air can leak from the parts that are stretched too much, resulting in a collapsed lung. If too much air is leaked, the baby has such a hard time breathing that a tube needs to be inserted into the baby's chest to remove the air.

Patent Ductus Arteriosus

Preterm babies are also susceptible to developing patent ductus arteriosus. There are two large arteries that stem from the human heart - one that transports blood around the whole body (aorta), and one that transports blood to the lungs (pulmonary artery). When the baby is in the womb, there is an arterial tube known as the patent duct which connects the two arteries together, and it is normal for this path to become blocked when the baby is born. However, in preterm babies, the rate at which this route becomes blocked is very slow, resulting in the time that it is open being long, which puts strain on the heart as blood flows between the two arteries. Patent ductus arteriosus may be treated with medication, but occasionally, surgery may be required if the patent duct is not closed after several attempts at medical intervention.



Heart arteries and patent duct

Apnea of Prematurity

Apnea is a phenomenon in which a baby stops breathing even after medical ventilation has been stopped and the baby is breathing well by him or herself. It often occurs in the event of a disease such as septicemia (blood poisoning) due to an infection or problems with electrolyte metabolism; however, it also frequently occurs for no apparent reason at all. So it is simply referred to as apnea of prematurity. Medication is also provided for apnea of prematurity. If medical intervention is not successful, then the baby is put on CPAP or medical ventilation again.

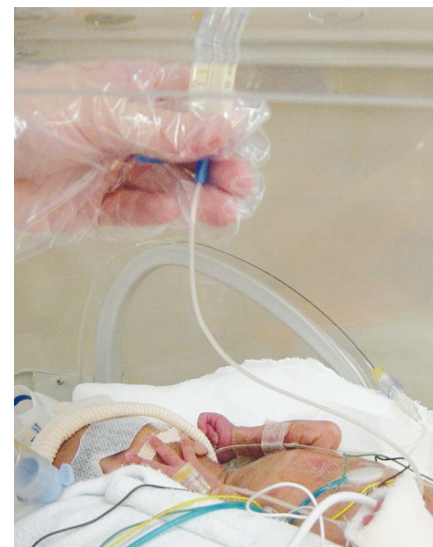
Intraventricular Hemorrhage

In a baby's brain, there is a bilaterally symmetrical cerebral ventricle which is kind of like a plastic bag. Because the underside of the bottom of the cerebral ventricle is weak and has a lot of nerve cells, it bleeds easily. Bleeding doesn't occur because of injury but because it is a weak spot with many blood vessels. Such bleeding is called intraventricular hemorrhage. Intraventricular hemorrhage can cause the baby's condition to suddenly deteriorate and can cause the baby to become anemic. The lower the baby's weight, and the sooner the baby is born, the more likely the occurrence of intraventricular hemorrhage becomes. If the bleeding is severe, the baby can become pale and have convulsions. Light bleeding doesn't result in any significant aftereffects; however, heavy bleeding can be dangerous. So even if your baby doesn't have any symptoms while in the neonatal intensive care unit, he or she will undergo multiple brain ultrasound examinations.

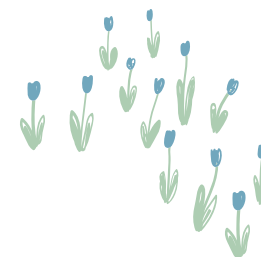
Periventricular Leukomalacia

Another reason for performing a brain ultrasound examination is to check whether a brain condition known as periventricular leukomalacia is present as well as to check for intracerebral hemorrhage. The area around the cerebral ventricle where many fibers that give commands to nerve cells pass through is called periventricular white matter. If

this area becomes weak and abnormalities are shown in an ultrasound, it is referred to as malacosis. This is also checked for in preterm babies as it often occurs. If this abnormality occurs, depending on its severity, there may be some aftereffects such as movement disorders of varying degrees.



Intubation feeding via a tube



Necrotizing Enterocolitis

When the baby is in a stable state, even though receiving various treatments due to difficulty in breathing, milk is started to be fed to the baby. Because the baby can only suckle on a bottle of the mother's nipple after 34 weeks of gestation, preterm babies are fed milk via a tube until that time. Sometimes while starting to be fed through a tube in this way, the baby can experience a problem. That problem is necrotizing enterocolitis. Necrotizing enterocolitis is a condition of the intestines that occurs in preterm babies in which the cells of the baby's intestines become damaged and necrotize (die). In severe cases, holes

can form in the intestine, progressing onto peritonitis. It is caused as a result of the baby's intestines being weak together with the infiltration of germs.

Sometimes the baby's abdomen may become swollen, and there may be some blood in the feces.

If the baby catches this disease, fasting and medication are started, and in severe cases, surgery to remove the infected part of the intestines may be required.

It is one of the diseases that everyone in the neonatal intensive care unit worries about.

Neonatal Septicemia (Blood Poisoning)

The length of time your baby will stay in an incubator will vary depending on his or her weight. The length of hospitalization will also vary depending on how sick your baby is. Neonatal septicemia is a disease that we are always worried about during a newborn baby's stay in the neonatal intensive care unit. Preterm babies are vulnerable to infection due to their immune system not yet being fully developed. Septicemia is a condition in which germs continue to circulate in the blood, causing disease throughout the whole body. No matter how thoroughly we disinfect everything, there is no way to completely prevent invisible germs from getting into your baby's body. When septicemia occurs, the baby's breathing becomes irregular, apnea becomes present, and sometimes body temperature control becomes inefficient. It is common for the baby's movements to appear sluggish, with his or her overall condition looking poorly. In this case, treatment with antibiotics will usually suffice; however, if the illness progresses rapidly or is severe, it can be fatal.



What should I feed my baby?

Preterm babies are fed their mother's breast milk or formula through a tube that goes down to their stomach until they are more developed. This is because preterm babies are not good at suckling or swallowing. Preterm babies are fed a very small amount of breast milk or formula through a tube, but this doesn't provide them with sufficient nutrition, so they are also put on a nutrition drip until they can consume a sufficient amount.

Once the baby's bowel movements become more efficient, the amount of food given is gradually increased. Most babies past 28 weeks of gestation will have a developed digestive system capable of digestive a small amount of milk without much difficulty.

Breast Milk

Especially for preterm babies, there are many advantages to being fed their mother's breast milk as opposed to formula. In addition to strengthening your baby's immune system which helps protect the baby against infections, breast milk contains several nutrients that your baby needs, which helps with development of the baby's intelligence and eyesight. It also reduces the occurrence of illness in general, especially necrotizing enterocolitis, respiratory infections, and onset of allergies.

All mothers want to provide their baby with nutritious breast milk, but because preterm babies are put in intensive care and there are many concerns about their condition, mothers are unable to suckle their baby directly, and so may feel uncomfortable about expressing breast milk for indirect feeding. However, providing the baby with her breast milk is the best thing a mother can do for her baby. So mothers are encouraged to express their breast milk and provide it to the hospital to feed the baby. Please refer to the explanation below on how to express breast milk.

Tips on expressing breast milk

- ◆ Start expressing breast milk as soon as possible after giving birth.
- ◆ Use an electric breast pump to express milk from both breasts at the same time.
- ◆ Express milk for 10 to 15 minutes every 3 hours.
- ◆ While increasing the amount of milk, continue to pump for 2 minutes after the last of the milk has been expressed. (Total 20 ~ 30 minutes).
- ◆ Aim to express milk at least 5 times a day, a total of 100 minutes a day.
- ◆ Apply a hot pack before pumping, and massage the breasts while pumping.
- ◆ You aim to get at least six hours of continuous sleep.



When the baby can't be fed your breast milk right away, we will refrigerate it and feed it to your baby within 48 hours. If it won't be possible to feed it to your baby within 48 hours, it will be frozen immediately after it is pumped. When the milk is frozen, it is possible to store it for up to three months in a freezer that it separate from the refrigerator, so we aim to designate sufficient space in advance to store your milk.

Always wash your hands thoroughly before expressing milk, then store enough expressed milk for one feeding in each bottle displaying your name or your baby's name together with the date and exact time of milk expression. If pumping both breasts at the same time, pump for 1 to 2 minutes more after the last drop has been expressed. Milk is usually expressed for about 15 minutes after it starts to come out. When expression one breast at a time, if the speed that the milk is expressed from the first breast becomes slow or isn't expressed at all, move on to the other breast. After completely expressing the other breast, go back to the first breast and express for 5 more minutes and then go back to the other breast and express for another 5 minutes. This is because the milk that is expressed in the second half is high in fat and therefore calories. When transporting the stored milk to the hospital, use an ice box with ice or an ice cold pack inside.

Breast Milk Enhancer

If the baby is fed 100cc of breast milk per 1kg of bodyweight, because the nutrition in the milk is not sufficient, it is supplemented with a breast milk enhancer containing protein, calcium, phosphorus, etc.

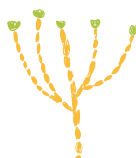
Preterm babies can have a lack of vitamins, so your baby will be given multiple vitamins from the time that he or she starts feeding sufficiently. Preterm babies are born without having gotten enough iron from their mothers, so they need to get a sufficient amount of iron. If your baby's daily breast milk intake is insufficient, he or she will be given an iron supplement. There are some products in syrup form that are made to be easy for your baby to eat.

Can such a tiny baby have surgery safely?

Preterm babies are more susceptible to illnesses than term babies. Because of this, there are cases where it is absolutely necessary for a preterm baby to have surgery. How can such tiny babies undergo surgery? In the past, such a thing would have been unthinkable, and even now, it is only possible in large hospitals with sufficient facilities. It is very advanced and precise medical treatment.

Patent Ductus Arteriosus

One disease that often requires surgery is patent ductus arteriosus. As mentioned earlier, the artery between the aorta and pulmonary artery in the heart often remains open or closes and then reopens in preterm babies, placing great strain on the heart. The first line of treatment is medication, but if the artery still doesn't close, it is necessary to close the artery surgically. If the baby doesn't have surgery, the heart continues to operate under tremendous strain and this can lead to heart failure. The surgery is performed under general anesthesia, and it is not an operation that is performed on the heart but an operation to lift the baby's lungs and find the artery known as the patent ductus arteriosus and then tie or clamp it shut. The surgery is very safe and goes without any problems in almost all cases. However, since



there are many large arteries near the patent ductus arteriosus, in rare instances, one of these arteries can become damaged during the procedure, which can cause bleeding resulting in a pneumothorax (collapsed lung). It takes days for the baby to recover from surgery, and the length of time it takes to recover normal lung state and breathing function varies from baby to baby.

Necrotizing Enterocolitis

Necrotizing enterocolitis may require surgery. If inflammation progresses and the intestines become damaged, the damaged part of the intestines must be surgically removed to keep the intestines healthy. A laparotomy (open abdomen surgery) is performed under general anesthesia. The damaged part of the intestine is removed and then the remaining healthy intestine is reconnected. When the damaged area of the intestine is clear and the parts to be connected are clean, they are connected right away. However, in most cases, both ends of the cut intestine are made to protrude from a hole in the baby's abdomen to allow the damaged intestine to recover, and the baby's stool will also come out of here. It may sound very strange to hear that we create a route for the baby's stool to come out of his or her abdomen, but you must understand that it is a necessary process to enable the baby's speedy recovery. A bag that collects the stool is attached to the baby's abdomen, but a diaper is also put on the baby's bottom. Surgery is performed again before the baby is discharged from the hospital, but if the baby is discharged early, you have to learn more in depth about how to care for the baby.

Retinopathy of Prematurity

Another problem that causes preterm babies to require surgery is retinopathy of prematurity. The blood vessels in the retinas of preterm babies are in the process of growing toward the front of the eye. So, if the blood vessels in the retina that are growing are damaged, new blood vessels grow in their place. This causes scarring and pulling on the retina, which can cause it to become detached. In the past when

we didn't know about this condition, there were many preterm babies that ended up going blind.

These days, however, extremely low birth weight babies born extremely early are given regular retina exams in the neonatal intensive care unit by an eye specialist. If the baby has severe or wide-spread retinopathy, he or she is given medication or freezing or laser surgery as this can reduce problems eyesight. In many cases, retinopathy of prematurity stops progresses and regresses by itself; however, if the baby's eyesight is in any danger, the above procedures are carried out. When retinopathy of prematurity causes detachment of the retina, the part that has become detached is pressed like a Band-Aid from outside the eye, or the corpus vitreum (clear gel filling the space between the retina and the lens) is removed to stop it from pulling on the retina. Even in severe cases like this, performing surgery without delay is helpful for preserving the baby's eyesight even if just a little.

Hydrocephalus (Water on the Brain)

Most cases of intraventricular hemorrhage are not severe and recover without intervention; however, in severe cases, the area of bleeding can expand and this can lead to hydrocephalus, or 'water on the brain'. Enlargement of the cerebral ventricles is referred to as hydrocephalus. When this occurs, the inside of the head becomes like a pouch filled with water, and this causes pressing on the brain which can lead to brain damage. For that reason, the baby has to undergo surgery in which a tube is inserted into the affected ventricle inside the head with the other half of the tube inserted into the abdominal cavity to move the fluid from the brain to the abdomen.

Inguinal Hernia

In preterm babies, inguinal hernias can often occur near the groin, which causes bulging to be visible or felt. Inguinal hernia is not something to worry about in itself; however, if the intestine is pressed down and does not recede back into the abdominal cavity, twisting



of the intestine can occur. This can cause a lack of blood flow in the intestine which can then result in damage to the intestine. In such a case, emergency surgery is required, and it could be dangerous for the baby. Therefore, once the baby has grown big enough to receive surgery and his or her overall condition is fine, surgery is performed in advance in principle. Preterm babies often have surgery before being discharged from the hospital. Under anesthesia, a small incision is made at the site of the hernia, the route of the hernia is identified and held in place. Recovery after surgery is usually fast.

Preterm Baby Care After Discharge

When can my baby come home?

After preterm babies have gotten through difficult treatments such as medical ventilation and are consuming enough nutrition, their body weight gradually begins to increase. At what weight can my baby come home? In the past, preterm babies were treated in an incubator until they reached a body weight of 2.5kg. These days, however, preterm babies are often discharged early as we now know that they can cope even at lower weights.

Once the baby has come out of the incubator and can maintain body temperature unaided, is properly digesting an amount of breast milk and/or formula that can supply an adequate amount of nutrition, and is showing continuous increase in bodyweight, then the baby will be able to go home. Of course, if there is still treatment to be performed that can't or there are still tests to be performed, then the baby will have to stay in the hospital.

What tests need to be done before discharge?

Preterm babies that were born extremely early at an extremely low birth weight need to be checked by an eye specialist to determine whether there is any occurrence of retinopathy of prematurity or to check on the progression of previously confirmed retinopathy of prematurity. Blood pressure also needs to be measured, and ultrasound examinations also need to be performed. Preterm babies are at an increased risk of hearing loss and must have a hearing test before or after discharge from the hospital.

Hernias often occur in preterm babies, which is why they need to be checked for hernias before being discharged.

Once all the problems that need to be treated have been resolved and it has been determined that the baby is capable of growing without medical aid, the baby may be discharged from the hospital. However, it is often difficult to stop oxygen therapy entirely in babies with chronic lung disease. Rather than having the baby separated from his or her mother until the oxygen therapy is completed, it's possible to continue oxygen therapy at home after discharge.

Wonderful Baby, It's time to go home!

What kind of preparations do I need to make for the day my baby comes home? Mothers are often excited and nervous at the same time about taking their baby home. To reduce your worries, be sure to talk with a member of the medical team in the neonatal intensive care unit and practice caring for your baby before taking him or her home. If you don't prepare enough in advance, you may have lots of worries and struggle to get any sleep at night. Be sure to prepare clothes for your baby to wear and a baby blanket to wrap your baby up in, and make sure that you prepare an adequate environment in the room that the baby will be in.



Baby Clothes

Prepare some baby clothes made of soft cotton. Because your baby is still smaller than a 'term baby', it's best to put baby clothes specially made for preterm babies on your baby. If putting 'term baby' clothes on your baby, be sure to add an extra button at the neck to keep the baby warm.

Temperature and Humidity

The temperature and humidity of the room where the baby will be staying may be the same as with term babies. The temperature should be kept between 24 and 25°C and the humidity between 30 and 60%. If it is summertime, you can use air conditioning in the room that the baby is in. However, because the baby's immune system is weak, be sure to clean the air conditioner filter beforehand. Use a humidifier to increase the humidity if it is low. Because bacteria can grow in the water of a humidifier, be sure to use a heated humidifier. If it is not the heated kind, clean the humidifier beforehand and change the water every day.

Body Temperature

It is necessary to take your baby's body temperature several times a day even after your baby has come home. To take your baby's temperature, you can use a mercury thermometer, tympanic thermometer or electronic thermometer. Mercury thermometers used to measure rectal temperature are the most accurate, but mercury thermometers are not recommended for use because they can break. Ear thermometers may not be accurate as there may be wax in the ear or the temperature of the ear may be affected by something that has been in contact with the ear. It is the safest and easiest to take measurements from the armpit using an electronic thermometer. When measuring with an electronic thermometer, hold the sensor part in your hand to warm it up to a sufficient temperature, put it in the baby's armpit and hold the baby's arm in place until the thermometer stops operating. For babies, it is best to use a thermometer whose end

part can be bent.

Restrict Visits from the Outside

Once your baby is home, it is a good idea to restrict visits from the outside. Because your baby's immune system is still weak, it is susceptible to infections. It is important to reduce the chance of germs or viruses being transferred where possible. You should also restrict access to the baby's room by other children in the house. Also, if any adult in the house is suspected of having any infectious disease such as a cold or stomach bug, it is best for the baby's safety for that person to stay out of the room that the baby is in. Grandparents and other family may be a little sad, but they need to understand that it is for the baby's safety.

Oxygen (Breathing) Machine or Monitor

If your baby is using an oxygen (breathing) machine or monitor, place the baby's bed close to a power outlet, and keep a phone in the baby's room so that you may make an emergency phone call if necessary. In addition, the number of the place to contact in case of an emergency should be kept next to the phone on a sticky note or what have you.

Baby Car Seat

It is common to see people holding a newborn baby in their arms in the car on the day that the baby is discharged from the hospital. It is a deeply moving experience to hold your baby in your arms after having waiting to do so for so long. However, you should not be holding the baby in your arms when traveling by car. You must have a baby car seat installed in the back seat of the car on the side opposite the driver's seat, and you must lay the baby on the seat and observe him or her as you travel. Of course, the baby should be facing the rear. Because there are no specially made car seats for preterm babies, it is recommended to lay the baby down and then fill in the spaces at the sides with towels or blankets.



From what date should I compare my baby's growth to average expectations for the growth of term babies?

Corrected Age

The day that your baby is born is registered as the baby's date of birth. So that day is your baby's birthday. However, in the case of preterm babies, observing the baby's growth on the basis of their birthday makes it seem as though the baby has slower development or growth than other babies. This is why many people refer to preterm babies as being 'late'. When it comes to preterm babies, we have to observe their growth and development based on their original due date in order to make correct observations. In other words, if the current (actual) age of a baby born two months earlier than his or her due date is 9 months, then we take 2 months away from that to get 7 months which is the considered age when measuring development and growth. This is referred to as the 'corrected age'.

There is also the method of looking directly at the development process from the date of birth. For example, let's say that a baby whose due date was May 1 was born on March 1. If that baby first rolled over onto his or her belly on October 1, then when considering the corrected age, that baby has first rolled over at the age of 7 months. However, when considering the original due date of the baby, he or she has rolled over for the first time at the age of 5 months old and is considered to be developing at a normal rate.

It's usually alright to stop using the corrected age when observing development and growth between the ages of 2 and 3 years. Prior to the baby's first birthday, there are significant advances in growth and development in a few months of time, but later on, there aren't really any significant differences in such time frames. However, if a baby was born extremely early with an extremely low birth weight, the length of time that the corrected age needs to be used is longer, and if the baby was born late enough not to make much of a difference from if born on his or her original due date, then it would be normal for that



baby to have caught up in terms of growth before his or her second birthday.

Are there any problems or difficulties that may continue after the baby is discharged?

Many people presume that preterm babies will always end up with disabilities. However, most preterm babies grow up to be healthy. However, there are cases in which preterm babies go through a lot of struggle in their early days which can lead to long-term problems. If your baby does have some aftereffects or disabilities, it's best to think that they are troubles that the baby will overcome as time passes.

Preterm Baby Clinic (Neonatal Follow-up Care)

After discharge you will meet with the medical team that took care of your baby. Your baby will be treated as an outpatient according to a schedule at facilities referred to as the preterm baby clinic or neonatal follow-up care clinic depending on the hospital.

One of the most important things to check up on after discharge is the growth and development of the baby. Since your baby was born early at a low birth weight, it is important to provide him or her with care to ensure that he or she grows healthily like other babies, and any medical problems your baby had before will be checked up on. Therefore, it is not in the baby's best interest to have a medical consultation with another healthcare provider who has not personally treated your baby. During the outpatient visits, the neonatal specialists will refer you to another specialist for treatment, and will provide you with guidance on having your baby receive treatment at the appropriate times. Therefore, you should receive guidance from medical professionals who have expertise in preterm baby care.



Bronchopulmonary Dysplasia (Chronic Lung Disease)

Preterm babies who have received medical ventilation treatment or babies that were born extremely early even if they did not have to receive medical ventilation treatment may develop chronic lung disease which causes breathing difficulties. The sooner into the pregnancy that the baby was born, and the lighter the baby's birth weight, the greater the risk of developing chronic lung disease. The medical term for chronic lung disease is bronchopulmonary dysplasia. The bronchial tubes become damaged due to various causes following birth. As a result, the ability of the lungs to exchange gas becomes hindered, and sometimes this can lead to prolonged medical ventilation or oxygen therapy.

Oxygen and Monitor

In some cases in which the baby has been treated for a long period of time with a medical ventilator or oxygen therapy, the baby may be discharge with oxygen therapy and a monitor to take home. It's very important for babies with chronic lung disease to get enough nutrition, but it's important that their water intake isn't too high. If their water intake is too high, this will put a strain on the lungs. The concentration of oxygen in the blood should be maintained properly so that the lungs are not damaged and recover without problems. If the endotracheal tube is kept in place for a long time for the purpose of medical ventilation, the procedure of connecting a medical ventilator to the neck via tracheostomy (incision in the neck) is considered. Most babies will recover quickly and will go home a little sooner than their original due date. If they do not finish oxygen therapy and are discharged, most of them will have stopped oxygen therapy before their second birthday.

Babies whose oxygen levels are maintained only when oxygen is continuously supplied at the time of discharge are discharged with oxygen to be supplied at home. You should know the capacity of the oxygen tanks and the available times, and you should be trained to be able to monitor the condition of the monitor and the baby. If the baby

is given oxygen through the nose, put the baby's hands behind his or her ears so that he or she doesn't pull it out, and put the tube inside the baby's clothes. Also, make sure that you have enough tubing to connect depending on your baby's development so that the baby can move freely. If the baby has had a tracheostomy, you should know how to remove the sputum and how to disinfect and manage the tracheostomy tube.

Retinopathy of Prematurity

Retinopathy of prematurity is a problem that requires long-term observation of the baby. As explained previously, most babies are discharged from the hospital having completed the initial examinations and having overcome sudden or potentially dangerous ailments; however, it should be ensured that babies who require treatment for retinopathy do not miss their appointment with the eye specialist after discharge. Parents absolutely must not delay or ignore appointments and stop care for the baby. Before hearing the welcome words of, "There won't be any need to come in often," you must have your baby receive treatment on the appointed date.

Cerebral Palsy

Some babies with neurological problems also require long-term observation and care. It is relatively common for muscle tension or reflex abnormalities to be observed in preterm babies before their first birthday. Not all of these babies have cerebral palsy. Of course, even at this age, babies who had severe intracerebral hemorrhage or periventricular leukomalacia are sometimes diagnosed with cerebral palsy (CP). However, most of them are diagnosed with cerebral palsy after a little more time, depending on whether there are differences in muscle tension, reflexes remain for a long time, the baby is slow to learn how to move, or the movement of the babies limbs is abnormal. Babies with nervous system-related symptoms should be treated by a pediatric neurologist and a rehabilitation physician. Your baby will be given a developmental test to make a proper assessment, and he or she



will be provided with physical or occupational therapy to give him or her the necessary exercise. There is no need to think that your doctor is trying to give you false hope when saying, “We will have to just keep our eyes on the baby’s development.” The reason the doctor says this is because it’s true. Also, there is no reason to misunderstand the suggestion of, “It would be a good idea for your baby to have physical or occupational therapy,” as meaning that the baby’s condition is not good. The baby’s muscular movements will be restored on their own, but helping them recover faster is necessary because this can help with cognitive development and other developments in the baby. Even if your baby has a lot of damage to his or her nervous system, your baby’s brain is very capable of recovering, so it’s a good idea to consult your doctor for advice and continue to receive follow-up treatment.

How should I feed my baby?

By the time the baby goes home, he or she will be consuming a good amount of breast milk or formula from a milk bottle. First, you should feed your baby the same way as he or she was being fed in the hospital. However, if you are feeding the baby breast milk, you can change the method to the baby suckling from the breast directly.

Feeding Breast Milk Right Away

It is not easy to breastfeed a preterm baby who is used to drinking milk from a bottle. However, if you have been practicing since being in the hospital, it will be easier. In contrast with the bottle feeding method in which the baby doesn’t open his or her mouth wide and blocks the hole of the teat with the tongue to swallow, when feeding directly from the breast, the baby needs to get his or her tongue under the subareolar area and latch on deep enough to withdraw the milk. It is best not to rush breastfeeding practice, and it’s best not to attempt it if the baby is very hungry and crying to be fed. It’s a good idea to

have the baby bite latch onto the breast before he or she starts crying after waking up and looking for the breast while tossing and turning and moving his or her legs around. When the baby latches on, gently press on the baby’s chin to get him or her to open his or her mouth a little wider or put the subareolar area of the breast on the baby’s bottom lip to make the baby open his or her mouth wider, allowing the baby to get his or her bottom lip onto the subareolar area to be able to suckle the breast deeply enough to draw milk. Your baby’s lips should be turned out like kind of like a fish’s mouth to suckle the teat efficiently. If the amount of breast milk is insufficient, put some breast milk enhancer in a bottle and have one end of a tube in the bottle and the other end of the tube right under your nipple so that the baby gets breast milk enhancer together with the breast milk.

Milk Formula

If the amount of breast milk is not enough or you are unable to breastfeed your baby, you will have to give the baby milk formula. Milk formula needs to be prepared in a precise way. Boil some drinking water and then cool it, then at the proper amount of milk formula. It is not advisable to put milk formula in anything but drinking water. If it says on the milk formula tin to add 1 spoonful to 20cc of water and you want to make 100cc of formula, add 60-70cc of water and five spoonfuls of formula and shake well. Then add water until reaching the 100cc mark on the bottle. The amount the baby drinks can be increased gradually based on the amount that he or she was drinking at the time of being discharged from the hospital. The amount of milk consumption varies depending on your baby’s growth rate, but because the baby needs between 120 and 150 calories per kilogram of bodyweight per day, you should aim to feed him or her this much.

Baby Food

The length of time that babies consume only breast milk or milk formula is 4 to 6 months. After that, the baby starts to eat baby food



together with breast milk and/or formula. In the case of preterm babies, it is better to start feeding him or her baby food between 4 and 6 months based on the corrected age rather than the baby's actual date of birth. It will be easier to feed the baby baby food around this time. If the baby can keep his or her head steady while being helped to sit up and see adults eating food, he or she will become very interested. It is also recommended that you start feeding the baby baby food from this time as the tongue pushing reflex is also lost. However, if the baby has a family member who is allergic to any foods and there is a high risk of the baby being allergic, it is a good idea to start your baby on baby food slowly.

The tips for feeding your baby baby food are the same as those for 'term babies'. Adding new foods to your baby's diet should be done at least a week apart and you should observe your baby's reaction to the new food closely. Feeding is done with a spoon, initially giving 1 to 2 spoonfuls and gradually increasing the amount. You should not add salt or sugar to the baby food when preparing it.

What is the vaccination schedule I should follow?

Hepatitis B

Because preterm babies spend months after birth in the neonatal intensive care unit before being discharged, they are sometimes discharged without having received vaccinations. First of all, there is no separate vaccination schedule for preterm babies. Bacteria and viruses are always a threat to your baby from birth. Therefore, your baby's vaccination schedule should be set based on the day he or she was born. However, for hepatitis B, it is not clear whether vaccination of babies under 2kg is effective, so this vaccination should be provided again after the baby has reached 2kg. It is advisable for your baby to have the other vaccinations closer to the original schedule based on his or her date of birth.

Influenza Vaccination

In particular, all family members of preterm babies must have a flu shot every year. Because babies need to be at least six months old before they can have a flu shot, other family members must have flu shot before the baby is six months old. Adults and other family members should protect themselves from the flu in order to protect the baby from the flu by getting flu shots in advance.

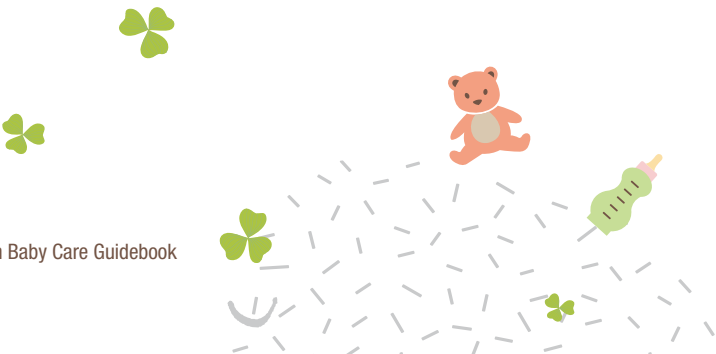
RS Virus Immunoglobulin Injection

There are vaccinations that are given to preterm babies only. Preterm babies are particularly vulnerable to the RS virus in the winter. The virus infects the respiratory tract and causes acute bronchitis or pneumonia. This virus can be very dangerous and sometimes fatal to preterm babies with chronic lung disease or who were born extremely early. However, no vaccine has been developed for this virus. Instead, immunoglobulin injections are given to help protect the baby. RS virus immunoglobulin injections can block the RS virus while it has a remedial effect. Because the remedial effect lasts for about one month, the baby needs to have an immunoglobulin injection one month before October when the epidemic starts, and then one immunoglobulin per month until the spring comes, which is a total of 5 times. Because health insurance in Korea doesn't cover all babies that require vaccinations, it is quite expensive; however, it lessens the likelihood of your baby becoming ill, and helps to prevent him or her from suffering, so it is highly advisable.



Vaccination Schedule

Vaccination Type	Time
BCG	In principle, this vaccination should be provided within four weeks of birth. However, being a live vaccine, it is not given during hospitalization but at the earliest possible time following the first outpatient visit.
DTaP	This vaccination is given at 2, 4, 6, and 18 months and then again between the ages of 4 and 6 years.
Polio	This vaccination is provided at 2, 4, and 6 months and then between the ages of 4 and 6 years.
Hib	This vaccination is given at 2, 4, and 6 months and then again between the age of 12 and 15 months.
Pneumococcus	This vaccination is given at 2, 4, and 6 months and then again between the age of 12 and 15 months.
Hepatitis B	This vaccination is given immediately after birth and then two more times at 1 and 6 months. Because it's ineffective in babies under 2kg, it is given another 3 times after the baby reaches 2kg. If the mother is a carrier, vaccination is commenced immediately after birth. If not, then vaccination may commence within two months once the baby has reached 2kg
MMR	This vaccination is given once between the age of 12 and 15 months and then again between the ages of 4 and 6 years.
Chicken Pox	This vaccination is given between 12 and 15 months old.
Hepatitis A	This vaccination is given 2 times at 6-month intervals after the baby reaches the age of 12 months.
Japanese Encephalitis	In the case of an inactivated vaccine, it is administered at intervals of 1 to 2 weeks at the age of 12 months, and then a third dose is given after 1 year. Additional doses are given at the ages of 6 and 12 years. In the case of a live vaccine, it is given at the age of 12 months, then again a year later. An additional dose is given at the age of 6 years.
Flu Vaccine	Flu vaccine is given every year after the baby reaches 6 months of age.



Introducing some people
who were born as preterm babies



There are many famous people who were born as preterm babies. Newton who discovered universal gravitation, famous French writer Jean Jacques Rousseau, Voltaire, German writer Goethe, American writer Mark Twain, Winston Churchill the great politician who led Britain, Einstein who developed the theory of relativity, impressionist painter Renoir, Charles Darwin, Napoleon of France, and many other historical figures were born prematurely to go on to achieve great things and leave their eternal mark on human history.

When considering that the people that lived in the times of the above historical figures hung onto to their every word and followed them, it's clear that being born as a preterm baby is merely a matter of date and not something to despair or feel sad about. It is just a difficult ordeal that some babies have to get through. In addition, medicine has become so advanced as to allowed preterm babies to grow up and live wonderful lives.

President Kennedy's third child, Patrick, who was born at 34 weeks of gestation and died of respiratory distress syndrome just thirty-nine hours after his birth, put the spotlight on the need for research and investment for preterm baby care. When considering that now even in Korea babies born at 34 weeks are more than likely to survive respiratory distress syndrome, we cannot help but feel grateful to all those people who have contributed to the development of the field of neonatal care over the years.



[Projects to Provide Support for
Inpatient Treatment Costs]

The story of Rayul Bae

that shines with great love and faith



Youngest daughter Rayul, who laughs and cries heartily

“Although she has grown up to be very shy I am still extremely grateful that she is growing up well without any problems. She cries the roof off when she wakes up from sleep, and when she does, I watch a video of her when she was in the incubator. I made up my mind at the time that I would never get angry at her and wouldn’t be bothered by her crying and I would just be grateful that she made it. That’s the promise that I made.”

Raim and Rayul’s mother, Mrs. Yunok Park, smiles brightly as she skillfully humors Rayul when she is crying loudly when there’s a stranger around. She has been in her mother’s arms for 7 months now. Rayul, who was in an incubator and relying on a ventilator to breathe as her lungs were weak, is growing up well and now rolls over onto her belly, and is learning about the world that she observes with those eyes filled with curiosity.

Sudden Pain at 28 Weeks

She was living with her frugal and strong husband and her cute Daughter Raim. One weekend, she left Raim with her mother and did a little makeup artist work, which is the work she was engaged in before getting married, and she was planning start working full-time again soon.

“I had gestational diabetes during my first pregnancy, but I didn’t have any health problems when I was pregnant with Rayul, so I never thought for a second that she would be born early. In the first trimester, I went to the hospital because of spotting and was told that I would be fine if I just got a shot of an anti-miscarriage drug. I got the shot and felt safe after a while as nothing had happened.”

At 28 weeks, however, I suddenly got abdominal pain. I had felt such pain before and so didn’t think much of it. I was told before that it was due to my activity levels and thought that that was the case this time as well. I thought that since I had a regular appointment at the clinic to go to anyway that I could just tell the doctor about it then. But the doctor wrote a medical certificate saying that I should be moved to a general hospital immediately. After being scolded by the doctor for ignoring the pain and being told that it’s possible that it seems like the baby isn’t breathing, I was rushed off to the general hospital. The doctor there said that we must do everything we can to stop the baby from being born until week 35, but Rayul came into the world at week 32. She couldn’t breathe by herself so she was put in an incubator.

Meeting with the Beautiful Foundation

“Our family was suddenly facing a difficult time. My husband’s work wasn’t going too well, and he started getting sick also. He had to have surgery right away. Within three days of Rayul being discharged from the hospital, my husband had to have surgery. It was such a terrible situation.”

She wondered if bad things always happen in clusters like this. The problem her husband was having in his logistics business was not easily solved. He had to pay a fine for unintentional vehicle overloading, and had pay huge taxes out of his own pocket to cut the company’s tax burden. To make matters worse, he had a tire blow-out on the expressway from Gyeongnam to Seoul when transporting goods. In the end, he had decided to sell the truck and close the business. He had gout and a bad knee, and caught a disease whose cause was unknown and had to have surgery.

During her first pregnancy, Mrs. Park had diabetes and was considered high-risk, and she had thought that the government would provide her with aid, but such aid was not at all easy to obtain. She was able to receive support for some of the costs and the procedures were very complicated. Unlike when she was pregnant with Raim, she didn’t



have gestational diabetes at the time, so the amount in benefits that she could receive from the government was less than KRW 500,000 (approx. \$425). With her husband having to pay for surgery immediately before Rayul's discharge from the hospital, they didn't know what to do, but luckily they saw a poster in the elevator advertising the Beautiful Foundation.

"My husband saw the poster and thought that it had nothing to do with us. But we were clutching at straws at the time so I called up the Beautiful Foundation. There was a medical social welfare department in the hospital, and the Foundation told me to speak with them. I went to have a consultation immediately. I had searched for other support programs, but the procedures were complicated and the conditions were often difficult to meet when I applied for them. Besides, most of them were settle first and get a refund later kind of deals, which made me wonder who would be eligible to receive such support when they could afford to pay the costs themselves. It looked really bleak ahead. There was hardly any information about preterm babies, and when researching myself, I found that surgery alone cost tens of thousands of dollars. I was terrified. But thanks to the Beautiful Foundation, I was able to leave the hospital without any problems. I can't even imagine what would have happened if it weren't for the Beautiful Foundation. At that time, we were thinking about taking a private loan. We thought about using our apartment security deposit to pay expenses and moving into a tiny low-cost one-bedroom place used by students known as a 'goshiwon' in Korean."

The most important thing is to believe in the child

Rayul eats almost anything. She now weighs close to 8kg. However, she has poor digestion, so she throws up often, and her hearing is not good so she has to be examined. She's already had four examinations, but nothing's been confirmed yet. She will have her final hearing test in April.

"I've heard that even slight problems with hearing in babies can interfere with language development. If Rayul is found to have a hearing problem at her final hearing exam, she will have to wear a hearing aid to correct it, and if that doesn't work, she will need to have a Cochlear implant. Every time she has an exam, she needs to fast and be put under anesthesia, which breaks my heart. The examination and treatment costs are also a burden. But I'm quite sure that there isn't much wrong with Rayul's hearing. I think she hears well. I'm staying positive."

Mrs. Park was making constant eye contact with Rayul while telling us her story. Her opinion is that we should believe in the child first over stories and rumors circulating the Internet. Perhaps she believes that the child can pick up on the mother's belief. Rayul is healthy and without complications.

Thanks to her mother who always believes in her children, Raim also understands that her mom and dad need to pay more attention to her little sister. Although she can't read yet, Raim talks to Rayul about what's happening in the picture books, and she holds Rayul in her arms as she rushes about the living room being the big sister. The girls' mommy watches them affectionately and their daddy looks after them well. Rayul is growing up well surrounded by her family.

"She was born differently, but I don't think she will be different from other children. Every child is different anyway."

It looks as though Rayul understands what her mother is saying as her eyes light up in her mother's arms. The belief of her mother lights up Rayul.



Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

Preterm Baby Rehabilitation Treatment

Preterm Birth and Cerebral Palsy
Cerebral Palsy Symptoms and Treatment
Correct Posture and Exercises for Rehabilitation

Rehabilitation Treatment for Preterm Babies

Bucheon
St. Mary's Hospital
Professor Hyewon Kim

Preterm Birth and Cerebral Palsy

What is cerebral palsy that often occurs in preterm babies?

Cerebral palsy is a clinical syndrome that causes problems with movement and posture due to non-progressive brain injury or brain lesions occurring during the fetal period or infantile period. It causes limitation of activity, and it is a disease that is often accompanied by visual, auditory, sensory, cognitive, language, and behavioral disorders.

When brain lesions or damage are diagnosed as being non-progressive, most of the time there has been no activity; however, the clinical symptoms that appear in infants vary depending on the growth of the child and may be mistaken as being progressive.

How common is cerebral palsy?

The incidence rate of cerebral palsy is 2 to 2.5 per 1,000 surviving infants, which makes it relatively rare, but around 40-50% of these cases occur in preterm babies. Most preterm babies are low birth weight (LBW) babies. Among LBW babies, the rate of occurrence of cerebral palsy is 8.5 per 1,000, and in the case of extremely low birth-weight (ELBW) babies, the rate is 77 per 1,000, meaning that such babies are at a 60 times higher risk of developing cerebral palsy than babies with a normal birth weight at 1.3 per 1,000.

Therefore, it is crucial to detect and treat cerebral palsy in preterm babies and low birth weight babies early through regular medical treatment by a rehabilitation medicine specialist.

What causes cerebral palsy?

Causes of cerebral palsy are diverse, with the cause being unknown in 25% of cases. In most cases, there are one or several causal factors, and they are usually difficult to identify, which means that there is a lot of guesswork involved. According to recent studies, prenatal causes and intranatal risk factors account for about 85% of cases, and the most significant and potent risk factors are preterm and underweight births. Preterm birth is the most significant single risk factor for cerebral palsy, so if your child is born preterm, it is crucial to keep a close eye for symptoms. Risk factors according to stage are as follows.



◆ Causes during pregnancy

Maternal infection (especially during the first trimester), radiation exposure (x-rays, etc.), drug use, umbilical cord anomalies, placental abnormalities, anoxia during pregnancy, congenital brain anomalies, preeclampsia, maternal iodine deficiency, alcohol use during pregnancy, inconsistency of blood type, preterm birth, etc.



◆ Causes during labor

Abnormal delivery, excessive bleeding, funis presentation, airway obstruction, respiratory paralysis, amnion aspiration syndrome, etc.



◆ Postnatal causes

Nuclear jaundice, head trauma, infection (encephalitis, meningitis), brain tumor, child abuse, etc.

Hemorrhage in the developing brain or shortage of oxygen



supply due to such causes eventually leads to cerebral palsy. The brain of preterm babies is more vulnerable to oxygen deficiency or hemorrhage than a full-term baby brain, and even small damage or lesions are more likely to produce cerebral palsy in preterm babies than in full-term babies.

When should a preterm baby be treated or examined closely by a specialist?

In preterm babies and low birth weight babies, the prevalence of cerebral palsy is much higher than in full-term babies, and the brain is much more susceptible to hypoxia or hemorrhage, so it is ideal for preterm or underweight babies to receive regular rehabilitative care after delivery. In particular, it is recommended appropriate tests are performed to detect movement disorders early in the rehabilitation medicine consultation when your baby has any of the following symptoms.

- Turning over onto abdomen within 3 months of birth
- Clenching fists tightly and not opening hands very much after reaching 3 months of age and having little response to environmental stimuli
- Unable to keep head steady unaided even after 4 months since birth
- Not trying to grab onto objects even after 5 months
- Unable to sit upright unaided when seated after 7 months
- Sits up but only sits on knees, or crawls but crawls two hands forward at a time
- Unable to crawl or stand up when holding onto something even at 12 months
- Using only one hand before 12 months old

Cerebral Palsy Symptoms and Treatment



What are the symptoms of cerebral palsy?

Cerebral palsy is classified into spastic, athetoid, and ataxic according to neurological characteristics. Athetoid cerebral palsy is classified into athetosis type, choreo type, ataxic type, choreo-athetosis type, dystonia type, etc.

Spastic Cerebral Palsy

Spastic cerebral palsy is classified as quadriplegic, diplegic, and hemiplegic depending on the affected areas. Diplegic refers to cases in which the upper limbs have movement disorders but the lower limbs have more distinct motor disorders. It occurs more frequently in preterm babies than full-term babies. Spastic cerebral palsy is characterized by a decrease in muscle tone in the early neonatal period, but it gradually increases, resulting in deformation of the musculoskeletal system such as in joint formation. In the case of limb paralysis, the muscle tone of the limbs and the trunk is seriously lacking, and opisthotonos is present in some cases.

Athetoid Cerebral Palsy

Athetoid cerebral palsy has the characteristic that the muscle tone changes according to the situation, and postural control and coordinated movement disorder, which are more severe when attempting deliberate movements, are present.

Clinical Symptoms of Cerebral Palsy

The clinical symptoms of cerebral palsy vary widely depending on the severity and extent of damage to the brain, so it may not be possible to detect symptoms for a long period of time and sometimes there are severe symptoms from birth. During the neonatal period, babies are not able to suckle well or they whine a lot. However, a diagnosis of cerebral palsy cannot be made based



on these symptoms alone, and it's only possible to make such a diagnosis when retarded motor development and abnormal posture or movement patterns are observed. Therefore, clinical symptoms include abnormal movement or posture by period depending on the child's growth. For example, the child may crawl with two hands and legs moving forward at the same time like a rabbit or crawl on the belly only, may walk with equinus gait, may have flexed posture when walking, may walk with scissor gait, may walk with stiff-knee gait, etc.

Equinus Gait and Flexed Posture

Equinus gait is walking on the tiptoes and is caused by the stiffening or shortening of the plantar flexor muscles. Flexed posture is walking with both knees and hip joints flexed, and it is caused by stiffening or shortening of the popliteal (hollow back of knee) muscles and iliopsoas (hip flexor) muscles.

Scissor Gait

Scissor gait is a condition in which the adductor muscles of the hip joints are stiff and rigid, and if the proper treatment is not partial dislocation of the hip joints may occur.

Comorbid Disorders

Because brain lesions are not confined to areas of the brain controlling movement, various other disorders may be present. The presence of such other disorders has an effect on the treatment of motor disorders, so it is very important to diagnose and begin treating the comorbid (accompanying) disorders early. Intellectual impairment is present in around 50% of all cases of cerebral palsy, usually spastic quadriplegic cerebral palsy and tends to be proportional to the severity of the motor disorder.

Spasticity

Spasticity is often accompanied by generalized tonic-clonic seizure in spastic quadriplegic cerebral palsy, and absence seizure is often present in hemiplegic cerebral palsy, so treatment such as anticonvulsants is required. If spasticity is not well controlled, cognitive development is impaired and this can have lasting aftereffects. In about 60% of cases, there are comorbid articulatory disorders, including language delay, and visual disturbances, such as strabismus (cross-eyedness) caused by unbalanced muscles around the eyes, and eyesight problems caused by retinopathy of prematurity, are also common. Other comorbid disorders such as eating disorders, hearing disorders, developmental delay, and learning disabilities are also common.

What does kinesitherapy for treating cerebral palsy entail?

Neurodevelopmental Therapy

Treatment of cerebral palsy is aimed at minimizing comorbid disorders, including motor disorders and reducing secondary deformities or complications that can occur. Treatment of cerebral palsy is very comprehensive with various treatments combined, and appropriate treatment should be selected according to the stage of development of the child and the severity of the disorder. It is not an exaggeration to say that there is no complete cure for cerebral palsy as of yet. In adults, treatment is merely aimed at re-acquisition or improvement of lost functions; however, treatment of cerebral palsy has to be linked with development, so the treatment should be adjusted according to the period in consideration of development. Currently, the most common treatment is neurodevelopmental therapy, which induces reconstruction of the damaged brain, ultimately making it possible to improve function through motor development.



Bobath Therapy

Among the neurodevelopmental therapies, Bobath therapy is the most commonly used therapy. Bobath therapy is based on the principle of normalizing muscle tone and promoting normal posture by controlling primitive reflexes and spasticity.

Vojta Therapy

Vojta therapy uses tactile stimuli to develop proprioceptive input that induces reflexive rolling over and reflexive crawling.

Rood Therapy

Rood therapy stimulates automatic movements through tactile stimulation, leading to gradual motor development. Joint movement exercises and strengthening exercises should be performed. Walking training should be provided when the child starts to stand up according to the stage of exercise development.

Does cerebral palsy require medication?

Anticonvulsive Medication

In the early stages of cerebral palsy, anticonvulsive medication is sometimes necessary as spasticity becomes more apparent. The most commonly used oral anticonvulsive drugs are baclofen, dantrolene, diazepam, and tizanidine, which are used when systemic spasticity needs to be controlled. However, drug compliance in children is low and there is a risk of side effects in that the drugs can affect cognitive function and so children taking such medication should be observed carefully. When local spasticity control is required, nerve blocking using phenol or alcohol, motor point block, and motor point block using botulinum toxin are performed. Phenol is usually 5% concentration, and it is injected after finding the position of the nerve or motor point with minimum electric stimulation. The effect of injecting phenol lasts for about 6-12 months. Botulinum toxin acts

on the acetylcholine receptors of the neuromuscular junctions and has the effect of reducing spasticity. Therefore, it is easier to treat moving children because has the advantage of acting on receptors by diffusion, even without having to find precise neural or motor points like in phenol injection.

Do children with cerebral palsy need to wear braces?

In the case of a spastic cerebral palsy, appropriate extension exercises should be performed together with the wearing of braces to prevent joint contracture from the beginning. When the child starts to stand, various types of short leg braces can be prescribed depending on the condition of the child to assist with standing or walking, and various walk-behind devices are also needed. Children with severe disabilities who have difficulty with sitting posture require postural support equipment, and a wheelchair is also necessary if walking is not possible.

Can cerebral palsy be treated with surgery?

To date, there are no surgical procedures to treat cerebral palsy itself. Sometimes, however, surgery is required to correct secondary problems and to control spasticity. Orthopedic surgery of soft tissue for secondary deformation is often performed at about 5 to 7 years of age. Orthopedic surgery includes surgery for dislocations of the hips, surgery for correcting equinus deformation or crouched posture and walking. Neurosurgical procedures to control spasticity include selective abdominal radicotomy (surgical section of the spinal nerve roots) and implantation of an intrathecal baclofen pump (a pump that releases the muscle relaxant baclofen in the spine).



Selective Abdominal Radicotomy

Selective abdominal radicotomy is performed when it is difficult for nurses to perform daily activities, and when it is possible for the child to walk but it is expected to improve the gait by decreasing spasticity.

Implantation of Intrathecal Baclofen Pump

Implantation of intrathecal baclofen pump is performed when the spasticity is so severe that it is hard for the child to maintain posture, is difficult for the child to carry out daily activities, and it is necessary to adjust spasticity continuously. However, the cost of this procedure is extremely high in Korea, so it is rarely implemented.

What other treatments are there?

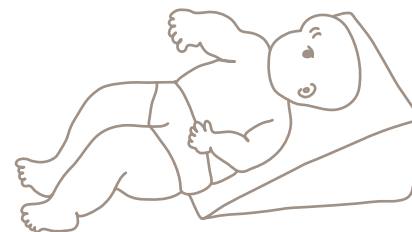
There is occupational therapy for improving limb function and cognitive development while helping to improve motor functions in daily life. If the child has an eating disorder, there is swallowing therapy, and if there is a language development delay and/or an articulatory disorder, speech therapy is also commenced at the appropriate time. After at least 3 years of age, appropriate education must be provided in parallel for optimal treatment.

However, it should be emphasized that not all of these things need to be provided at the same time, but that they should be combined appropriately according to the degree of development and the condition of the individual child. Therefore, it is important to start treatment as soon as possible in order to reduce any disabilities, and it should be emphasized once again that regular treatment should be provided to select the most appropriate treatment methods, prevent complications, and detect and treat any complications early.



Correct Posture and Exercises for Rehabilitation

What are the right postures that parents with preterm babies should know about?

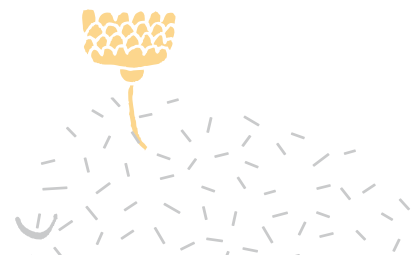


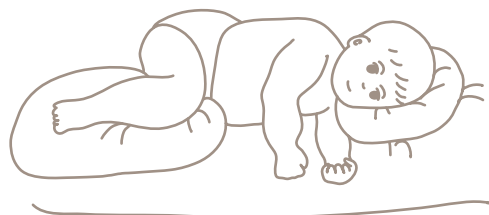
Correct Lying Posture

- ◆ The head should be in the center so it is easy to bring both hands together.
- ◆ Make sure that the shoulders are not tilted backwards, the head, but not the shoulders, is slightly tilted forward, and the pelvis slightly tilted forward.

Prone Position

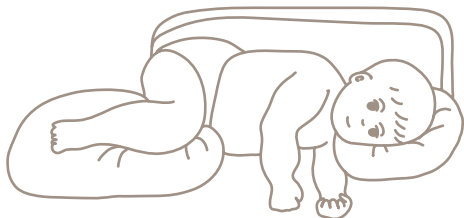
- ◆ This is a beneficial position for preterm babies and it is effective for helping them lift up their head.
- ◆ In a prone position, turn the baby's head back and forth, keep the head in the middle, the arms and shoulders in front, and the legs in a natural position.





Lying Sideways

- ◆ Lay the baby down switching between the left side and the right side. Help the baby to bring both of his or her hands together to the middle of his or her body.
- ◆ Bend one leg to provide support, and have the arms stretched forward about 90 degrees.



Holding the Baby

- ◆ When picking up and holding the baby, make sure that it is comfortable for the baby.

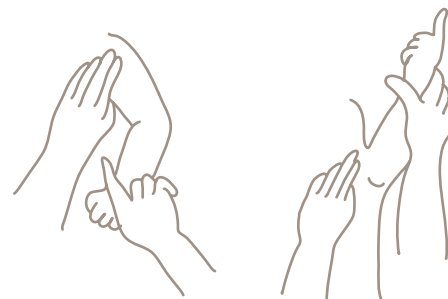


Are there any simple exercises parents can help their preterm baby to do?

Children with developmental disabilities, including cerebral palsy, can easily develop joint contracture due to muscle stiffness. In order to prevent this, continuous joint exercises should be performed to prevent joint contracture and to prevent deformation.

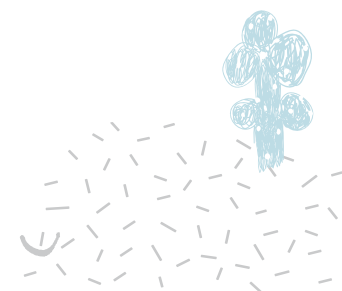
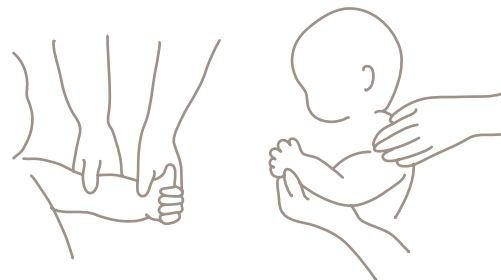
Raising the Arms

- ◆ When the child is lying on his or her back, hold down one shoulder with one hand so that it cannot be raised, and hold the child's wrist with the other hand and raise the child's arm all the way up above the head keeping the elbow straight.



Bringing the Arm to the Center an Open Position

- ◆ When the child is lying down on his or her back, hold one shoulder in place with one hand so that it cannot be raised, and with the other hand, hold the child's wrist and bend the arm across the child's body from an open position.



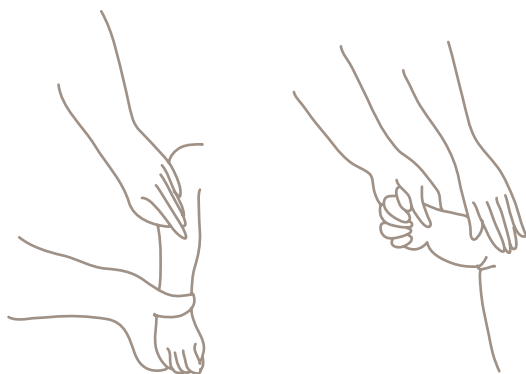
Arm Rotations

- ◆ When the child is lying on his or her back, bring the child's arms out about 90 degrees from the body. Then bend the child's elbows, hold onto his or her wrists and raise and lower his or her arms.



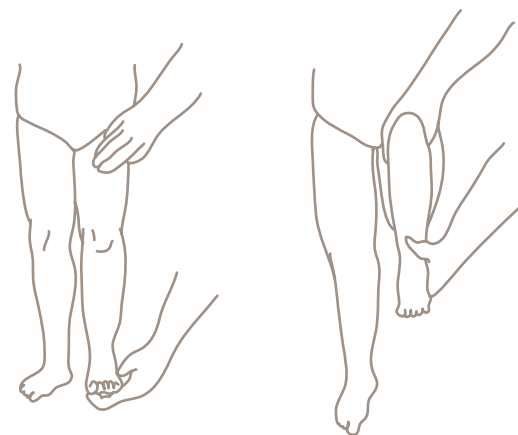
Opening the Arms to the Sides

- ◆ When the child is laying on his or her back, hold one shoulder in place with one hand so that it cannot be raised, and with the other hand, hold the child's wrist and move his or her arm from the centerline out to the side.



Bending the Legs

- ◆ When the child is laying on his or her back, use one hand to hold one knee up in a flexed position and hold the heel with the other hand.
- ◆ Bend the child's knee up to his or her chest and then bring it back down again.



Lifting the Legs Back

- ◆ When the child is lying in a prone position, use one hand to hold down the pelvis at the sacrum and use the other hand to hold onto the part of the leg below the knee.
- ◆ Raise the child's leg back.



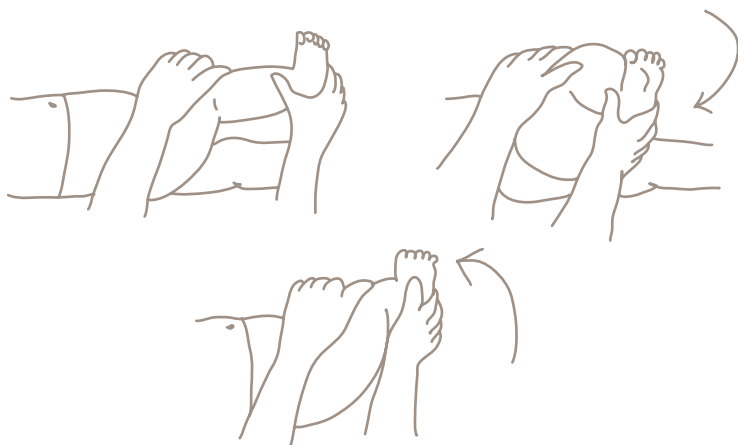
Opening the Legs to the Sides and Closing Them

- ◆ When the child is laying on his or her back, use one hand to hold his or her pelvis in place and use the other hand to hold onto the heel of one foot.
- ◆ Stretch the child's leg out to the side and then bring it down to meet the other leg.



Bending the Pelvis and Rotating the Legs

- ◆ When the child is laying on his or her back, bend the child's hip joints and knee joints about 90 degrees.
- ◆ Hold onto the part of the leg above the knee with one hand and the heel of the opposite foot with the other hand.
- ◆ Turn the heel outward so that the child's knee turns inward, and then turn the heel inward.



The following are treatments that can be performed simply at home depending on the stage of development of the child during infancy.

Holding and Playing with the Baby

- ◆ Sit the child up in a comfortable position with both legs bent.
- ◆ With the child lying on his or her back, bend the hip joints so that the child's feet rest on your chest.
- ◆ Stretch out your arms forward from a position that makes it easy for the child to see and let him or her play with your hands.



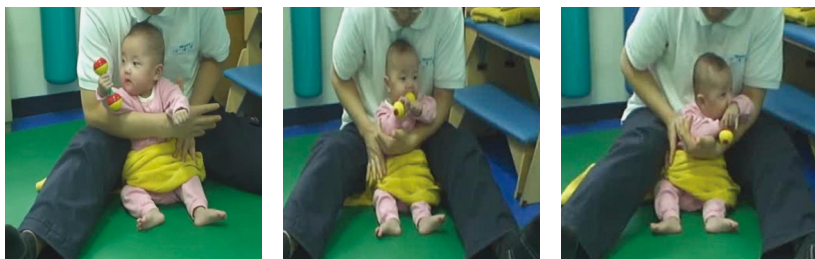
Adjusting the Head in a Prone Position and Promoting Upper Limb Function

- ◆ Lay your child down in a prone position and put a rolled up towel inside the clothes under the chest.
- ◆ Put toys in front of the child to promote adjustment of the head position.
- ◆ Place toys within the child's reach.
- ◆ Help the child to touch and grab the toys.



Moving Body Weight in a Seated Position

- ◆ Sit behind your child with your legs stretched out in front.
- ◆ Put your hands under the child's armpits and help the child to practice shifting his or her body weight to the right.
- ◆ Then help the child to shift his or her body weight to the center.
- ◆ Help the child to practice moving his or her body weight to the left.



Visual Stimulation in Crawling Position

- ◆ Put the child on your legs to make a crawling position.
- ◆ Put a toy to the left of the child to induce visual stimulation and touching of the toy.
- ◆ Induce visual stimulation to the center again.
- ◆ Place a toy to the right of the child to induce visual stimulation and touching of the toy.



Correct posture for a child with an eating disorder when eating

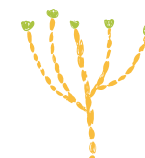
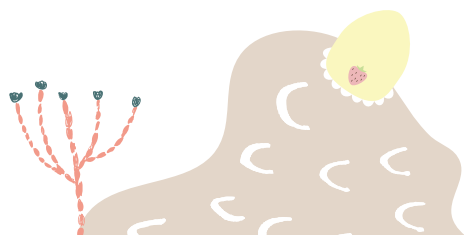
Postural control refers to stable movement of the head and neck in order to maintain proper posture and to swallow food when eating. First, maintaining stable posture during eating can promote oral motor skills and swallowing function. Second, it prevents food from being inhaled, allowing for pieces of food and liquids to safely pass through the esophagus. Third, good posture during eating helps to reduce the effects of abnormal reflexes and to help the child have a successful meal.

In general, it may be thought that the best posture is sitting posture with a straight back, but good posture can change slightly depending on development.

Infants

- ◆ For infants, good posture is posture that allows for natural swallowing of breast milk while resting against the mother's arm and body. The most suitable eating posture for an infant is a natural curve of the head, neck, and torso, and the head and limbs are gathered toward the center of the body to naturally bend the arms and make the shoulders symmetrical. The hips flex from 45 to 90 degrees. Place the child's knees and ankles on your leg and then support the child's head and neck with the arm and make eye contact while feeding. Make sure that the child has safe eating posture while making physical contact.

Good feeding posture while making eye contact



Incorrect eating posture

Excessively tilted forward neck posture



Excessively tilted back neck posture

- ◆ Lying down sideways over your knee helps to close the lips, facilitating suckling, and promotes laryngeal movement, laryngeal closure, and protection of the airway. Be careful that the child's head doesn't tilt forward excessively.

**Infants and Toddlers**

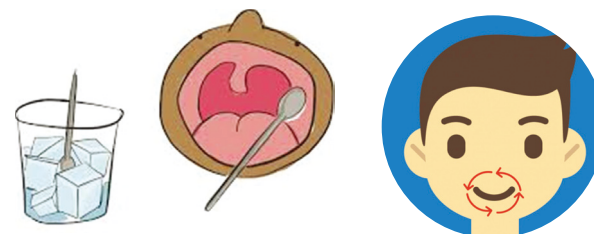
- ◆ For infants and toddlers, if the head and neck are supported by the parent's upper body, the child can use his or her own arms to hold the baby bottle and suckle on it. If the child chokes on the milk, or if the child isn't able to produce enough suction strength to suckle from the milk bottle, use one hand to gently support the cheek and chin to help the child to generate more suction force.

Toddlers

- ◆ For toddlers, seat your child on a chair with a high back rest, allowing him or her to stably adjust his or her trunk and move his or her neck and head as he or she pleases. Make sure that the child is sitting back in the seat, and make sure that the legs and hips are bent at a 90-degree angle. The back should be straight and the feet should be well supported. The shoulders should be parallel and the head should be in the center. You should slightly bend the head and neck forward while the child swallows in order to reduce the effect of abnormal reflexes in the neck and allow for safer swallowing. While the trunk is stable, the child can freely use his or her arms and has the opportunity to eat food independently. For that reason, keeping the child's trunk, neck and head stable can be a very important process for eating independently. If the child does not have stable posture, you can help him or her to have stable posture using a chair with a high backrest, a strap, and a belt as shown in the figure. If using a general chair, you can use a towel to the sides of the buttocks and trunk to help the child to maintain stable posture. Also, if the child sometimes chokes when drinking water, you may be able to reduce the risk of this occurring by having the child tilt his or her forward when drinking water.

**Treatment of children with eating disorders****Sensory Stimulation Therapy**

- ◆ Sensory stimulation can be achieved by using various materials, tastes, and tactile senses, including temperature and tactile stimulation methods. Sensory stimulation stimulates the tongue and oral cavity to create a positive awareness of the senses through various sensory experiences in children who refuse food from reaching the lips or tongue when the food comes near. The aim of this is to reduce the avoidance reaction when the food comes near. Sensory exercises are performed by using ice sticks, various flavors and fragrances, and brushes to feel the temperature, tactile sensations and tastes of the senses around the cheeks, around the lips, around the teeth, and on the tongue. In the case of infants, stimulation is not easy due to the restrictions of the oral structure, so a pacifier can be used to provide stimulation to the inside of the mouth.



Mouth Exercise

◆ Mouth exercise refers to promoting muscular movements of the lips, chin, tongue, and the soft palate. Through such movement, it is possible to improve the swallowing action in the pharynx. Such exercise allows the child to practice passively at first, and then actively if there is progressive improvement. For active exercise, there is tapping, rubbing, and vibrating, and for passive exercise, there is resistance exercise and chewing and swallowing exercises.



Change of Diet

◆ Infants and toddlers have far more sensitive tactile and taste sensation around the oral cavity than adults. Therefore, when making baby food, the child may accept or reject even the same food depending on the size of the rice grains, the size of the sliced or ground meat, and textures such as garlic and greens. Therefore, for children who do not have an aspiration hazard and simply refuse food, you can try making the texture of the baby food a little softer and ground down. In addition, it is difficult for the child to experience the unique tastes of food when they are mixed together at the same time. Therefore, it is a good idea to let the baby try one food at a time and get used to it and then gradually add foods to the baby food mix.

memo

Consistent effort that brought a 4-year-old miracle!

The Story of Preterm Baby Juho Choi



The mature preterm baby, Juho

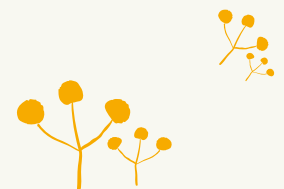
The first time we met Juho was at the pool in the hydrotherapy room at the welfare center.

“Juho, let's go over there!”

Juho followed the therapist's instructions as he swam through the water with great effort while wearing his swimming goggles. Juho was floating as he slowly moved forward through the waves in the pool. He didn't complain and actively engaged in his therapy as best he could while following the instructions of the therapist while his mother cheers him on from the side.

“He has been coming to hydrotherapy for two years now. Juho has a brain lesion which causes him to have poor balance. I think walking in the water is more helpful for children with a brain lesion than walking on flat solid ground. It helps to increase their physical abilities and sense of balance. Having attended hydrotherapy for a long time, he is also very close with his therapist and is improving leaps and bounds.”

Juho's mother, Mrs. Miran Jeong spoke with a beaming smile on her face as she watched her son engage in his therapy with a serious and determined expression on his face not like a seven-year-old. Juho's great progress is the result of his mother's consistent effort.



The miracle brought by consistent rehabilitative therapy

Juho, who was born after 9 months of gestation, was a twin. A month and a half after their birth, his twin brother developed pneumonia. His condition suddenly worsened and he passed away. Juho also spent several months in the intensive care unit of a university hospital and was discharged after having barely overcome a life-threatening condition. His brain disorder is the result of brain damage caused at that time.

“We started going to the university hospital in Seoul where Juho was treated immediately after discharge as a baby. We didn’t have a car at the time, and we had a difficult journey to make as we had to transfer bus several times. He would only be treated for 30 minutes but sometimes he would cry so much that he couldn’t be treated properly. I took him there for five months before finally giving up and taking him to a local welfare center that someone had recommended to me.”

Mrs. Jeong and Juho were quite lucky. There are usually many people on the waiting list to start rehabilitative treatment at the welfare center, so it is difficult to get in. But Juho was lucky to secure a spot in the nick of time. So Juho has never really taken a break from rehabilitative therapy such as physical therapy, occupational therapy or cognitive therapy. Attending the welfare center has had a positive effect on Juho’s personality in addition to the physical rehabilitative effects. At Gwanak Welfare Center where Juho was treated, there is an integrated preparation class where afflicted children can get along with other children their age. When Juho was four, he experienced being away from his mother and mingling with other children in a group which helped him to learn a lot.

“For the first few months, he didn’t want to be separated from me. But the therapist started telling him that he should let his mom go and take a rest, so he started to accept being separated. At first, Juho would look for me and cry, but the therapist told him that I would come back when the big hand on the clock struck 12, which helped him to also learn about the concept of time. I think he has grown a lot since then.”

Thanks to consistent rehabilitative treatment, Juho, who was unable to walk or speak well, suddenly started to make amazing progress from the age of four.

“The lights were off and I was trying to sleep when all of a sudden Juho stood up. Everyone was surprised, so we turned on the lights and gave him a round of applause. It was wonderful. Before, he couldn’t walk or even say ‘Dada’. From that time, he gradually started to walk and talk.”

Desire to sow seeds of hope!

It was thanks to the old lady who lived across from Mrs. Jeong that she was able to find out about the Beautiful Foundation’s preterm baby support project. She had previously tried going to the social welfare center and the public health center to request support from the government, but she was told that she wasn’t eligible because her husband’s income passed the threshold. She was living at her husband’s parents’ house with no house and no car, but it was no use to explain about her situation. Luckily, this year, she was selected as a recipient of the <Dasom Baby> rehabilitative therapy costs support, which became a strong leg to stand on for Juho’s family who had found themselves in the blind spot of the welfare system. There are continuous treatment and rehabilitation costs for preterm babies, so she felt that it is necessary for the threshold to be eligible for support to be increased.



“I kept pushing forward as I thought that it would be best to continue with rehabilitative therapy. In fact, since Juho has been making good progress since he was four years old, it has been rewarding to not give up and keep pushing forward for several years. He couldn't walk well before and crawled kind of like a frog and couldn't even say bye-bye to his daddy when he was heading out to work. I think any mother would do the same. They would not give up.”


Juho is seven years old already. He starts school next year, so there is a big challenge waiting for her and Juho on the horizon. Until now, he has been getting used to getting along with his peers at the welfare center, the integrated day care center, and the kindergarten, where they are considerate of his condition, but school will be another matter altogether. His mother worries that even if he is in a special needs class, the other children might make fun of him and hurt his feelings and she worries that he might fall over and hurt himself because of his hindered walking. But she knows that worrying won't stop the day from coming, so she and Juho are continuing to work hard together to get over this new mountain, just like they have done in the past.

“I would like to say to other mothers that better times will come if you don't lose hope and consistently attend rehabilitative therapy. Once Juho goes to elementary school, I will have some free time, so I would like to help other mothers with afflicted children like me. I once overheard another mother saying that she wishes that there could be someone who could take their child to therapy even just twice a week, which moved me deeply. Mothers understand well the hearts of other mothers.”

Mrs. Jeong, who always tries to be positive, talked with an upbeat tone throughout the interview, but when she told us about the hard times, she was

holding back tears. Her happy and cheerful face today is the result of several years of hard work and tears that only she and Juho know. Her dear heart that wants to help other mother having overcome such difficult times herself will certainly spread seeds of hope to other struggling families.





Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

Preterm Baby Nutrition Management

Preterm Baby Nutrition Management

Early Nutrition in Preterm Babies

As previously explained in “Preterm Baby Hospitalization and Discharge”, during the time that preterm babies remain in the hospital after being born, they receive parenteral nutrition through vascular injections or intubation feeding through tubes.

Babies who receive parenteral nutrition and intubation feeding gradually progress to the step of drinking breast milk or formula from a bottle. When feeding from a bottle, the mother’s breast milk together with breast milk enhancer, or preterm baby formula is given. Of course, if breastfeeding is possible, it is the priority.

When the amount of breast milk the baby consumes via bottle is not enough, nutritional supplementation is provided; however, around the time of discharge, many babies are consuming enough breast milk or regular formula.

How to feed after discharge

Direct breastfeeding is recommended after discharge from the hospital. If it is difficult to breastfeed, then the baby is fed breast milk or formula from a bottle. If the amount of breast milk is not enough when breastfeeding directly, or if the baby isn’t catching up in terms of growth, you may also feed the baby formula from a baby bottle.

If the baby isn’t drinking enough when feeding formula from a bottle, or if the baby is not growing well, you can use high-calorie milk formula, calorie supplements or other supplements. It is advisable to decide with your dietician or doctor about the appropriate formula preparation and supplements to give your baby.



Carbohydrates supplements

Fat supplements

Carbohydrates + Fat supplements



Protein supplements

Baby Food

When determining the time to move onto the baby food stage, the corrected age should be used. If your baby is about 4 to 6 months based on corrected age, you can start thinking about providing baby food.

Baby food refers to other food besides breast milk and formula. In other words, it is the process of shifting from a liquid-based diet, such as breast milk and formula, to a semi-solid and solid food diet and then onto a normal dietary pattern similar to adults. If you start your baby on baby food too soon, this may increase the incidence of allergic diseases and it may shorten the duration of breastfeeding and prevent the absorption of beneficial nutrients in breast milk. On the other hand, if you start your baby too late, you may slow down the proper dietary development and fail to meet nutrient requirements, which may result in poor growth or malnutrition.

Baby Food Progress

When your baby is around 4 to 6 months old, you can start transitioning to baby food with the concept of ‘preparing for baby food’, and proper feeding of baby food is usually started from 6 months of age.

The frequency of baby food feeding increases with the number of months, increases from once a day to once a day in the beginning to 2 to 3 times a day at 7 to 8 months, and from 3 to 4 times at 9 to 11 months. However, for babies who only eat a small amount of food, the frequency can be increased.

Type and Form of Food

☉ In the beginning, start with just one type of food. In Korea, babies are mainly started off on rice gruel and then move onto 'rice + one other food'. When trying a new food, try it for 3 to 5 days in the case of new grains, vegetable, and fruit, and for 5 to 7 days for fish, etc. and observe your baby's reaction.

☉ In the case of fruit and vegetables, you can try either or first; however, if you start off with fruit, the baby will become more familiar with sweet tastes and there is research suggesting that it's best to start off with vegetables because of this.

☉ It is common for babies to reject new foods, so don't give up on a food just because your baby refused it once and have the approach of making ten attempts at a new food.

☉ As the child's body functions develop, add new foods of different textures. In the beginning, start with rice gruel and ground food and gradually increase the particle size.

☉ From 7 to 8 months, prepare food that your baby can pick up and eat with his or her hands, and give him or her juice, etc. to drink from a cup.

Baby Food and Utensils

☉ When starting to feed a baby with baby food, a spoon should be used. Around 4 to 6 months of age, the baby's reflex to stick out his or her tongue disappears, and the baby starts to chew food. Therefore, starting baby food means to use a spoon to allow to baby to progress slowly from sucking to chewing.

☉ At 6 to 9 months, have your baby start practicing using a cup. This depends on the baby's development, but it is preparation for drinking all fluids, including milk, from a cup after reaching about 12 months of age. In particular, if a baby consuming modified milk continues to use a baby bottle after 12 months, this itself can be a cause for delaying baby food progress and can impede the formation of desirable eating habits. It is recommended that you stop using a baby bottle after 12 months and before 18 months at the absolute latest.

At about 9 months of age, babies are able to hold a spoon and can practice using the spoon by themselves.

☉ Together with spoon practicing, giving your baby foods that he or she can pick up and eat with his or her hands is also good for cultivating the habit of eating by himself or herself. If you keep feeding your baby because you're concerned that the baby will spill the food, your baby will have less sense of self-reliance. Therefore, letting your baby touch, pick up and eat foods by himself/herself develops the baby's skills and motor functions.



The Weaning Period



1st Quarter

4 to 6 months

- ◆ **Rice gruel (liquid food).** 1 time *30 - 80g
- ◆ **Make into porridge or grind finely.** (Breast milk / formula amount 800 - 1000ml / day)
- ◆ **Introduce protein foods.**



2nd Quarter

7 to 8 months

- ◆ **Porridge (semi-solid).** 2 to 3 times *70 to 100g
- ◆ **Cut into 0.3cm pieces.** (Breast milk / formula 700 to 800ml / day)
- ◆ **Start finger food.**
- ◆ **Practice drinking from a cup.**



3rd Quarter

9 to 11 months

- ◆ **Thick gruel / soft rice (solid).** 3 to 4 times *150 to 100g
- ◆ **Cut food into 0.5cm pieces.** (Breast milk / formula 600 to 800ml / day)
- ◆ **Eating “grains, fish and meat, vegetables, fruit, milk and dairy products”.**
- ◆ **Practice eating by himself/herself.**



4th Quarter

12 to 15 months

- ◆ **Slightly soft boiled rice** 3 times (+ 2 snacks)
- ◆ **Three meals a day and snacks,** (breast milk / cow's milk 400 to 600ml / day)
- ◆ **Wide variety of foods, eating without help (using a spoon, straw or cup)**
- ◆ **Stoppage of bottle feeding.**



How to Cook and Serve

☉ It is hygienic to make just enough food for a single serving. If this is too troublesome, portion the food into single servings and store.

☉ Don't give the baby food that he or she leftover before, and be sure to heat food that has been stored to above 70 degrees Celsius before serving.

☉ It is recommended not to add salt or sugar to the food. This may vary depending on the level of the baby's acceptance of the food, but salt and sugar should be avoided as much as possible in the beginning.

Food Allergies

☉ “Eggs, beans, wheat, peanuts and nuts, fish and shellfish”, which may cause food allergies, were used in the past as a guideline of what to avoid feeding babies in the early days of transitioning to baby food and to feed babies such things later on. However, people now believe that such advice is ungrounded, and there are people who believe that feeding such foods later on may increase allergy rates, so it isn't necessary to place restrictions on such foods. There is also no need to place restrictions on such foods even if a parent or sibling has a food allergy.

☉ However, it is recommended that you don't start your baby off right away on baby food that includes ingredients that mainly cause allergies.

☉ However, if you notice that your baby has any symptoms that seem to be related to an allergy, check with your baby's doctor and then strictly restrict any further feeding of the food.

☉ Strawberries, berries, tomatoes, and mandarins can cause rashes or urticaria around the mouth, but they do not cause systemic reactions, so you may want to keep an eye on your baby when eating these.

☉ You can start giving your baby fresh milk and honey from 12 months old.

Attitude to Feeding Baby Food

☉ While feeding baby food, it's important for Mommy and Daddy to smile, make eye contact, and talk to the baby to make it a happy experience. It's good to let the baby watch the family enjoying food together as a unit. Make sure that the environment is comfortable for the baby so that he or she can become interested in baby food and accept it.

☉ If your baby isn't accepting of baby food at first, be patient and don't rush or force the baby to eat.

☉ You must watch out for the following signals and respond appropriately.

Hungry signal:

The baby leans forward or moves toward the spoon with his or her mouth open.

Full signal:

The baby leans back or turns his or her body away and is eating more slowly. He or she closes his or her mouth and doesn't seem to want to play with the food or doesn't seem interested in eating.

Final Baby Food Stage

After 12 months, baby food should be fed as the main food and not just as snacks, and there should be a gradual transition from baby food to regular food.

At this time, the six food groups (grains, fish and meat, vegetables, fat, milk, and fruit) should be included in the diet for even consumption of nutrients. Grains should be the stable food and fish, meat and vegetables should be the side dishes. Fruit and milk should be given as snacks, and fat should be used when cooking to allow for a balanced diet.

The different foods belonging to each group and their main nutrients are as follows.



Grains

Carbohydrates

♦ Rice, mixed grains, potatoes, sweet potatoes, noodles, bread, rice cake, chestnuts, corn, etc.



Fat

Fat

♦ Vegetable oil, butter, mayonnaise, nuts, etc.



Meat and Fish

Protein

♦ Beef, pork, chicken, fish, shrimp, eggs, etc.



Dairy

Calcium and Protein

♦ Milk, soy milk, milk formula, yoghurt, cheese, etc.



Vegetables

Vitamins and Minerals

♦ Spinach, carrots, eggplant, radish, mushrooms, laver, seaweed, bean sprouts, kimchi, etc.



Fruit

Vitamins and Minerals

♦ Apple, pear, banana, melon, watermelon, tomato, grapes, fruit juice, etc.


How to Supplement Nutrition

If your baby doesn't eat well during this period, causing delayed growth, increase the calories and protein content of baby food and snacks. When cooking, you can increase calories by using more of the 'fat' group such as vegetable oil (e.g., fried rice, rice balls, vegetable pancake, fried foods). In addition, give your baby suitable amounts of dairy products like milk and cheese as snacks, and you can also give him or her nutritional supplements for children over 1 year old.



supplements for children

memo



Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

Preterm Baby Care Guide

Preterm Baby Care Guide

Medical Newspaper Attachment
Cognitive Development Institute
Kids & Mom Healing Center
Hyojeong Shim

Introduction

Humans begin to adapt to the world from the time of birth. The ten months spent in the mother's womb is a time to prepare for sudden arrival into the world. However, babies who come into the world before having completed their ten months of preparation time for various reasons are referred to as 'preterm' babies, and preterm babies have difficulties adapting and developing on their own.

Such difficulties are not only difficult for the baby, who is lying in a hard incubator instead of in his or her family's warm arms. It is also very difficult for the baby's parents to go through, causing them difficulties in their daily lives, and due to frequent long-term treatment, parents often feel as though they miss out on bonding with their baby. In particular, one month after birth, it is a very important time for the mother and baby to bond, and the 'stable bond' formed at this time greatly affects the baby's brain development, as well as emotional and physical development. The role of parents is very important as the baby eats when he is hungry, sleeps when he is asleep, and cries when something is uncomfortable, and when his parents hug him, he feels a sense of security. However, for various reasons, parents often cannot enjoy playing their roles, and after being discharged, it is difficult to know what kind of environment should be made in the house for preterm babies as they struggle with the vagueness of information provided on preterm baby care.

Let's take a look at the attitudes and roles that parents of preterm babies should assume in order to overcome difficult situations and become a happy family.

Becoming a Parent with High Self-Respect

Parents are given the title of parents the moment their child is born; however, true parents are those who have performed their role properly, and this leads to the formation of self-esteem as parents.

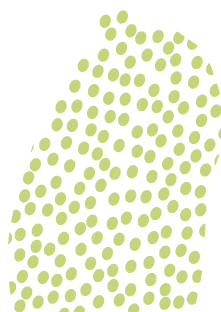
Let's look at the parents of preterm babies.

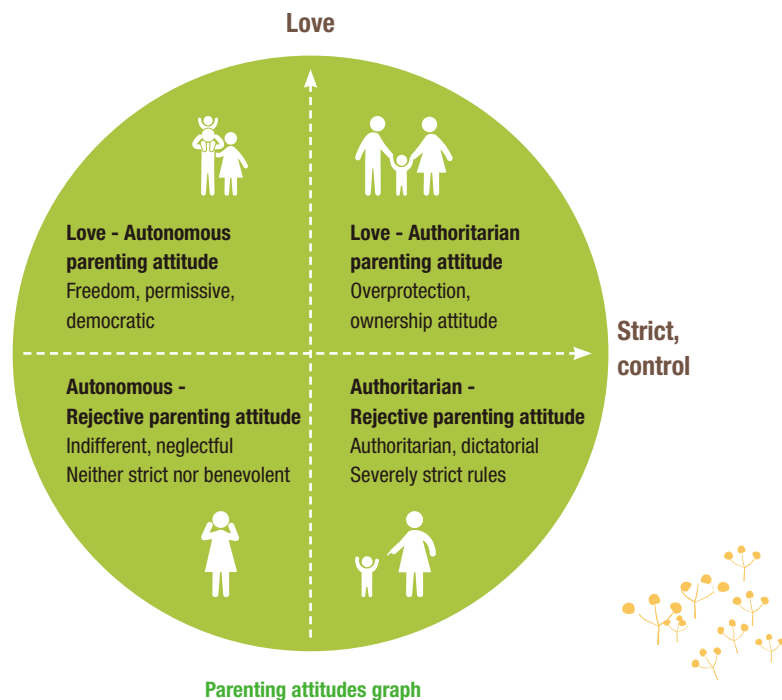
Sadly, parents of preterm babies find themselves putting off their first interactions with their baby and concentrating on treatment. In particular, parents experience sadness and feelings of guilt when their baby, who hasn't completed his or her ten months of preparation, is born early, and they experience psychological distress and negative emotions such as a sense of deprivation and loss of self-esteem. An unstable mental and emotional condition can interfere with bonding with the baby as well as communication between family. And parents need to be even more careful as this can become an obstacle that prevents a stable parenting environment.

Because of this, a prerequisite for parents of preterm babies is 'high self-esteem'. Parents with high self-esteem can raise their children in a healthy and stable manner. Before parents can raise their self-esteem, they first need to know what kind of parents they are.

Increasing Self-Esteem with a Positive Attitude to Parenting

The parenting environment, which affects the development of young children, is determined by the temperament of the parents and the resources they received from their parents during their childhood. In other words, the parents' personalities formed as a result of the aspects of personality, sociality, and emotions of the parents and the family environment that they grew up in are merged to become the attitude to parenting of the two parents. This is because people's personalities and characteristics are different from each other, and the family environments that they grew up in vary. Such environments can be classified into four categories according to the level of affection and control of their parents.





The parents of preterm babies around 36 months of age show ‘overprotective love’ and an ‘authoritarian parenting attitude’ due to excessive concern for the health of the child. An overprotective parenting attitude helps preterm babies grow into dependent children with low self-confidence by reducing their opportunities to explore the environment themselves and acquire new responses. This might not be a big problem during infancy, but if the parents suddenly expect the child to be independent and seek to accomplish things by himself/herself, the child can become very confused. It is important to create an environment where you slowly allow the child to have freedom and to develop democratic problem-solving skills.

Language, cognitive development, sociality, and physical development in the infant and toddler stages are influenced by the parenting attitude and the social and environmental background. In particular, the higher the self-esteem of the parents, the more positive a parenting environment can be created. This is because unconscious behaviors, thoughts, and expressions have a significant impact on the parenting environment and play a very important role in interactions with the child.

Parents who often have a bad relationship with their children usually have personal problems, so an objective understanding of themselves is crucial to fulfilling their parenting role. Parents with high self-esteem lead a responsible life based on their confidence in themselves, and they create a desirable parenting environment, allowing for the development of good psychological stability in their children. However, parents who have low self-esteem may cause maladjustment due to their depressive and impulsive behavior, and may feel emotional and easily become angry with their children.

To be a parent with high self-esteem, you need to properly understand your parenting attitude and positive feedback when that comes from providing your children with appropriate stimuli.

In order to provide your children with the right stimuli, it is good to be aware of the growth goals that are needed at that time. Because the infancy (from birth to 18 months) and the toddler (18 months to 3 years) periods are time when children develop trust and autonomy, parents should react sensitively and subtly to the

signals given by their children while providing their children with opportunities to develop the self-confidence and willingness to do things by themselves.

Also, between the ages of 3 and 6, children develop a sense of initiative and often show the tendency of wanting to do things by themselves. At this time, they say a lot of things like, “No! I’ll do it!” and it can be a most troublesome time for parents. This is also the time when the child develops moral concepts, the time that the super-ego forms, and the time that the child starts to display an interest in social relations out of the family. When parents recognize and encourage their child’s curiosity and fantastical behavior, the child develops self-esteem and confidence.

If parents have a sensitive and demanding temperament, they may think that it is difficult to provide proper stimulation for the child themselves. It is important, however, to be fully aware of the stimuli needed at that time and to slowly adjust your attitude to parenting.

Parents with high self-esteem are not afraid of trouble with their children. They believe that the more they conflict, the more they get to know each other and make compromises. Because parenting is not something that’s done alone, parents should always keep in mind and understand that their words and behavior will influence their children, and should make efforts to improve through dialog.

Developing Parental ‘Self-Esteem’ by Overcoming Stress

When people become parents, it becomes difficult for them to fully

express their abilities, not only because of personal stress but also because of marital relationship-related stress, parenting-related stress, and stress due to lack of social support, eventually having a negative impact on their parenting ability.

Parenting Attitude Needed for Parents of Preterm Babies

1. Clear Division of the Roles of Mother and Father

When roles are clearly divided, such as the mother being in charge of health, diet, and affection, and the father being in charge of providing a safe place to live, various experiences, and teaching social etiquette, use of time is maximized and the atmosphere in the house becomes very positive.

2. How should I discipline my child who was born preterm?

Parents of a child born preterm are generally not very good at disciplining their child due to their fondness and pity for the child. Also, the development of preterm babies is checked based on the corrected age until around the age of two years, and after that, their development is treated the same as full-term babies. At this time, it’s important to identify any areas where your child may be less developed than other children the same age, and it’s important to know what kind of rules and regulations are suitable for his or her age. It needs to be clear what kind of behavior is acceptable and what kind of behavior is unacceptable.

Children who were born preterm need to be able to fully experience and adapt to the socialization process together with their parents because as their social adaptation index may be low. However, children who have experienced an environment of limitations and repeated failures from childhood tend to have lower self-esteem. Therefore, it is necessary to discipline your child while keeping in mind that excessive control and discipline can be detrimental rather than beneficial.



Checking Your Stress

- ☐ Less enthusiasm for children, family, housework, or everyday life
- ☐ Feeling lonely
- ☐ Lack of interest in everything
- ☐ Intolerant of other's mistakes
- ☐ Increased conflict in interpersonal relationships
- ☐ Frequent voice raising and getting worked up
- ☐ Frequent shouting
- ☐ Unable to control anger
- ☐ Thinking that problems will be solved if you were to disappear
- ☐ Impatience when others are talking and interrupting
- ☐ Being easily startled and feeling nervous or restless / Feeling a lot of anxiety
- ☐ Suddenly becoming angry or bursting into tears
- ☐ Excessive smoking, drinking, abusing sedatives or other substances
- ☐ Difficulty sleeping, waking up frequently, or having difficulty getting up in the morning
- ☐ Continuous weight gain or weight loss
- ☐ Frequent occurrence of illnesses such as colds and diarrhea
- ☐ Chronic headache or dizziness
- ☐ Forgetfulness
- ☐ Feeling like you want to give up

If you checked more than ten of the boxes above, it means that you are severely stressed and will have difficulty fulfilling your role as a parent. Stress in parents interferes with the creation of a consistent parenting environment, which increases problem behavior in children, which then creates a vicious cycle of stress to the parents.

Children born as preterm babies are generally considered to have a demanding temperament. This is due to the lack of sense

of security during the newborn period, which is a phenomenon caused by the lack of opportunity for interaction with parents at this important time, which can be overcome with a stable parenting attitude.

However, if parents are not aware of this, all situations can be stressful in the child rearing process, and in severe cases, this can lead to conflict between parents and disbandment of the family. Especially, in the case of children born preterm, the development and growth process may be different from that of children born full-term. Therefore, integrated treatment such as rehabilitation and cognition, language, tactile sensation, and emotions required for the life cycle is continuously required. Because of this, it is crucial to develop the strength to overcome parenting stress through regular parenting education, professional parenting coaching, and psychological support.

Fortunately, treatment for children born preterm is constantly evolving and positive prognoses are increasing day by day. Therefore, it is necessary to believe in a child, to pursue self-esteem as a parent, and to regain emotional stability rather than to worry excessively. In particular, it is very important to actively seek treatment through consultation with experts rather than relying on false information found on the Internet.

Also, in the developmental areas of language, motor functions, and social development, parenting attitudes and the home environment can have more of an impact on children born preterm than children born full-term, which can lead to a great sense of responsibility for parents of children born preterm. However, properly fulfilling roles to ensure that children born preterm grow up healthily and become members of society is not limited to just parents but includes all members of the family. In order to do this, it is important to first understand the current situation and identify any family problems, and it is necessary to actively seek support that can solve any economic and psychological problems so that your child can grow up happily.



Tips for Overcoming Parenting Stress

1. Self-Belief

'It is me that solves problems.'

Focus on the positive things in the current situation rather than on the negative things, and try to solve the problems that are happening now rather than worrying about the distant future.

2. Taking Time for Leisure and Relaxation

Sometimes parents want to take a break from parenting.

It's important to find a way to relax according to your life pattern.

Change your life pattern in ways such as getting a change of hairstyle or dining out. Sometimes it's good to meditate or read as these can help to clarify life values, and it is also necessary for parents to sometimes get help from someone so that they can get away from the home. Be sure to reward yourselves sufficiently for your efforts as parents.

3. Learning Effective Parenting Skills

Review parenting skills in areas you feel that you are experiencing difficulty repeatedly in your relationship with your child. If you are having difficulty by yourself, get help from a professional or join a parents' meeting. You will be able to listen to the stories of other parents who have successfully overcome the challenges that you are facing, and you will be able to share your difficult feelings and learn effective parenting techniques.

Above all, when you pay attention to your own stress and make an effort to help your child, you can grow to be a great parent.



Raising a Playful Child

Children want to start and end their day with play. It seems simple and meaningless in the eyes of parents; however, when you observe the facial expressions of children playing, you can see that it changes every moment. In other words, play is a way for children to express their emotions and communicate with the world.

In particular, play that can give fun and pleasure to children born preterm, who can have many restrictions on outdoor activities, positively affects not only overall development such as physical, cognitive, social, and emotional, but also learning development, while also promoting brain development. Play that shapes the experience of seeing, hearing and feeling indirectly through pictures, photos, and video is an important step in communication that promotes interaction through the process of realization. When your child starts to talk more to himself/herself while playing, it's possible to find common subjects when talking with his or her peers and play together. If he or she has a toy that he or she has played with together with Mom or Dad, he or she will feel more confident.

In order to promote this mysterious activity known as play, stimulation and reaction, which are the basis of play, must be cultivated in infancy. In the case of children born preterm, the difference between the babies is large, but the difference between the individual developmental areas is also large, so it's important to focus on play that balances the areas.

Raising 'Meticulously from the Start'

Preterm babies need stimulation as a foundation for healthy growth at the age of 0. It is recommended that babies aged 0-6 months engage in play that stimulates the five senses, and from 6-12 months, engage in play that allows them to explore the world with their bodies. Space is limited, but the baby has frequent physical contact with parents and visual/auditory stimulation. The parents



need to shower the baby with love and support in order to form trust, which leads to active exploration. This extends to brain development.

Vestibular Stimulation Play

In the womb, the fetus grows for 10 months while being subjected to the stimulation of shaking of the body and head in the amniotic fluid. Such stimulation are responses felt when the vestibular organs in the ears are stimulated when moving the head, which is transmitted to the brain. When a person's body and head are gently swayed, they feel a sense of security, and vestibular stimulation also affects development of sense of balance. In the case of preterm babies, as soon as they are in the incubator, there is a lack of opportunity to experience proper vestibular stimulation, so it's important to provide vestibular stimulation in various ways to make up for this.

Normally, a mother will sit on a rocking chair while holding the baby and feeding, and the father does things like lie on his back and put the baby on his legs and play 'airplane', or lifts the baby up under the armpits and plays 'rocket ship' to let the baby experience the sensation of bouncing. However, because the brain is small relative to the skull size in preterm babies, the brain is strongly shaken even with slight movements. Therefore, there shouldn't be any movement of just the baby's head and body but the baby should be held tight to the parent's chest and it's the parent that moves to provide the baby with stimulation. For children aged 4 to 6 months, it is possible for them to extend their back as they have some strength in their back muscles, so if you hold the baby close to your chest in a curled up position like a fetal position and sway, the baby can experience a sense of security with the stimulation of swaying.

Visual / Auditory / Skin Stimulation Play

Preterm babies are hospitalized as soon as they are born, lying under a lot of lights, exposed to repetitive and meaningless

mechanical sounds. It is very helpful to put a baby focus book or family photos, or a playback device playing back recordings of the parents' voices in the incubator. At this time, it is better to talk about general daily life rather than the contents of stories containing various events and characters so that the baby can focus on the voices.

For example, talking about the day's weather, how mommy's feeling, dad's work day, etc. are good topics, and it is recommended to speak in a soft and calm voice as using tones that convey emotions as if really having a conversation.

After discharge, you can let the baby stick stickers on your face, which helps develop eye focus, and you can the baby's name using a variety of animated voices to get your baby responding to his or her name. An easy game that can be played at home is hiding toys and saying for example, 'Where's the teddy bear? - Here he is!', or playing peek-a-boo, or 'find mommy's face' in which you put a thin cloth on your head and have the baby pull it off. Once the baby is getting good at those, you can make repeated hand gestures in front of your baby while he or she watches and attempts to imitate such as holding up a palm sideways and prodding it with the thumb on the opposite hand and switching back and forth between hands, opening and closing the palms, hand clapping, etc. to help develop the baby's hand-eye coordination.

Besides visual/auditory stimulation, it's also important for your baby to have skin stimulation to develop a sense of security and attachment in infancy. However, as preterm babies have to spend a lot of time in the hospital from birth, they lack opportunities to experience skin stimulation. Physical contact is the best play for the development of intelligence, and children who grow up with love will feel comfort and satisfaction, helping them to feel safe while exploring their surroundings, which facilitates brain and emotional development. Examples of activities that encourage a variety of physical contact include 'bath play', 'lotion play', 'blanket sandwich play', 'where are your eyes?' etc.

In particular, the best stimulus that can stimulate your child's



five senses is when suckling from the breast or a bottle. This is referred to as 'kangaroo care' and it is widely used nowadays. It is very important for resolving not only basic hunger and desire for oral satisfaction, but it is an important time for forming attachment with the mother as the baby listens to her voice. At this time, the baby's breathing becomes stable, he or she feels skin stimulation, and makes an effort to make eye contact with his or her mother. Also, if you sway the baby gently after feeding to burp him or her, because the baby also experiences vestibular stimulation, he or she feels great happiness, which is a great power for growth.

Language Development Play

Language is important for the baby to be able to express his or her condition, and it also has an impact on relationships with peers and self-confidence regarding learning. In the case of preterm babies, it is common to see that brain growth is somewhat delayed and that language development is difficult. It is important to start speech therapy early if you notice any difficulties with talking. If not, providing the baby with enough verbal stimulation through play at home can facilitate language development. In order to stimulate language development through play at home, it's important to first understand the language development stage.



Language Preparation Stage

1. Crying Stage

◆ Characteristics

This stage is the first step in communicating with the parents through crying and the stage in which the baby expresses hunger, pain, and anger by crying. Crying exercises the vocal organs, which is essential for language development, and listening to his or her own cries facilitates development of hearing.

◆ How to play

1. Looking in the mirror and sticking the tongue out
2. Puffing air through the lips saying 'popopopo'
3. Oral stimulation with a silicone finger toothbrush - vagus nerve (tongue), palate
4. Stimulation of the soft palate (throat) - Chewing and swallowing delicious mashed potatoes, banana, strawberry, etc. cut small enough to avoid choking.

2. Grumbling Stage

◆ Characteristics

This stage starts around 3 to 4 months and peaks at around 9 to 12 months. In particular, the baby enjoys hearing the sound of his or her own voice, and the phenomenon of repeating sounds is vividly expressed in to demonstrate interest, rejection, and expression of desire.

◆ How to play

1. Show reactions to your child's grumbling and converse with them, listen to his or her grumbling and respond using basic language and language about behavior such as, 'Oh, is that so?', 'Oh really?', 'Someone's in a good mood', 'Wow', 'Yummy', etc.

Language Expression Stage

1. First Stage

◆ Characteristics

It starts from about 8 to 12 months of age, starting with words that the child hears the most in daily life like 'mamma', 'dadda', 'dinner', etc.

◆ How to play

If the child says something like 'mil, mil', you can say, 'Do you want mil? Or do you want some milk?' to let the child hear what it is that he or she is saying and what the correct way to say it is so that he or she can become aware of the correct way to say a word that he or she understands.

2. Word Combining Stage

◆ Characteristics

From 18 months of age, babies start to combine words to form sentences about the environment, their feelings and desires.



3. Sentence Formation Stage

◆ Characteristics

When the baby is around 2 or 3 years old, he or she will start using two or three words together in a sentence to express what he or she knows or wants, and his or her language abilities will start to flourish as he or she picks up special language rules, grammar, etc.

◆ How to play

1. 'Give me milk' develops into 'Give me milk, Mommy'. Help your baby to form basic sentences made up of 'subject + verb + object' if using English, or the order of your native language if not English.
2. During play time, help your child to form clear sentences containing meaningful words such as 'The butterfly flies' and 'Let's play with Lego'.

4. Sentence Linking Stage

◆ Characteristics

At around 4 to 5 years of age, children use simple linked sentences, and they start to use conjunctions to combine sentences. By the age of 5, the child has already acquired the main components of the adult language system.

◆ How to play

1. Story making, such as: 'There was a lion who lived in the forest. The lion wanted to eat strawberries. So he went to find some strawberries.'
2. Talking about today, speaking in chronological order, sharing experiences, sharing information

Language Development in Infancy

Become familiar with the language development stages described above, and provide the baby with stimulation according to his or her current level, but keep in mind that developmental stages may differ for each child. Keeping this in mind when trying to get an idea of your child's current development stage will be helpful.

Example

◆ **Expression in the morning:** 'Daddy is going to work.'

◆ **Expanding to play:** Connect with a picture book about Daddy going to work. Use expressions based on the concept of items, such as 'Daddy's shoes are gone', and 'Daddy's shoes are big'. Talk about emotions as you watch Daddy going to work through the window.



The factors affecting the language development of the children are as follows: first, there are 'individual factors' such as intelligence, physical factors, social and emotional factors, gender, etc. and second, 'environmental factors' such as the socioeconomic situation of the family and family culture', and third, 'educational environmental factors' such as learning methods.

Among the factors that are the most important to take into consideration is the factor of talking with parents, repeating words, learning new language and using it in daily life.

Also, nowadays, we cannot overlook video media such as TV and smartphones. Watching video media in the infancy and toddler stages causes children to become dependent on visual stimulation, which results in impaired auditory attention and language development. However, video media also has the advantage of improving the use of various words and use of language, etc. in various situations. This means that natural language stimulation is possible if the child watches video media for a fixed length of time together with parents as the parents interact with the child, such as by saying things like, 'What is that animal?', 'He's growling!', 'Oh,

he's scary'. Also, if getting the child to express his or her thoughts while talking about the video media, this can have a positive effect.

In conclusion, because all stimulation in infancy among preterm babies will be the foundation for future growth, you mustn't overlook anything. Through play, various stimuli help the development of the child. Parents play together and look for social behavior such as eye contact, responding to his or her name, and laughter about 6 months after birth, and this makes it possible to detect any anomalies early and take preventive measures.

Raising a Child with High Self-Esteem

Self-esteem is the greatest gift that parents can give to their child. Self-esteem affects all aspects of life as the child feels that they are a good person who is loved and worthy.

Development of self-esteem is an acquired factor. Just as early childhood memories are retained in the long-term memory, it impacts the child for life. In other words, experiences in childhood are important in the development of self-esteem, and interaction with parents is emphasized.

Children with high self-esteem believe in themselves. The development of self-belief in a child starts with trust in his or her parents. If parents believe in their child and provide him or her with deep care while observing him or her lovingly and helping him or her grow up properly through appropriate discipline, the child can more successfully master the developmental tasks that children need to adapt to and learn as they grow. In addition, if such experiences are accumulated and the child is provided with positive feedback in his or social relations, this can serve as the basis for the child to grow up to live a diverse and interesting life in which he or she focuses on self-realization and finds meaning in life.

However, parents who raise children born preterm, who have slower brain development and development of motor functions than full-term children, are concerned about the development of self-esteem during the infancy stage. However, preterm babies

were just born a little early and a little small. They can grow to be healthy if they only have the love and appropriate care from their parents. Most children born preterm start to grow rapidly in terms of weight and height from the corrected age of six months, and because they start to catch up in terms of development at around the age of 2 to 3, there is no reason to be impatient.

If parents try to hurry their child's development while comparing with other children, contrary to the parents' intention, the parents may use language that hurts the child's self-esteem, or they may have excessive expectations resulting in disappointment and failure to help the child reach his or her potential. However, comparing with other children can be a result of an inferiority complex in the subconscious mind, so parents have to make sure that they are always aiming to build a strong sense of self-esteem in their child.

A positive view of oneself is connected with belief in others, and it allows people to form personal relationships without fear, and even if conflicts and problems do occur, they can actively resolve these and cope with them. And through friendly interpersonal relationships, social competence is formed, and sociality is increased, resulting in a cheerful child who can confidently express himself/herself. Also, you mustn't forget that facilitating this is an important role of parents.



Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

Preterm Baby Q&A

Preterm Baby Q&A¹

<Baby Dasom> Expert Member
Department of Neonatology,
Asan Medical Center
Professor Gisu Kim

Impact of Smoking and Drinking Alcohol During Pregnancy

Q: Why are some babies born prematurely? Can smoking or drinking alcohol during pregnancy cause premature birth? If a mother has successfully quit smoking before becoming pregnant, is there still a risk of premature birth due to previous smoking?

A: Abnormalities in the placenta and womb, toxemia, chronic disease, infection and substance abuse by the mother can cause premature birth. Fetal abnormalities resulting in premature birth include dangerous fetal condition, twins, and various diseases of the fetus itself during pregnancy. A baby may also be born prematurely if the amniotic sac bursts early. Smoking and drinking alcohol are extremely bad for the fetus. However, having a history of smoking before pregnancy is not thought to have any significant impact on the possibility of premature birth.

Catching Up in Terms of Growth

Q: Does poor health stay with people born preterm throughout their whole lives? If treated in an incubator, do their organs develop fully? Are the functions of their lungs or other organs impaired?

¹ These are the answers provided by Professor Gisu Kim to the questions of parents of preterm babies on the Q&A forum on the <Baby Dasom> website (www.babydasom.org).

A: There are many cases of preterm babies catching up with other children in terms of growth. They are small at the time of birth, but they gradually get bigger and eventually catch up with their peers who were born full-term in terms of average weight. Depending on the child's weight at birth, it usually takes between 3 and 12 months to catch up in terms of growth. Some preterm babies may continue to grow at a lower body weight than full-term babies. Causes include genetics, family history, and chronic diseases that may interfere with growth. Unless the child underwent medical ventilation for an extended period of time in the intensive care unit or had complications in the intestinal tract, the child's lungs and intestines are likely to function normally.

Chronic Lung Disease

Q: I am the mother of a 70-day-old baby who was born at 25 weeks and 2 days. Her current weight is 1,120 grams, and her lungs are immature, so she still depends on an oxygen respirator. Her doctor says that she might be discharged in such a state. What kind of medical devices need to be prepared to use if my child is discharged in her current state?

A: If your baby's current weight is 1,120 grams, you don't need to worry about it right now. Usually babies in this condition aren't discharged from the hospital until they are at least 2.3kg. If your baby is discharged from the hospital while still requiring oxygen, usually you will require oxygen or an oxygen generator, an oxygen saturation meter, an oxygen hose and cannula, and if required, you can buy or rent an aspirator. At Asan Medical Center, we haven't had a case yet where a baby has been discharged from the hospital with a medical ventilator to use at home.

Rehabilitative Therapy Time

Q: I am the mother of a preterm baby born at 28 weeks with a body weight of 1,100 grams. He just recently came out of the incubator. He has recently reached 2kg and is due for discharge soon. However, the doctor says that the bleeding in his head has not yet been absorbed. Listening to the various stories of other mothers, I hear that it is best to start rehabilitative therapy fast, but I haven't heard anything at the hospital about rehabilitation. When should I start rehabilitation? Should I start immediately after discharge?

A: Rehabilitation is usually started when a neurological disturbance is expected. If your child is diagnosed with a severe brain injury, or if his or her development is slow or there are abnormal neurological symptoms present during outpatient consultation, rehabilitation will be started.

Perhaps you are asking about preventative rehabilitative care. It is not yet clear exactly when it is best for a baby to start preventative rehabilitation. However, there are many doctors who believe that the 2 to 3 months spent in the incubator by preterm babies who were born early as they could not feel comfortable in their mothers' wombs during the third trimester of pregnancy, where brain development is most rapid, will have a negative impact on brain development. So, there are those who say that it's best to start preventative rehabilitation quickly if possible, and I personally also agree with this. Especially if the pregnancy was just 24 weeks, or if the child was born at an extremely low birth weight like 500 grams, rehabilitative therapy is even more necessary.

However, there aren't yet any definite studies showing there to be a significantly improved prognosis resulting from early commencement of rehabilitation. Therefore, insurance companies don't pay for preventative rehabilitative treatment, and there aren't many reserves for large hospitals to be able to provide rehabilitative treatment, so in reality, it is difficult for

preterm babies to receive preventative rehabilitation.

It is advisable to consult with a neonatal specialist or rehabilitation therapist to determine whether your child needs rehabilitative treatment.

Baby Food Period

Q: I am the mother of a preterm baby born at 33 weeks. When is the proper time to start baby food?

A: Full-term babies born at 40 weeks are usually started on baby food between 5 and 6 months after birth, and preterm babies should also start around 5 months based on corrected age. In other words, since the baby was born two months early, he or she should start around seven months.

Retinopathy vs Lens Posterior Fibroplasia

Q: I want to know the difference between retinopathy and lens posterior fibroplasia. I have been told that since the incubator was supplied with a high concentration of oxygen, there would be damage due to abnormal vascular growth due to change in oxygen concentration when coming out the incubator. Do the two different terms refer to the same disease? Or are they separate diseases?

A: They are the same disease. Retinopathy of prematurity is a more clinical term, and lens posterior fibroplasia is a more pathological term for the disease. Nowadays, retinopathy of prematurity seems to be the more commonly used term.

Retinopathy

Q: Can retinopathy of prematurity be cured by surgery?



A: There are two types of early surgery for retinopathy, which are laser surgery and freezing coagulation surgery. In recent years, laser surgery has been the more commonly performed surgery. Surgery is performed to prevent vision loss, but the results are not great in all cases. Laser surgery for retinopathy is performed at Asan Medical Center about 30 to 40 times a year. In one or 2 to 3 of these cases, progress after laser surgery is not good, and there are cases in which the child loses his or her eyesight.

Congenital Heart Disease in Preterm Babies

Q: My child needs to have surgery for symptoms such as patent ductus arteriosus, atrial septal defect, ventricular septal defect, etc. I have also been told that no CT will be performed so as not to cause the baby stress and ultrasound examination will be performed. Will my baby be able to grow up without any problems following this operation?

A: Heart surgery has advanced a lot in recent years, so it's now possible to perform heart surgery even on most preterm babies. Of course, there may be surgeries that cannot be performed on very small babies. The surgery for the three conditions you mentioned above can be performed without any difficulty on bigger babies; however, in the case of small babies, there may be some problems. What I want to say to parents is that it is so fortunate that there is a way to provide treatment. Sometimes, unfortunately, there are cases in which no treatment is currently possible. Please try not to worry and have faith in the medical team.

Necrotizing Enterocolitis

Q: Can necrotizing enterocolitis ensue with continuous diarrhea?

My baby keeps having ochre yellow diarrhea, but it isn't red. The doctor says that so long as there isn't any blood in the stool, we can just keep an eye on it, but I'm so worried. The people around me are saying that if he keeps passing diarrhea like this, then he might develop necrotizing enterocolitis. Is this really possible?

A: Necrotizing enterocolitis, which can occur in preterm babies while they're in the hospital, is a very serious disease. Peritonitis may occur, and in severe cases, perforation may occur, which requires surgical intervention. The most common cause is underdeveloped intestines in preterm babies, but it can also be caused by intestinal ischemia, infection, and feeding. Diarrhea is not a common symptom of necrotizing enterocolitis. Symptoms include rejecting feeding, abdominal inflation, and bloody stools.

Going Outside

Q: I am the mother of a preterm baby born at 2kg and discharged at 2.5kg. I have a lot of anxieties about how to care for the baby at home. Do I have to prevent contact with people? Can I take the baby outside?

A: Judging from the birth weight of 2kg, I estimate that your baby must have been born around the gestational age of 33 weeks. Such babies are usually discharged from the hospital after about 2 to 3 weeks in the neonatal intensive care unit. If your baby was discharged when reaching 2.5kg, then I think the gestational age would be about 35 to 36 weeks. You asked if you should prevent contact with people. Newborn babies have very weak immune systems. Therefore, they can easily become infected, and such infections can lead to serious outcomes. Therefore it is not advisable to allow your baby to be touched by other people as there is too high a risk

of infection. In Korea, people used to mark the main gate to the house with gold lines for three weeks to let people know that there was a newborn baby in the house so not to come in.

Periventricular Leukomalacia

Q: I am the mother of a preterm baby born at 2,160 grams. 43 days after birth, he now weighs 4kg. He eats well, sleeps well, and plays well. However, the doctor says he suspects periventricular leukomalacia on a microscopic level. Showing symptoms of periventricular leukomalacia in a brain ultrasound, he was given an MRI. He makes eye contact, watches his baby mobile, and is making efforts to lift his head up. He moves his arms and legs around well as he plays also. Would my son be just like regular babies even with a microscopic level of periventricular leukomalacia? Is this something I don't have to worry about? His breathing is good, and all other areas are normal.

A: Symptoms of cerebral palsy present themselves in periventricular leukomalacia. Typical symptoms of cerebral palsy don't appear much in infancy and a diagnosis is usually made when the child is at least one year of age. Delayed development is a symptom of periventricular leukomalacia. If the baby is unable to hold his or her head up at the corrected age of 3 months, can't roll over at the corrected age of about 5 months, and can't sit upright by himself/herself at 7 months, then you may start to concern yourself. In this case, it's best to start rehabilitation early. If the baby's growth and development are normal, the likelihood of having lasting disabilities resulting from microscopic periventricular leukomalacia will be reduced.

Using a Rocking Crib

Q: I am the mother of a preterm baby born at 31 weeks who is now 56 days old. She always cries when I lay her down by herself, so I'm thinking about using a rocking crib. Would this be okay?

A: That depends. Has the baby reached her original due date yet? I think a rocking crib might be too much stimulation. I think it would be best not to use a rocking crib.

Pulmonary Dysplasia

Q: My baby received surgery for patent ductus arteriosus, but he still has difficulty breathing even at six months since birth. I'm told it's pulmonary dysplasia. Is this a congenital disease? I wonder if it might have been caused by using a respirator for too long and whether it will get better as he grows up.

A: As the survival rate of preterm babies increases compared to the past, this is the biggest problem in neonatology. The condition is caused by a combination of factors such as underdeveloped lungs, medical ventilation, oxygen, infection, and patent ductus arteriosus, which can leave scarring of the lungs. If he has been on medical ventilation for six months, it is very serious. The longer a child is on medical ventilation, the more unlikely it becomes to come off of it. Medical ventilation is a treatment that's necessary to keep the baby alive. If he wasn't on it, it's possible that he wouldn't have made it this far.

There have been cases at Asan Medical Center in which a baby has remained on medical ventilation for 11 months before being discharged. It is hard for the parents, but it's also very hard for the doctors. I think it's best that you continue to provide your son with the best medical care and

wait to see how his condition progresses.

Tooth Development

Q: My baby was born at 33 weeks with a body weight of 1.5kg and has now reached her first birthday. Her front teeth haven't yet come in at all but the side teeth are coming in first. I'm worried whether this is a sign of anything more serious.

A: In babies, usually the two front teeth emerge first, but sometimes the side teeth can come in first. This is not a sign of any serious condition.

Developmental Examination

Q: I am the mother of a preterm baby born at 33 weeks with a birth weight of 2,120 grams. They said at the hospital that there was slight cerebral hemorrhage at 5 months of age, but having taken about 4 MRIs, we haven't had the financial means to take any more MRIs after he reached 5 months. He is currently 12 months old. Based on corrected age, he is about 9 and a half months. Now, he can stand up while holding onto someone, and if you give him an item, he grabs it and can put it down. He can roll over, lift his head, crawl, grab things, and stand up while holding onto someone. I don't know if he has any problems with his brain or not.

A: From what you say, it seems to me that his growth and development are normal for a child 9 and a half months of age. Once he's between 12 and 18 months corrected age, it will be possible to get a more precise evaluation of his development if he has an in-depth development examination such as Bayley Scales of Infant Development.

Brain Hemorrhage

Q: I am the mother of a 15-month-old preterm baby. My baby was born with severe cerebral hemorrhaging and is now undergoing rehabilitation. She has problems in the motor nerves in her legs, so she can't crawl on her legs or stand up and walk. What are the aftereffects of cerebral hemorrhage? Is it possible to grow up without having any lasting effects? I am curious about intracranial hemorrhage in preterm babies. There is hemorrhaging on two parts of the brain - one that can cause spasticity and seizures, and one that controls the limbs. I'm told that the probability of this leading to a disability in 1 to 2 years is over 80%. There are already signs of spasticity. I've heard that it's not possible to cure cerebral hemorrhage. Is it true that it can't be completely cured? Is it cerebral hemorrhage that has caused problems in the motors nerves in the legs?

A: In the case of preterm babies, the earlier they are born, the higher the chance of sustaining brain damage from cerebral hemorrhage or periventricular leukomalacia. Cerebral hemorrhage is usually divided into four stages, and the most severe case is stage 4. Usually, hemorrhage doesn't progress past stages 1-2, and if the bleeding is well absorbed, there are minimal neurological aftereffects. However, if it progresses to stage 3, the likelihood of aftereffects increases. Neurological aftereffects include symptoms of cerebral palsy, decreased intelligence, agitation, blindness and severe epilepsy. The most common among these is cerebral palsy. There are problems in the motor nerves, so it's not possible to freely use the muscles. In mild cases, only the lower extremities are affected, and in more severe cases, paralysis of the upper limbs can occur. There may also be complications such as reduced intelligence or severe epilepsy. If the condition progress beyond stage 3, active rehabilitation is required to minimize aftereffects. Of course, rehabilitation doesn't mean that all

disabilities will be completely cured. However, the goal is to reduce the severity of aftereffects to as close to normal as possible.

Growth Hormone Injections

Q: I am the mother of a preterm baby who was born with a body weight of 1,020 grams and is now 7kg. He has had intestinal surgery 4 times and has had surgery one time for cryptorchidism. He crawls and can stand up while holding onto things, and side teeth have started coming in first. He drinks formula and eats rice and has fruit as snacks, and he is at the stage of saying mamma and dadada in terms of language development. The hospital has recommended that he have growth hormone injections due to slow growth. Are such injections really effective, and are there any side effects?

A: Growth hormone injections are considered when a baby that is small for gestational age becomes 2 to 3 years old and is still smaller than normal and is considered in less than 3% of cases.

There aren't any studies yet on the long-term accumulated results as the treatment has not been around for very long, but it has been proven to be effective in small babies by several studies.

There was a study in the past that suggesting an increased rate of leukemia; however, there have been no major side effects in recent years, and the treatment is given to many small children.

Because it isn't covered by insurance, the cost burden is high, and your child would need to receive 3 injections a week for a number of years.

If your child is 20 months now, I think it would be best to just keep an eye on his development, and if he is still small by the time he is 3 years old, consult a pediatric endocrinologist to discuss the matter.

Nausea

Q: I am the mother of a preterm baby born at 32 weeks. She is currently 7kg. After drinking milk, she throws up if she exerts herself even a little, and sometimes she throws up when burping. She is especially prone to throwing up if she rolls over. I am wondering if her stomach might be underdeveloped or perhaps she is throwing up due to drinking too quickly.

A: There are a lot of babies that throw up a lot. You haven't provided information on how many months old your child is at 7kg, but I think she may be growing well and catching up with full-term babies. In most cases, if the baby's weight gain is adequate, there usually isn't anything to worry about a baby throwing up. It wouldn't hurt to get a consultation at the neonatal outpatient department.

Growth Rate

Q: I am the mother of a six-year-old boy who was born prematurely. What is the growth rate of premature babies? There seems to be some differences with other children the same age in terms of size, growth rate and learning ability. Can he catch up with the other children? I would like to know more about the growth rate and developmental characteristics in preterm babies.

A: If he is behind his peers in terms of growth and learning ability at 6 years old, I think that it's unlikely that he will catch up as the general timeframe during which preterm babies do catch up with full-term babies has passed. As I answered in the question above, preterm babies often catch up with full-term babies in terms of growth. Once they have caught up, their growth curve will start to become the same as full-term babies. They do not catch up in terms of development. In other words, if you

base the baby's age on the original due date, this is known as the baby's corrected age, and this date is the basis for comparing to children born full-term. For example, if a preterm baby born on January 1, 2007 after 28 weeks of gestation is 6 months old on July 1, when evaluating his or her development, the evaluation must be based on the baby's corrected age.

Eye Examination

Q: I have heard that preterm babies should have an eye exam every year to check for astigmatism. Is this true?

A: Astigmatism, nearsightedness and amblyopia are more common in preterm babies. It is recommended that full-term babies have an eye examination every year, so I would strongly agree that a baby born preterm should do the same.

Facial Nerve Disorder

Q: I am the mother of a baby born at 27 weeks with a birth weight of 980 grams who is now 33 weeks and 1,630 grams. The left corner of his lips goes up as if it is twitching, and when he opens and shuts his eyes, it seems that his right eye isn't closing all the way. When he smiles, there isn't any sagging on either side. I'd like to believe that it isn't a sign of a problem, but I would like to know if there's any way to tell at home when there is an abnormality on one side of the face. He is having no trouble feeding from a baby bottle. How do I distinguish between general muscle spasms and conditions often observed in preterm babies?

A: It doesn't seem that he has nerve paralysis in the face. If facial nerve paralysis was suspected, your baby's primary care giver would have told you about it. It is very common for healthy preterm babies and full-term

newborn babies to have occasional twitches in the limbs and lips. This is not an abnormal finding. When determining whether there is a nerve problem, it lasts longer, the motion is not fast and is regular, and the twitch doesn't stop even when you grab onto the affected area.

Osteopenia

Q: I am curious as to whether preterm babies with low bone density grow normally and am wondering about the process.

A: Preterm babies do not have an unhindered provision of nutrition in the early days of hospitalization, especially in the third trimester of pregnancy. Many of the nutritional deficiencies are caused by lack of substances that need to be accumulated in the body. Therefore, osteopenia can occur frequently during hospitalization. Such osteopenia becomes normal when enough calcium and vitamin D is supplied when the baby is able to drink milk well. I don't know when the baby's condition will become normal, but be sure to feed your baby plenty of breast milk or cow's milk after discharge.

Phototherapy and Replacement Transfusion

Q: I am wondering what phototherapy and replacement transfusion are. Can my baby be completely cured by receiving this treatment?

A: There is a disease known as neonatal jaundice which is a unique disease that occurs during the neonatal period. Bilirubin, which is generated in the body, must be removed from the liver. If the liver function is immature or if the production of bilirubin becomes excessive, the amount of bilirubin in the body will increase. Too much bilirubin can settle in the brain and cause

brain damage. In order to prevent such brain damage, affected babies are treated with phototherapy or replacement transfusion. In the case of mild neonatal jaundice, the baby is treated with phototherapy. In cases of severe neonatal jaundice, if the bilirubin concentration needs to be reduced quickly, blood transfusion is performed. Jaundice is a disease that can be completely cured after the newborn period. However, treatment is provided to prevent neurological aftereffects such as brain damage or hearing impairment.





The preterm baby support project <Baby Dasom> has been providing support to parents of preterm babies in the way of hospitalization treatment and rehabilitative therapy costs since 2004. In addition, we are carrying out awareness-raising activities for preterm birth and providing various emotional support for the families of preterm babies.

MISSION

Our mission is to help all preterm babies grow to be healthy and to help the families of preterm babies from being defeated by adversity.

VISION

- To lower the rate of cessation of treatment for preterm babies and to increase the rehabilitative care provision rate
- To build a support system that allows the families of preterm babies to easily ask for help
- To continue to promote the expansion of a healthy donation culture.
- To raise healthy social awareness surrounding preterm birth and to change the support system

Preterm Baby Care Guidebook

<Dasom Baby> is pursuing the creation of a harmonious world filled with vitality and love.

CORE PROJECTS

Preterm Baby Treatment Costs Support Project

- Initial hospitalization and treatment costs support project
- Re-admission and treatment costs support project
- Rehabilitative therapy costs support project

Preterm Baby Environment Creation Support Project

- Research and expert conferences
- Establishment of professional information network related to preterm baby care
- Support for preterm babies and propagation of specialized information



Small change, Big impact

The Beautiful Foundation is Created by People.

It is a foundation created together by donors, local activists, and beautiful citizens.

The Beautiful Foundation created by people invests in 'small change' with the wishes of the donors.

The Foundation plants, sprouts, extends the roots of, and grows 'small change' in the eight fields of health, education, labor, culture, social participation, safety, housing, and the environment in stages.

Our dream isn't huge or grandiose.

This is because we believe that miracles begin with 'small change'.

The Beautiful Foundation has that organizations that have set their roots in the field and civil society can make a real difference when they grow together.

'Small change, Big impact' starts together with the citizens.

**A Foundation for all,
The Beautiful Foundation**



Preterm Baby Care Guidebook

VISION

Sharing and Working Toward Becoming a Harmonious Society Harmonious Society

The Beautiful Foundation aims at a society in which everyone lives together in harmony. We pursue a 'life of sharing' based on our vision of taking practical action.

MISSION

To be a Creative Support Foundation that Promotes Public Interest Activities for the Citizens

Incubating a Sustainable Models of Public Interest Activities

Beyond traditional charitable activities, we seek to develop action models that pursue change. We identify groups that will realize our vision together based on cooperation and solidarity. Furthermore, we support the establishment of organizations as well as business and independence.

Proliferators of Civil Donation Culture that Take Action

By clarifying the roles and responsibilities of individuals (donors and volunteers), corporations, organizations, and governments participating in the process of sharing, we contribute to the establishment and propagation of the right sharing culture.

VALUE

Transparency



Public interest



Mutual respect



Support Projects

The Beautiful Foundation assists neighborhoods and supports public interest activities through over 40 projects.

We create change by eliminating various inequalities.

All members of our society must be guaranteed rights in the eight areas of education, health, labor, culture, social participation, safety, housing, and the environment, and we are creating change by providing conditions worthy of human dignity, which we must pursue together.

We create change by solving fundamental problems.

Social awareness and policies must change in order to create even greater changes with a little support. From basic support to policy improvement, we will create change through more fundamental problem solving.

Preterm Baby Care Guidebook

Education

- College student education expenses support project
- High school student education expenses support project
- Junior high school freshman uniform support project
- Youth career exploration support project
- Jangseok Seo leadership program support project
- Childcare rights for migrant children support project

Labor

- Single-mother business start-up loan support project

Safety

- Support project for eliminating blind spots in compensation for industrial accidents
- Support project for ensuring children's right to safety
- Living expenses support project for senior citizens living alone
- Hara Fund designation trust project
- Lost animal protection activities support project

Social Participation

- Support project for Small Change Support Center
- Local community activist story camp support project
- Local civil society capacity enhancement support project
- Public interest groups incubation support project
- Public interest activists network support project
- Public service activists rest support business
- Overseas training support project for public interest activists
- Citizens' public interest activities support project

Health

- Single-parent women's health rights support project
- Assistive device support project for senior citizens living with dementia at home
- Eco-friendly assistive device for persons with disabilities development project
- Hospitalization and treatment costs for preterm babies support project
- Rehabilitative treatment expenses for preterm babies support project

Culture

- Children and youth culture enjoyment support project
- Youth creative activity support project

Housing

- Integrated subsidy support project in the housing field

Environment

- Wind power support project

*Some of the new business names will be changed

Donations

1% 나눔으로
세상을 바꾸는 작은 변화

Regular Donations

We are creating small changes that change the world through 1% sharing in the eight areas of education, health, labor, culture, social participation, safety, and housing.

Fundraising

The Beautiful Foundation has over 90 funds which are the seeds that lead to long-term and continuous changes in communities.

Funds are raised in accordance with the purpose of the fund, the period of operation, the support project, etc.

Corporate Social Contribution

The Beautiful Foundation creates small changes together with companies.

There are various ways such as opening up corporate funds, 'salary sharing' participated in by employees, in-company events, public interest marketing linked with products, etc.

Life Cycle Donation 'Beautiful Day'

This is our anniversary donation program that allows people to commemorate the precious moments in life more meaningfully through sharing.

Anniversaries such as first birthday party weddings birthdays
100 day celebrations memorials etc.

Donation Inquiries

Website: www.beautifulfund.org/donation

Email: nanum@beautifulfund.org



Preterm Baby Care Guidebook

Find out more about the Beautiful Foundation :D

Website



You can find information on the Beautiful Foundation projects, how to donate, application for support projects, annual reports, and other news.
www.beautifulfund.org



Blog



You can read the stories told by the donors directly via the blog.
Come and learn about the Beautiful Foundation.
blog.beautifulfund.org



Facebook



You can learn about the news of the Beautiful Foundation first and with a sense of realism.
Obtain information on various nonprofit activities and organizations.
www.facebook.com/beautifulfund



Main Site

Donation Culture Research Institute
research.beautifulfund.org

Life Cycle Donation 'Beautiful Day'
thebeautifulday.org

Sharing Education
nanumedu.org

Baby Dasom
babydasom.org

Hope Store
hopestore.org





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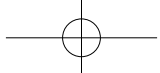


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Preterm Baby Care Guidebook

Happiness that Grows Bigger and Bigger,
We Wish You that Happiness

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