DOWNLOAD PDF THE NORMAL PATTERN OF GROWTH

Chapter 1 : The growth pattern of transplanted normal and nodular hepatocytes

Normal Growth: What to Expect in Healthy Children Normal growth is an indicator of child's overall well being. Any deviation from expected growth velocity for age indicates compromised child health in terms of psycho-social stress in the family, chronic diseases, emotional deprivation or inadequate nutrition.

Up until the time babies are 36 months old, doctors measure weight, length, and head circumference. With older kids, doctors measure weight, height, and body mass index BMI. Why Is Head Circumference Measured? In babies, head circumference the distance around the largest part of the head can provide clues about brain development. For example, an unusually large head may be a sign of hydrocephalus, a buildup of fluid inside the brain. Percentiles are measurements that show where a child is compared with others. On the growth charts, the percentiles are shown as lines drawn in curved patterns. How Are Percentiles Determined? They were last updated in After collecting growth measurements from thousands of U. Being in a high or a low percentile does not necessarily mean that a child is healthier or has a growth or weight problem. There is no one ideal number. Healthy children come in all shapes and sizes, and a baby who is in the 5th percentile can be just as healthy as a baby who is in the 95th percentile. Ideally, each child will follow along the same growth pattern over time, growing in height and gaining weight at the same rate, with the height and weight in proportion to one another. This means that usually a child stays on a certain percentile line on the growth curve. So if our 4-year-old boy on the 10th percentile line has always been on that line, he is continuing to grow along his pattern, which is a good sign. What Could Signal a Problem? A few different growth chart patterns might signal a health problem, such as: This is particularly common during infancy and puberty. That might be a problem.

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Chapter 2 : Patterns of Growth and Decline in Lung Function in Persistent Childhood Asthma.

An understanding of infant growth and development patterns and concepts is necessary for parents and caregivers to create a nurturing and caring environment which will stimulate young children's learning.

It is important to remember that these predictions are only educated guesses. In general, height predictions are more reliable as the child becomes older. Tests for growth hormone secretion should be performed after other causes of growth failure have been considered and ruled out. Growth hormone is secreted by the pituitary gland in quick bursts and does not last long in the blood, so checking a single blood sample for growth hormone is not likely to be helpful. The amount of growth hormone in the bloodstream is measured by taking one or more small blood samples over a 1 to 4-hour period. This is usually done as a brief hospital stay. The results of this test will show if the child s growth problem is caused by a deficiency lack of growth hormone. The amount of testing a child needs depends on what the doctor finds at each step of the evaluation. A short child who is healthy and growing at a normal rate may be observed throughout childhood, while a child whose growth has stopped, will need more involved testing. The evaluation process may make more sense if we take a closer look at some of the variations of the normal growth pattern and some of the causes of abnormal growth. Variations Of The Normal Pattern Of Growth Although most children follow the usual pattern of growth described earlier, a small but significant number of children have growth patterns that differ from this typical model. Some of these less common but normal patterns of growth include shifting channels in infancy, familial short stature, constitutional growth delay and familial tall stature. Shifting Channels In Infancy It is not unusual for normal children under 2 years of age to cross percentile lines in either direction. This happens because the factors that affect the growth of the fetus are different from those that govern growth after birth. Babies who are small at birth often shift to a higher growth channel during the first few months of life, as they "catch up" to their own growth potential. On the other hand, large or average-sized babies who have short parents may have slower-than-expected growth during the first months of life, as they settle into their own growth channel. A downward shift in growth during the first 1 to 2 years of life may not be a cause for concern if the baby is healthy, thriving and has a good diet, and if height and weight are shifting together. After this "new" growth curve is established, height and weight should be checked and plotted on the growth chart every 3 to 6 months until age 3 and every 6 to 12 months after that. As long as the child is healthy and growing at a normal rate, no special treatment is needed. Familial Short Stature Short parents tend to have short children. This is the result of genes that are passed from one generation to the next. Your pediatrician needs to know the heights of parents and relatives when evaluating a short child. The height of a short child with short parents often will fall within a normal range of height when this midpoint is taken into account. The term familial short stature applies to children who: Children with familial short stature are likely to enter puberty and have a growth spurt at a normal age, their bone age will be the same as their chronological age age in years , meaning that there is no delay in bone maturity. They can expect to reach an adult height about the same as that of their parents. Sometimes the diagnosis of familial short stature can be made only by excluding other causes of short stature. Certain laboratory tests may be necessary to exclude other causes of short stature. There is no known treatment that will increase the adult height of these children beyond their inherited potential. Constitutional Growth Delay This type of growth pattern is one of the most frequent causes of parental concern about growth. Constitutional growth delay is the term used to describe children who: Constitutional growth delay is much more common in boys than in girls. These children often fall behind the height of other children their age before they start school. If good growth records are available, one or more periods of slow growth during early childhood may be seen. These children do not catch up in their growth until after the pubertal growth spurt. They continue to grow at the slow, steady rate of childhood for longer than most of their friends. When they finally enter puberty at age approximately 15 to 18 for boys and 14 to 16 for girls, they have a normal growth spurt and normal sexual development. Their adult height usually is similar to that of their parents. Constitutional growth delay sometimes runs in families. As with familial short stature, the diagnosis of constitutional growth delay may depend upon excluding other causes of short stature. To do that, your pediatrician may order some laboratory tests before making the diagnosis. The problems faced by some children with constitutional growth delay result from their short stature and delayed sexual development. A year-old boy with severe growth delay may look like a 9-or yearold-a real disadvantage when it comes to making the football team or getting a date for the school dance. In many cases, support from parents and reassurance from your pediatrician that he is normal, that he can expect to mature sexually and that he will reach a normal adult height, is all that is needed to help him adjust. In some cases, where the teenager s emotional pain is extreme, the endocrine specialist may consider using male hormones androgens to speed up the delayed timetable of puberty. These hormones cause a growth spurt and the onset of sexual development, but they also speed up bone maturation. This means that the growing ends of the bones fuse and growth stops at an earlier age than if no treatment were given. The result may be a small decrease in adult height. Some experts think that giving growth hormone to children with constitutional growth delay may increase their growth rate without speeding up bone maturation. This treatment is experimental, and studies are planned to see if growth hormone will help these children. Abnormal Growth Although most children who are very short or tall are healthy and normal, there are children who have diseases or conditions that affect their growth. For this reason, regular, accurate measurements plotted on a growth chart are very important: The known causes of growth failure and short stature fall into 3 major groups: Sometimes no cause can be found, this is called idiopathic short stature. Abnormal tall stature is most often caused by an endocrine disease or a genetic condition. They impair growth by affecting the child s overall health and well-being. Good nutrition is the cornerstone of normal growth. A balanced diet with the right number of calories and the right amount of protein is necessary to meet the needs of growing children. Several diseases of the digestive tract gastrointestinal diseases can cause food to be poorly absorbed, so that the body cannot use food properly. Failure to absorb nutrients and energy from food often leads to growth failure. Some of the symptoms of nutritional or bowel disease include: Treatment of digestive tract problems often involves a special diet. Children usually have normal growth after the problem is correctly diagnosed and treated. Diseases of the kidneys, heart and lungs may lead to growth failure by causing the buildup of undesirable substances in the body and by interfering with the body s use of nutrients and energy. Children with diabetes, or "high sugar, sometimes grow poorly even when their blood sugar is fairly well controlled. Severe stress can cause growth failure. Children who live in very unhappy or disturbed homes may stop growing for a while, then start growing again when their home life improves. Endocrine Diseases Endocrine diseases are those which involve deficiencies or excesses of hormones. A deficiency exists when there is not enough of a hormone in the body, excess means there is too much of a hormone in the body. Hypothyroidism, or deficiency of thyroid hormone, can halt growth completely and can occur at any time. Growth failure may be the first sign of this disease in childhood. Other symptoms which may appear later include: Every child who is growing at a slower than normal rate should have the simple blood test to check for thyroid deficiency. This disease is treated easily by taking a thyroid pill every day. The child with growth arrest from hypothyroidism usually "catches up" and returns to his or her previous growth channel after treatment begins. In this disorder, weight often increases while height stays the same. Too much cortisol also causes thinning of the skin, easy bruising, softening of the bones, and muscle wasting and weakness. It may be caused by overactivity of the pituitary gland, a tumor in the adrenal glands where cortisol is made or overmedication with cortisol pills used to treat asthma and other diseases. A blood test is used to check the amount of cortisoi in the blood. If there is too much cortisol, additional tests are needed to find out what is causing the excess. The treatment depends on the cause. Early diagnosis of this problem is important because the longer it lasts, the less chance the child has of returning to a normal height channel. Growth hormone GH deficiency may occur at any time during infancy or childhood. There are many causes of GH deficiency. Most of them involve damage to the pituitary gland before, during or after birth. The major sign of GH deficiency is a marked slowing of growth, usually to less than 2 inches 5 cm a year. Children with GH deficiency have normal body proportions and normal intelligence, some may be overweight for height and have problems with low blood sugar. GH deficiency is diagnosed by doing special blood tests to look for GH in the blood. It is treated by giving the child injections of GH several times a week until the child reaches an adult height in the normal range or until the growing ends of the bones fuse.

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Congenital Conditions Congenital conditions are present at birth and result from a problem that occurs before the baby is born. A number of factors can affect the mother, the fetus or the placenta the organ in the uterus that links mother and fetus to cause intrauterine growth retardation, or slow growth within the uterus. Babies who are born prematurely early but who are of normal size for their age usually will "catch up" and fall within the normal range for height and weight by 2 to 3 years of age, assuming that they are in good health. Some full-term babies are smaller than expected at birth. Full-term babies who are very small at birth under 4 pounds are likely to remain small throughout life. No treatment is known to be consistently effective in increasing their height. Many genetic syndromes groups of signs and symptoms of a known abnormality are associated with short stature and growth problems. One of the most common is Turner syndrome, which occurs only in girls. Girls with Turner syndrome have a missing or misshapen sex chromosome "package" of genes in many of their cells. The cause of this defect is not known.

Chapter 3 : Understanding Growth and Development Patterns of Infants | VCE Publications | Virginia Tech

During the second half of the first year of life, growth is not as rapid. Between ages 1 and 2, a toddler will gain only about 5 pounds (kilograms). Weight gain will remain at about 5 pounds (kilograms) per year between ages 2 to 5.

Helps pick up and put away toys. Enjoys being held and read to. Often imitates adult actions in play. Enjoys adult attention; likes to know that an adult is near; gives hugs and kisses. Recognizes self in mirror. Enjoys the companionship of other children, but does not play cooperatively. Begins to assert independence; often refuses to cooperate with daily routines that once were enjoyable; resists getting dressed, putting on shoes, eating, taking a bath; wants to try doing things without help. May have a tantrum when things go wrong or if overly tired or frustrated. Exceedingly curious about people and surroundings; needs to be watched carefully to prevent them from getting into unsafe situations. Young toddlers 12 months have a wider midfoot than older toddlers 24 months. The foot will develop greater contact area during walking. Maximum force of the foot will increase. Peak pressure of the foot increases. Force-time integral increases in all except the midfoot. The lateral toes did not show a pattern in development of walking. Loading parameters of the foot generally increase, the midfoot develops opposite of the other regions in the foot. Two-year-old[edit] Physical Posture is more erect; abdomen still large and protruding, back swayed, because abdominal muscles are not yet fully developed. Respirations are slow and regular Body temperature continues to fluctuate with activity, emotional state, and environment. Brain reaches about 80 percent of its adult size. Squats for long periods while playing. Climbs stairs unassisted but not with alternating feet. Balances on one foot for a few moments , jumps up and down, but may fall. Throws large ball underhand without losing balance. Holds small cup or tumbler in one hand. Unbuttons large buttons; unzips large zippers. Opens doors by turning doorknobs. Grasps large crayon with fist; scribbles. Climbs up on chair, turns, and sits down. Stacks four to six objects on top of one another. Uses feet to propel wheeled riding toys. Most likely in the emerging stage of learning to run. Cognitive Eyeâ€"hand movements better coordinated; can put objects together, take them apart; fit large pegs into pegboard. Begins to use objects for purposes other than intended may push a block around as a boat. Does simple classification tasks based on single dimension separates toy dinosaurs from toy cars. Seems fascinated by, or engrossed in, figuring out situations: Attends to self-selected activities for longer periods of time. Discovering cause and effect: Knows where familiar persons should be; notes their absence; finds a hidden object by looking in last hiding place first. Expected to use " magical thinking ". Tells about objects and events not immediately present this is both a cognitive and linguistic advance. Expresses more curiosity about the world. English language Enjoys participating while being read to. Realizes language is effective for getting desired responses. Uses fifty to three-hundred words; vocabulary continuously increasing. Receptive language is more developed than expressive language; most two-year-olds understand significantly more than they can talk about. Utters three- and four-word statements; uses conventional word order to form more complete sentences. Refers to self as "me" or sometimes "I" rather than by name: Some stammerings and other dysfluencies are common. Is able to verbalize needs. Asks a lot of questions. May use some pronouns. Social and emotional Shows signs of empathy and caring: Temper tantrums likely to peak during this year; extremely difficult to reason with during a tantrum. Impatient; finds it difficult to wait or take turns. Enjoys "helping" with household chores; imitates everyday activities: Watches and imitates the play of other children, but seldom interacts directly; plays near others, often choosing similar toys and activities parallel play ; [16] solitary play is often simple and repetitive. Making choices is difficult; wants it both ways. Often defiant; shouting "no" becomes automatic. Ritualistic; wants everything "just so"; routines carried out exactly as before; belongings placed "where they belong.

Chapter 4 : Normal growth and development: MedlinePlus Medical Encyclopedia

Normal growth is the progression of changes in height, weight, and head circumference that are compatible with established standards for a given population. The progression of growth is interpreted within the context of the genetic potential for a particular child [1].

Understanding child development is an important part of teaching young children. Developmental change is a basic fact of human existence and each person is developmentally unique. Although there are universally accepted assumptions or principles of human development, no two children are alike. Children differ in physical, cognitive, social, and emotional growth patterns. They also differ in the ways they interact with and respond to their environment as well as play, affection, and other factors. Some children may appear to be happy and energetic all the time while other children may not seem as pleasant in personality. Some children are active while others are typically quiet. You may even find that some children are easier to manage and like than others. Having an understanding of the sequence of development prepares us to help and give attention to all of these children. Child Development Development refers to change or growth that occurs in a child during the life span from birth to adolescence. This change occurs in an orderly sequence, involving physical, cognitive, and emotional development. These three main areas of child development involve developmental changes which take place in a predictable pattern age related , orderly, but with differences in the rate or timing of the changes from one person to another. Physical Development Physical development refers to physical changes in the body and involves changes in bone thickness, size, weight, gross motor, fine motor, vision, hearing, and perceptual development. Growth is rapid during the first two years of life. As each physical change occurs, the child gains new abilities. During the first year, physical development mainly involves the infant coordinating motor skills. The infant repeats motor actions which serve to build physical strength and motor coordination. Reflexes Infants at birth have reflexes as their sole physical ability. A reflex is an automatic body response to a stimulus that is involuntary; that is, the person has no control over this response. Blinking is a reflex which continues throughout life. There are other reflexes which occur in infancy and also disappear a few weeks or months after birth. The presence of reflexes at birth is an indication of normal brain and nerve development. When normal reflexes are not present or if the reflexes continue past the time they should disappear, brain or nerve damage is suspected. Some reflexes, such as the rooting and sucking reflex, are needed for survival. The rooting reflex causes infants to turn their head toward anything that brushes their faces. This survival reflex helps them to find food such as a nipple. This reflex also helps the child get food. This reflex usually disappears by three weeks of age. The Moro reflex or "startle response" occurs when a newborn is startled by a noise or sudden movement. When startled, the infant reacts by flinging the arms and legs outward and extending the head. The infant then cries loudly, drawing the arms together. This reflex peaks during the first month and usually disappears after two months. This reflex disappears the first three or four months after birth. The Babinski reflex is present in normal babies of full term birth. This reflex usually lasts for the first year after birth. The Stepping or walking reflex can also be observed in normal full term babies. When the infant is held so that the feet are flat on a surface, the infant will lift one foot after another in a stepping motion. This reflex usually disappears two months after birth and reappears toward the end of the first year as learned voluntary behavior. Motor Sequence Physical development is orderly and occurs in predictable sequence. For example, the motor sequence order of new movements for infants involves the following orderly sequence: Head and trunk control infant lifts head, watches a moving object by moving the head from side to side - occurs in the first few months after birth. Infant rolls over turning from the stomach to the back first, then from back to stomach - four or five months of age. Sit upright in a high chair requires development of strength in the back and neck muscles -four to six months of age. Infant gradually is able to pull self into sitting positions. Crawling - occurs soon after the child learns to roll onto the stomach by pulling with the arms and wiggling the stomach. Some infants push with the legs. Hitching - infant must be able to sit without support; from the sitting position, they move their arms and legs, sliding the buttocks across the floor. Creeping - As the arms and legs gain more strength, the infant supports his weight on hands and knees. Stand with help - as arms and legs become stronger. Stand while holding on to furniture. Walk with help with better leg strength and coordination. Pull self up in a standing position. Stand alone without any support. Walk alone without any support or help. Changes in physical skills such as those listed above in the motor sequence, including hopping, running, and writing, fall into two main areas of development. Gross motor large muscle development refers to improvement of skills and control of the large muscles of the legs, arms, back and shoulders which are used in walking, sitting, running, jumping, climbing, and riding a bike. Fine motor small muscle development refers to use of the small muscles of the fingers and hands for activities such as grasping objects, holding, cutting, drawing, buttoning, or writing. Early hand movements in infants are reflex movements. By three to four months, infants are still unable to grasp objects because they close their hands reflexively too early or too late, having no control over these movements. They will swipe at objects. By the age of nine months, infants improve eye-hand coordination which gives them the ability to pick up objects. Children must have manual or fine motor hand control to hold a pencil or crayon in order for them to write, draw, or color. Infants have the fine motor ability to scribble with a crayon by about 16 to 18 months of age when they have a holding grip all fingers together like a cup. By the end of the second year, infants can make simple vertical and horizontal figures. By two years of age, the child shows a preference for one hand; however, hand dominance can occur much later at around four years of age. By the age of four, children have developed considerable mastery of a variety of grips, so that they can wrap their fingers around the pencil. Bimanual control is also involved in fine motor development, which enables a child to use both hands to perform a task, such as holding a paper and cutting with scissors, and catching a large ball. The infant appears to focus in a center visual field during the first few weeks after birth. In infants, near vision is better developed than their far vision. They focus on objects held 8 to 15 inches in front of them. As their vision develops, infants show preference for certain objects and will gaze longer at patterned objects disks of checks and stripes than disks of one solid color. Studies also show that infants prefer bold colors to soft pastel colors. They also show visual preference for faces more than objects. By two months of age, an infant will show preference gaze longer at a smiling face than at a face without expression. As infants grow older they are more interested in certain parts of the face. At one month of age, their gaze is on the hairline of a parent or other caregiver. By two months of age, infants show more interest in the eyes of a face. At three months of age, the infant seems very interested in the facial expression of adults. Hearing Hearing also develops early in life, and even before birth. Infants, from birth, will turn their heads toward a source or direction of sound and are startled by loud noises. The startle reaction is usually crying. Newborns also are soothed to sleep by rhythmic sounds such as a lullaby or heartbeat. Infants will look around to locate or explore sources of sounds, such as a doorbell. They also show reaction to a human voice while ignoring other competing sounds. At three to six months, vocalizations begin to increase. Infants will increase their vocalizations when persons hold or play with them. Perception To explore their world, young children use their senses touch, taste, smell, sight, and hearing in an attempt to learn about the world. They also think with their senses and movement. They form perceptions from their sensory activities. Sensory-Perceptual development is the information that is collected through the senses, the ideas that are formed about an object or relationship as a result of what the child learns through the senses. When experiences are repeated, they form a set of perceptions. This leads the child to form concepts concept formation. For example, a child will see a black dog with four legs and a tail and later see a black cat with four legs and a tail and call it a dog. The child will continue to identify the cat as a dog until the child is given additional information and feedback to help him learn the difference between a dog and a cat. Concepts help children to group their experiences and make sense out of the world. Giving young children a variety of experiences helps them form more concepts. Cognitive Development Cognitive development refers to the ways children reason think , develop language, solve problems, and gain knowledge. Identifying colors, completing a maze, knowing the difference between one and many, and knowing how things are similar are all examples of cognitive tasks. Children learn through their senses and through their interactions with people and things in the world.

Chapter 5 : Developmental milestones record: MedlinePlus Medical Encyclopedia

Growth patterns differ between breastfed and formula-fed infants. Beginning around 3 months of age weight gain is generally lower for breastfed infants than for that of the formula-fed infant. Linear growth generally follows a similar pattern for both breast- and formula-fed infants. 4 For the.

While the putative clonal nature of focal lesions has often been emphasized, increasing attention is being devoted to the possible role of an altered growth pattern in the evolution of carcinogenesis. Here we compare the growth patterns of normal and nodular hepatocytes in a transplantation system that allows their selective clonal proliferation in vivo. Rats were pre-treated with retrorsine, which blocks the growth of resident hepatocytes, and were then transplanted with hepatocytes isolated from either normal liver or hepatocyte nodules. Both cell types were able to proliferate extensively in the recipient liver, as expected. However, their growth pattern was remarkably different. Clusters of normal hepatocytes integrated in the host liver, displaying a normal histology; however, transplanted nodular hepatocytes formed new hepatocyte nodules, with altered morphology and sharp demarcation from surrounding host liver. Both the expression and distribution of proteins involved in cell polarity, cell communication, and cell adhesion, including connexin 32, E-cadherin, and matrix metalloproteinase-2, were altered in clusters of nodular hepatocytes. Furthermore, we were able to show that down-regulation of connexin 32 and E-cadherin in nodular hepatocyte clusters was independent of growth rate. These results support the concept that a dominant pathway towards neoplastic disease in several organs involves defect s in tissue pattern formation. Liver nodules, Growth pattern, Cell transplantation, Focal growth Introduction Many human solid cancers, including hepatocellular carcinoma, often arise from discrete focal lesions that long precede the overt clinical appearance of the disease. In fact, it is well established that such lesions represent a common precursor site for overt neoplasia Clark et al. Historically, the salient feature of cancer precursor lesions has been considered to reside in their putative clonal nature, and this notion still forms the basis for most of the current theories on the pathogenesis of neoplastic disease Diallo et al. Within this perspective, research efforts continue to be focussed mainly on putative biochemical and molecular changes of rare altered cells that could possibly explain their selective growth, resulting in the emergence of focal proliferative lesions Hanahan and Weinberg However, over the past few years increasing attention has been devoted to the analysis of the phenotypic property that serves to define these focal lesions, i. In fact, a nodule, an adenoma, a polyp or a papilloma are defined as discrete lesions displaying a morphology distinct from that of the normal surrounding counterpart. While this phenotypic feature has long been neglected and implicitly considered as a mere by-product of clonal growth, it is now emerging as a fundamental property of pre-cancerous lesions with specific pathogenetic relevance to the process Chen et al. Over the past several years, we have developed a model of orthotopic hepatocyte transplantation wherein the selective clonal expansion of both normal and nodular hepatocytes can be achieved and analysed over time in an in vivo system Laconi and Laconi This transplantation model is based on a pre-conditioning regimen, i. It was observed that both normal and nodular hepatocytes undergo clonal proliferation when injected into the liver of RS-treated hosts. However, the biological outcome is radically different in either case. In fact, transplanted normal hepatocytes integrate in the host liver and gradually repopulate the entire organ with a seemingly normal histology Laconi et al. In contrast, when hepatocytes isolated from liver nodules are injected into RS-treated animals, they also proliferate but fail to integrate in the host parenchyma and rather undergo expansive growth, re-forming liver nodules that rapidly progress to hepatocellular carcinoma Laconi et al. We observed that the altered growth pattern of transplanted nodular hepatocytes is consistently associated with decreased expression of Cx32, E-cadherin, and MMP Furthermore, it was unequivocally found that these alterations are inherent to nodular lesions and are unrelated to growth per se. Induction of liver nodules in donor rats and isolation of nodular and normal hepatocytes Hepatocyte nodules were induced according to a well-characterized experimental model in the rat, as previously described Laconi et al. W and prepared for transplantation experiments. Normal hepatocytes were isolated from a normal young adult syngeneic Fischer donor rat following a similar two-step collagenase perfusion technique. Cells were isolated as described above and were delivered via portal vein infusion, suspended in 0. Immunohistochemistry for Ki67, Cx32, and E-cadherin was performed using specific monoclonal antibodies anti-Ki67 from Abcam, cat ; anti-Cx32 from Zymed Labs, cat , anti-E-cadherin from Santa Cruz, cat. After rehydration in Tris buffer, specimens were blocked and subsequently incubated with the second primary antibody anti-DPPIV, 1: Negative controls were carried out for each antibody by omitting the primary antibody from the protocol. Pictures of each filter set were digitally merged using layering technology software Leica FW , Version 1. PCR thermal profile was as follows: Results The growth pattern of normal and nodular hepatocytes Normal transplanted hepatocytes integrated well in the recipient liver, forming clusters of irregular shape which were macroscopically indistinguishable in the context of the host tissue. No signs of compression of the surrounding tissue were evident during the growth of normal cells derived from donors. The distribution of DPPIV enzyme activity displayed the typical chicken-wire pattern, consistent with its normal bile canalicular location Fig.

Chapter 6 : Infant growth: What's normal? - Mayo Clinic

pattern of growth by 3 years of age and do not deviate from this pattern until the onset of puberty. During this time, the normal growth rate is inches/year (cm/year).

They are circumscribed and localized and do not transform into cancer. They are localised, do not invade and destroy but in time, may transform into a cancer. Malignant neoplasms are commonly called cancer. They invade and destroy the surrounding tissue, may form metastases and, if untreated or unresponsive to treatment, will prove fatal. Secondary neoplasm refers to any of a class of cancerous tumor that is either a metastatic offshoot of a primary tumor, or an apparently unrelated tumor that increases in frequency following certain cancer treatments such as chemotherapy or radiotherapy. Rarely there can be a metastatic neoplasm with no known site of the primary cancer and this is classed as a cancer of unknown primary origin Clonality[edit] Neoplastic tumors are often heterogeneous and contain more than one type of cell, but their initiation and continued growth is usually dependent on a single population of neoplastic cells. These cells are presumed to be clonal â€" that is, they are derived from the same cell, [8] and all carry the same genetic or epigenetic anomaly â€" evident of clonality. For lymphoid neoplasms, e. The demonstration of clonality is now considered to be necessary to identify a lymphoid cell proliferation as neoplastic. Therefore, clonality is not required in the definition of neoplasia. Current English, however, both medical and non-medical, uses tumor as a synonym for a neoplasm a solid or fluid-filled cystic lesion that may or may not be formed by an abnormal growth of neoplastic cells that appears enlarged in size. Tumor is also not synonymous with cancer. While cancer is by definition malignant, a tumor can be benign , precancerous , or malignant. The terms mass and nodule are often used synonymously with tumor. Generally speaking, however, the term tumor is used generically, without reference to the physical size of the lesion. Not all types of neoplasms cause a tumorous overgrowth of tissue, however such as leukemia or carcinoma in situ and similarities between neoplasmic growths and regenerative processes, e. Recently, tumor growth has been studied using mathematics and continuum mechanics. Vascular tumors formed from blood vessels are thus looked at as being amalgams of a solid skeleton formed by sticky cells and an organic liquid filling the spaces in which cells can grow. Recent findings from experiments that use this model show that active growth of the tumor is restricted to the outer edges of the tumor, and that stiffening of the underlying normal tissue inhibits tumor growth as well. Breast cysts as occur commonly during pregnancy and at other times are another example, as are other encapsulated glandular swellings thyroid, adrenal gland, pancreas. Encapsulated hematomas, encapsulated necrotic tissue from an insect bite, foreign body, or other noxious mechanism , keloids discrete overgrowths of scar tissue and granulomas may also present as tumors. Discrete localized enlargements of normal structures ureters, blood vessels, intrahepatic or extrahepatic biliary ducts, pulmonary inclusions, or gastrointestinal duplications due to outflow obstructions or narrowings, or abnormal connections, may also present as a tumor. Examples are arteriovenous fistulae or aneurysms with or without thrombosis , biliary fistulae or aneurysms, sclerosing cholangitis, cysticercosis or hydatid cysts, intestinal duplications, and pulmonary inclusions as seen with cystic fibrosis. It can be dangerous to biopsy a number of types of tumor in which the leakage of their contents would potentially be catastrophic. The nature of a tumor is determined by imaging, by surgical exploration, or by a pathologist after examination of the tissue from a biopsy or a surgical specimen. The central features of DNA damage, epigenetic alterations and deficient DNA repair in progression to cancer are shown in red. DNA damage is very common. Naturally occurring DNA damages mostly due to cellular metabolism and the properties of DNA in water at body temperatures occur at a rate of more than 60, new damages, on average, per human cell, per day [16] [also see article DNA damage naturally occurring]. Additional DNA damages can arise from exposure to exogenous agents. Tobacco smoke causes increased exogenous DNA damage, and these DNA damages are the likely cause of lung cancer due to smoking. Individuals with a germ line mutation causing deficiency in any of 34 DNA repair genes see article DNA repair-deficiency disorder are at increased risk of cancer. However, a majority of sporadic cancers have deficiency in DNA repair due to epigenetic alterations that reduce or silence DNA repair gene expression. These epigenetic defects occurred in various cancers e. When expression of DNA repair genes is reduced, DNA damages accumulate in cells at a higher than normal level, and these excess damages cause increased frequencies of mutation or epimutation. Mutation rates strongly increase in cells defective in DNA mismatch repair [34] [35] or in homologous recombinational repair HRR. Field defects, normal appearing tissue with multiple alterations and discussed in the section below , are common precursors to development of the disordered and improperly proliferating clone of tissue in a malignant neoplasm. Such field defects second level from bottom of figure may have multiple mutations and epigenetic alterations. Once a cancer is formed, it usually has genome instability. Because of such instability, the cancer continues to evolve and to produce sub clones. For example, a renal cancer, sampled in 9 areas, had 40 ubiquitous mutations, demonstrating tumour heterogeneity i. Plus a schematic diagram indicating a likely field defect a region of tissue that precedes and predisposes to the development of cancer in this colon segment. The diagram indicates sub-clones and sub-sub-clones that were precursors to the tumors. Various other terms have been used to describe this phenomenon , including "field effect", "field cancerization", and "field carcinogenesis ". The term "field cancerization" was first used in to describe an area or "field" of epithelium that has been preconditioned by at that time largely unknown processes so as to predispose it towards development of cancer. Field defects are important in progression to cancer. Likewise, epigenetic alterations present in tumors may have occurred in pre-neoplastic field defects. An expanded view of field effect has been termed "etiologic field effect", which encompasses not only molecular and pathologic changes in pre-neoplastic cells but also influences of exogenous environmental factors and molecular changes in the local microenvironment on neoplastic evolution from tumor initiation to patient death. A mutant or epigenetically altered stem cell may replace the other nearby stem cells by natural selection. Thus, a patch of abnormal tissue may arise. The figure in this section includes a photo of a freshly resected and lengthwise-opened segment of the colon showing a colon cancer and four polyps. Below the photo there is a schematic diagram of how a large patch of mutant or epigenetically altered cells may have formed, shown by the large area in yellow in the diagram. Within this first large patch in the diagram a large clone of cells , a second such mutation or epigenetic alteration may occur so that a given stem cell acquires an advantage compared to other stem cells within the patch, and this altered stem cell may expand clonally forming a secondary patch, or sub-clone, within the original patch. This is indicated in the diagram by four smaller patches of different colors within the large yellow original area. Within these new patches sub-clones , the process may be repeated multiple times, indicated by the still smaller patches within the four secondary patches with still different colors in the diagram which clonally expand, until stem cells arise that generate either small polyps or else a malignant neoplasm cancer. These neoplasms are also indicated, in the diagram below the photo, by 4 small tan circles polyps and a larger red area cancer. The cancer in the photo occurred in the cecal area of the colon, where the colon joins the small intestine labeled and where the appendix occurs labeled. The fat in the photo is external to the outer wall of the colon. In the segment of colon shown here, the colon was cut open lengthwise to expose the inner surface of the colon and to display the cancer and polyps occurring within the inner epithelial lining of the colon. If the general process by which sporadic colon cancers arise is the formation of a pre-neoplastic clone that spreads by natural selection, followed by formation of internal sub-clones within the initial clone, and sub-sub-clones inside those, then colon cancers generally should be associated with, and be preceded by, fields of increasing abnormality reflecting the succession of premalignant events. The most extensive region of abnormality the outermost yellow irregular area in the diagram would reflect the earliest event in formation of a malignant neoplasm. In experimental evaluation of specific DNA repair deficiencies in cancers, many specific DNA repair deficiencies were also shown to occur in the field defects surrounding those cancers. The Table, below, gives examples for which the DNA repair deficiency in a cancer was shown to be caused by an epigenetic alteration, and the somewhat lower frequencies with which the same epigenetically caused DNA repair deficiency was found in the surrounding field defect. Frequency of epigenetic changes in DNA repair genes in sporadic cancers and in adjacent field defects Cancer.

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Chapter 7 : HON Mother & Child Glossary, Postnatal Physical Development

Still, infant growth tends to follow a fairly predictable path. Consider these general guidelines for infant growth in the first year: From birth to age 6 months, a baby might grow 1/2 to 1 inch (about to centimeters) a month and gain 5 to 7 ounces (about to grams) a week.

URL of this page: By about age 2 weeks, an infant should start to gain weight and grow quickly. During the second half of the first year of life, growth is not as rapid. Between ages 1 and 2, a toddler will gain only about 5 pounds 2. Weight gain will remain at about 5 pounds 2. Between ages 2 to 10 years, a child will grow at a steady pace. An infant needs more calories in relation to size than a preschooler or school-age child needs. Nutrient needs increase again as a child gets close to adolescence. A healthy child will follow an individual growth curve. However, the nutrient intake may be different for each child. Healthy eating habits should begin during infancy. This can help prevent diseases such as high blood pressure and obesity. A child with a poor diet may be tired and unable to learn at school. Also, poor nutrition can make the child more likely to get sick and miss school. Breakfast is very important. Children may feel tired and unmotivated if they do not eat a good breakfast. The relationship between breakfast and improved learning has been clearly shown. There are government programs in place to make sure each child has at least one healthy, balanced meal a day. This meal is usually breakfast. Programs are available in poor and underserved areas of the United States.

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Chapter 8 : Average Growth Patterns of Breastfed Babies â€¢ blog.quintoapp.com

If the infant is following a normal pattern of growth, what would be an expected weight for this child at the age of four months? 13 lbs. (kg) Most infants double their birthweight by 4 months of age and triple their birth weight by the time they are 1 year old.

It is important to realize that the plant, with its two transport systems, xylem and phloem, is able to move any substance to virtually any part of its body; the direction of transport is usually opposite in the two systems, and transfer from oneâ€¦ The process of growth Growth is seldom random. Rather, it occurs according to a plan that eventually determines the size and shape of the individual. Growth may be restricted to special regions of the organism, such as the layers of cells that divide and increase in size near the tip of the plant shoot. Or the cells engaged in growth may be widely distributed throughout the body of the organism, as in the human embryo. In the latter case, the rates of cell division and of the increase in cell size differ in different parts. That the pattern of growth is predetermined and regular in plants and animals can be seen in the forms of adults. In some organisms, however, notably the slime molds, no regular pattern of growth occurs, and a formless cytoplasmic mass is the result. The rate of growth of various components of an organism may have important consequences in its ability to adapt to the environment and hence may play a role in evolution. For instance, an increase in the rate of growth of fleshy parts of the fish fin would provide an opportunity for the fish to adapt more easily to terrestrial locomotory life than could a fish without this modified fin. Without disproportionate growth of the finâ€"ultimately resulting from random changes in the genetic material mutations â€"the evolution of limbs through natural selection might have been impossible. Types of growth In cells The increase in size and changes in shape of a developing organism depend on the increase in the number and size of cells that make up the individual. Increase in cell number occurs by a precise cellular reproductive mechanism called mitosis. During mitosis the chromosomes bearing the genetic material are reproduced in the nucleus, and then the doubled chromosomes are precisely distributed to the two daughter cells, one of each chromosomal type going to each daughter cell. Each end of the dividing cell receives a complete set of chromosomes before the ends separate. In animal cells this is a pinching off cytokinesis of the cell membrane; in plant cells a new cellulose wall forms between the new cells. During the period of cell life preceding the actual distribution of chromosomes, the mother cell often grows to twice its original size. Hence, a cycle consisting of cell growth and cell division is established. Cell growthâ€"an increase in cytoplasmic mass, chromosome number , and cell surfaceâ€"is followed by cell division, in which the cytoplasmic mass and chromosomes are distributed to the daughter cells. An increase in cytoplasmic mass does not always occur during cell-division cycles, however. During the early development of an embryo, for example, the original egg cell, usually a very large cell, undergoes repeated series of cell divisions without any intervening growth periods; as a result, the original egg cell divides into thousands of small cells. Only after the embryo can obtain food from its environment does the usual pattern of growth and mitosis occur. In plants The fact that most plant cells undergo extensive size increase unaccompanied by cell division is an important distinction between growth in plants and in animals. Daughter cells arising from cell division behind the tip of the plant root or shoot may undergo great increases in volume. This is accomplished through uptake of water by the cells; the water is stored in a central cavity called a vacuole. The intake of water produces a pressure that, in combination with other factors, pushes on the cellulose walls of the plant cells, thereby increasing the length, girth, and stiffness turgor of the cells and plant. In plants, much of the size increase occurs after cell division and results primarily from an increase in water content of the cells without much increase in dry weight. The very young developing plant embryo has many cells distributed throughout its mass that undergo the cycle of growth and cell division. As soon as the positions of the root tip, shoot tip, and embryonic leaves become established, however, the potential for cell division becomes restricted to cells in certain regions called meristems. One meristematic centre lies just below the surface of the growing root; all increases in the number of cells of the primary root occur at this point. Some of the daughter cells remain at the elongating tip and continue to divide. Other daughter cells, which are left behind in the root, undergo the increase in length that enables the new root to push deeper into the soil. The same general plan is evident in the growing shoot of higher plants, in which a restricted meristematic region at the tip is responsible for the formation of the cells of the leaves and stem; cell elongation occurs behind this meristematic centre. The young seedling secondarily develops cells associated with the vascular strands of phloem and xylemâ€"tissues that carry water to the leaves from the soil and sugar from the leaves to the rest of the plant. These cells can divide again, providing new cell material for development of a woody covering and for more elaborate vascular strands. Hence, the growth of higher plantsâ€"i. These activities occur throughout the period of plant growth. In animals The growth of animals is more restricted in time than is that of plants, but cell division is more generally distributed throughout the body of the organism. Although the rate of cell division differs in different regions, the capacity for cell division is widely distributed in the developing embryo. Increase in size is rapid during the embryonic period, continues at a reduced rate in juveniles, and thereafter is absent. Cell division and size increase continue, however, even after increase in total body size no longer occurs. Because these events are balanced by cell death , post-juvenile increase in cell number is primarily a replacement phenomenon. Height increase in mammals is limited by cessation of cell division and bone deposition in the long bones. The long juvenile period of growth in humans is unusual, most higher animals attaining mature size soon after the end of embryonic development. Some organ systems undergo little cell division and growth after birth; for instance, all of the germ cells precursors of egg cells of the female are formed by the time of birth. Similarly, all of the nerve cells of the brain are formed by the end of the embryonic period. Further increase in the size of the nervous system occurs by outgrowth of nerve fibres and deposition of a fatty insulation material along them. Although the greatest increase in size of nerve cells occurs, as in plant cells, after the cessation of cell division, the nerve fibre outgrowth in animals represents a true increase in the amount of cytoplasm and cell surface and not just an uptake of water. Some organs retain the potential for growth and cell division throughout the life span of the animal. The liver , for example, continues to form new cells to replace senescent and dying ones. Although cell division and growth occur throughout the liver, other organs have a special population of cells, called stem cells , that retain the capacity for cell division. The cells that produce the circulating red cells of mammalian blood are found only in the marrow of the long bones. They form a permanent population of dividing cells, replacing the red cells that continuously die and disappear from the circulation. The rates of both growth and cell division can vary widely in different body parts. This differential increase in size is a prime factor in defining the shape of an organism. Normal and abnormal growth Tumours When growth is not properly regulated, anomalies and tumours may result. If the increase in the number of liver cells is abnormal, for example, tumours of the liver, or hepatomas, may result. In fact, one feature of malignant tumours, or cancers , is the absence of the usual growth patterns and rates. The cells of malignant tumours, in addition to having abnormal growth rates, have altered adhesive properties, which enable them to detach easily from the tumour; in this way the cells may spread to other parts of the body metastasize and grow in unusual locations. It is the growth of tumours in places other than the organ of origin that usually causes the death of an organism. Tumours may vary widely in their growth rates. They may grow very rapidly or so slowly that the rate approaches that of normal cell division in adult tissues. Tumours are not only characterized by an increase in the rate of cell division but also by abnormal patterns of growth. The new cells formed in the tumour are not organized and incorporated into the structure of the organ and may form large nodules. These abnormal growths may present no medical problems e. Regeneration Not all abnormal growths are tumours. If a tree is partially burned, cells below the bark produce a new covering for the exposed vascular strands. Growth may not be normal, and an obvious scar or growth of the new bark is apparent. Similarly, if the skin of a mammal is severely injured, the repair, although abnormal and imperfect, causes the organism no physiological difficulty. Many organisms possess the ability to regrow, or regenerate, with varying degrees of perfection, parts of the body that are lost or injured. Salamanders possess remarkable powers of regeneration, being able to form new eyes or a new limb if the original is lost. Lizards can regenerate a new tail; even humans can regenerate parts of the liver. The reasons for the differences in regenerative powers in different animals remain a fascinating mystery of great practical importance. When regeneration does occur, some specialized cells usually lose their specialized characteristics and enter a period of an increased rate of cell division; subsequently, the new cells respecialize into the tissues of the original body part. Plants whose tops are lost as in pruning can also sometimes form new meristematic centres from dormant tissues and produce new shoots. Compensatory growth Many organs of animals occur in pairs, and if one is lost the remaining member increases in size, as if responding to the demands of increased use. If one of the two kidneys of a human is removed, for example, the other increases in size. This is called a compensatory reaction and may occur either by some increase in cell size hypertrophy , by an increase in the rate of cell division hyperplasia , or both. Although an increase in cell number is primarily responsible for the compensatory reaction of the kidney, the number of individual filtration units glomeruli does not increase. Hence, cell division increases the size of glomeruli but not the total number. Some of the most striking examples of increases in cell size in animals take place during stimulation of endocrine organs, which secrete regulatory substances called hormones; when the thyroid gland is stimulated, for example, the individual cells of the gland may increase dramatically in size. Factors that regulate growth Temperature The environment in which an organism lives plays an important role in modifying the rate and extent of growth. Environmental factors may be either physical e. Organisms and the cells of which they are composed are extremely sensitive to temperature changes; as the temperature decreases, the biochemical reactions necessary for life occur more slowly. The width of trees increases partly by cell division and enlargement of secondary meristematic tissue below the bark. During the cold of winter, cell division and enlargement may cease completely; but during the spring renewed growth occurs. This intermittent growth is influenced by temperature, light, and water. The amount of growth may decrease considerably if the spring is cold, if day length is changed by obstructions blocking the sunlight, or if a drought occurs. In fact, the width of the growth rings visible on the surface of the cut tree trunk provides a partial history of climatic conditions, the spacing of the growth rings of different size having been correlated with known periods of drought and cold to provide reliable archaeological dating of various structures, as in the timbers used in Indian pueblos in the southwestern United States. Temperature also affects both warm- and cold-blooded animals. In animals that do not become dormant, increased demands for food consumption occur during cold periods to provide energy to maintain body temperature; this utilization of food energy may limit the energy available for size increase if food is in short supply. Pressure Because atmospheric pressure is relatively constant except in the mountains, it probably is of little importance in growth regulation. Tissues of deep-sea fishes must have become adapted to such pressure effects, which have been little studied thus far. Movements of the terrestrial atmosphereâ€”windsâ€”may affect growth patterns in trees and shrubs, as is evident in the exotic shapes of certain conifers that grow along coastlines exposed to strong prevailing winds. Light Of all the physical factors, light plays the best understood and most dramatic role. Many of the effects of light on plant growth are obvious and direct. Light energy is the driving force for photosynthesis , the series of chemical reactions in green plants in which carbon dioxide and water form carbohydrates and upon which all life ultimately depends. Insufficient light causes death or retardation of growth in green plants. But light also has indirect effects of great importance. Green plants possess small amounts of a pigment called phytochrome that can exist in two forms.

Chapter 9 : Growth and Your 2- to 3-Year-Old

Two boys or girls exactly the same age can start or end puberty years apart, yet still fall within what is considered "normal" blog.quintoapp.com timing and speed of a child's physical development can vary a lot, because it is determined largely by the genes inherited from the parents.