Lumps and Bumps in Children
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Lumps and Bumps in Children

Thomas C. Putnam, MD*

FOCUS QUESTIONS
1. What superficial cutaneous and subcutaneous lesions do not have a predilection for anatomic location?
2. What superficial or deep cutaneous lesions have a predilection for specific anatomic locations, and in what location(s) is each most likely to be found?
3. What are the indications for rapid biopsy of a skin lesion?
4. What risk factors predict malignancy in 80% of the malignant skin lesions seen in children?

Many lesions involving the skin or subcutaneous tissues alarm parents and, often fearing cancer, they bring their child to a physician. Most lesions are benign and rarely life-threatening. The physician faces the problem of determining which characteristics suggest only observation of a lesion and which make biopsy necessary.

Because many lesions have a predilection for certain areas of the body, this is a useful form of categorization (Table 1). On first inspection of a superficial lesion, several questions must be asked, including the known duration, change in size, presence of pain or other signs of inflammation, and any noted multiplicity. The examination includes an accurate measurement of the size and, most importantly, a determination of the level of the lesion. This will help establish the diagnosis and help to determine whether the possibility of malignancy exists.

Essentially all lesions originating in the skin of children are benign. Some are obvious, such as a wart, while others may not be so clear-cut, especially if the epidermis is not altered in appearance. Upon palpation of a cutaneous mass, the skin does not move over the surface and puckers when the adjacent skin and tissues are compressed and elevated. If the skin moves freely over the mass, the nature of the lesion is not so readily apparent. If the mass moves over the underlying fascia, the lesion lies in the subcutaneous tissue and is essentially benign. However, if the lesion is fixed to the underlying fascia, or the examiner cannot be sure, then the possibility of malignancy does exist.

The location of the lesion on the body affects the risk of malignancy. A submandibular node is usually not worrisome, but a supraclavicular node is always alarming and requires urgent biopsy (Fig 1). Most malignant superficial lesions in children involve lymph nodes. Masses involving deeper layers may represent sarcomas.

Lesions Without Predilection for Anatomic Location
Many superficial lesions occur on the body without a preference for a particular area. Lesions attached to the skin include nevi, warts, sebaceous cysts, capillary hemangiomas, and pyogenic granulomas. Subcutaneous lesions involve cavernous hemangiomas, fibromas, neurofibromas, and lipomas. Lesions arising from tissues deep to the subcutaneous layer include fibromatoses, foreign bodies, hematomas, and benign and malignant tumors of neural or musculoskeletal origin.

Cutaneous Lesions
Sixty-two percent of the white population has nevi; affected individuals have an average of 15 per person. Darkly pigmented races have fewer moles. Cutaneous melanoma, the concern of physician and parent alike, rarely is found in infants and young children. However, 0.3% to 0.5% of all cutaneous melanomas are diagnosed in children younger than 13 y. Preexisting pigmented lesions at the site of a melanoma have been reported in 18% to 85% of patients, representing a widely variable incidence.

Two types of nevi are considered precursors of melanoma: congenital and dysplastic. Congenital nevi are recognized at birth. These moles range from 2 to 10 mm in diameter and are similar in appearance to benign acquired nevi. Compared with acquired nevi, however, congenital nevi carry a 21-fold greater relative risk of becoming melanoma. This means that 1 in 20 patients who have a congenital nevus will develop a melanoma in the nevus if the individual lives to be 60 y of age. Therefore, surgical excision of congenital nevi is recommended.

Dysplastic nevi usually develop during the second decade of life. They vary in color from deeply pigmented to a haphazard coloration with irregular or poorly demarcated borders (Fig 2). One third of adults who have a melanoma have preexisting dysplastic nevi. In patients with a family history of melanoma (an autosomal dominant trait), 90% also have dysplastic nevi. Dysplastic nevi are seen in 40% of relatives who do not have melanoma. Such patients require education and careful yearly evaluation by a physician familiar with dysplastic nevi. Nevit that appear dysplastic should be excised and submitted for pathologic evaluation.

A melanoma is characterized by an irregular border with deeply pigmented or variably colored areas. Ulceration or satellite lesions may be present, and growth usually occurs (Fig 3).

Acquired nevi are not present at birth, by definition. The average number of acquired nevi in the white adult is 15, although some studies have reported up to 40. In contrast, the average number in the black adult is two, and in the East Indian adult, six. These lesions are <1 cm in diameter, may be flat or slightly raised, and have discrete regular borders. Their color may vary from fawn to blackish blue (Fig 4). They develop during the first several decades of life and often disappear in the later decades. The location of such nevi on the palms, soles, or the genitalia is of no prognostic significance.

Two varieties of acquired nevi deserve special comment: the Spitz nevus and the halo nevus. A Spitz...
### Lesions Without Predilection for Anatomic Location

<table>
<thead>
<tr>
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<th>Subcutaneous</th>
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<td>Neurofibroma</td>
<td>Hematoma</td>
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<td>Lipoma</td>
<td>Benign or malignant tumor</td>
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<td>Pyogenic granuloma</td>
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### Lesions With Predilection for Anatomic Location

#### Head and Neck

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<tr>
<td>Pilomatrixoma</td>
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<td>Mucocoele</td>
<td>Exostosis</td>
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<tr>
<td>Preauricular tag and sinus</td>
<td>Congenital torticolis</td>
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<td>Neck sinus</td>
<td>Thyroglossal duct cyst</td>
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<td>Branchial cleft cyst</td>
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#### Trunk

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<td>Supernumerary nipple</td>
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#### Upper Extremity

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<tr>
<td>Pilomatrixoma</td>
<td>Ganglion cyst</td>
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<td>Granuloma annulare</td>
<td>Exostosis</td>
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#### Lower Extremity

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<td>Ganglion cyst, Baker cyst</td>
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<tr>
<td>Exostosis</td>
<td>Pseudorheumatoid nodule</td>
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nevus also is referred to as a juvenile melanoma. Its histologic appearance resembles a nevus, but it is benign and recognizable histologically. It may appear grossly similar to a dysplastic nevus, but usually occurs during the first decade of life (Fig 5). A halo nevus is an acquired nevus surrounded by a halo of depigmented skin, a cellular immunologic reaction to melanocytes evidenced by T-lymphocyte invasion in the depigmented area. Sometimes the central nevus will disappear. Treatment is determined by the behavior of the central nevus rather than the fact that a halo exists.

Although the vast majority of acquired nevi are harmless, certain changes indicate a need for biopsy for histologic study. These include sudden darkening, changes in size or borders, ulceration, itching, pain, or bleeding.

Warts, caused by the papilloma virus, concern parents and adolescents alike. Younger children do not seem concerned by the perceived undesirable appearance. Many warts disappear spontaneously, while others may be very resistant to treatment. Warts may occur anywhere on the body, but frequently appear on the hands or feet (plantar warts). They also may appear on the genitalia (venereal warts) and in the perianal area (raising the suspicion of sexual abuse), mouth, and upper airway. Treatment alternatives may include observation. If active treatment is requested, keratolysis using weak acids in tape or collodion is tried initially. If possible, the body part containing the wart should be soaked for 5 min in warm water containing a small amount of dishwashing liquid detergent. This softens the overlying callous, which then is excised gently with sharp cuticle scissors. The excision should be superficial so that no pain or bleeding occurs. A drop of collodion or circular piece of tape is placed over the wart. A simple bandaid then is applied on top to keep the area moist. The treatment is repeated twice daily and the resulting keratolyzed white-colored tissue is sharply excised with cuticle scissors every 3 to 4 d. This method of treatment requires considerable attention at home but must be adhered to if the wart is to be eradicated. If treatment is not successful, the physician has the option of using liquid nitrogen for freezing, electrofulguration, laser therapy, and excision. Because of their infectious nature, warts frequently recur.

Sebaceous cysts may occur anywhere on the body where hair is located and usually are not seen before adolescence. The cysts are of concern if they are visible on the face or neck, are irritated by pressure, or become inflamed. The latter may be due to secondary bacterial infection or rupture with a chemical inflammatory response. They are attached to the skin and have a small pore or punctum in the center. There may be tenderness, itching, swelling with loss of the punctum, or redness if inflammation exists. Excision under local anesthesia is indicated for an undesirable or symptomatic lesion.

Capillary hemangiomas (strawberry birthmarks) are vascular lesions that occur in 20% to 40% of newborns; the entire spectrum of vascular lesions represents the single largest group of neoplasms found in infants and children. Capillary hemangiomas may be associated with deeper cavernous hemangiomas, in which case they are referred to as mixed capillary-cavernous hemangiomas. The simple capillary form usually develops at 1 mo of age, although occasionally it may be present at birth. Initial growth is rapid, peaking at about 10 mo of age. Involution then occurs, beginning centrally and progressing to the periphery. The onset of involution is heralded by a change in color from strawberry red to a more violaceous hue. The vessels gradually thrombose, giving a seed-like appearance to the lesion (Fig 6).
Both color and appearance justify the common term "strawberry lesion." The lesion usually disappears by 5 to 7 y of age. Sex predominance has been shown in different studies to vary in a female-male ratio from 1:1 to 3:1.

Most capillary hemangiomas are of only cosmetic concern. Some may affect sight if they develop in an eyelid and block vision in the eye. Ones that occur in the pharynx, larynx, or trachea may occlude the airway. If the hemangiomas are associated with a cavernous hemangioma, they may cause platelet trapping and severe thrombocytopenia (Kasabach-Merritt syndrome). Treatment consists of appropriate parenteral counseling and periodic observation to witness expected resolution. The lesions that can have serious consequences secondary to airway or vision obstruction are treated with steroids, given either systemically or by local injection. Other treatments that have been used less frequently include excision, radiation, cryotherapy, embolization, and laser therapy.

Pyogenic granulomata may occur anywhere on the skin. They appear as small raised red nodules that are easily abraded by minor trauma and bleed. They are believed to be secondary to trauma, although there may be no history of injury. Left untreated, they will grow slowly. Treatment for small lesions (≤5 mm) is silver nitrate cauterization. Larger lesions require electrocautery under local anesthesia to thrombose the feeding vessel. Frequently, granulomata may be noted in the navel following sloughing of the umbilical cord. If they are short with a broad base, they are simply handled by silver nitrate cauterization. If, however, they protrude ≥1 cm and have a narrow stalk, they are managed by ligation of the base with a silk or nylon suture with expectant sloughing of the granuloma in approximately 7 d. Very rarely a granuloma-like lesion of the navel may be either a urachal duct opening or the remnant of an omphalomesenteric duct. Either of these lesions features persistent drainage of fluid from an otherwise normal-appearing navel or may have the appearance of a miniature colostomy draining fluid within the navel (Fig 7). In the absence of these findings, silver nitrate cauterization can be considered a safe treatment approach.

**SUBCUTANEOUS LESIONS**

Cavernous hemangiomas usually are easily recognized because they have an associated cutaneous component; occasionally, they present as isolated lesions. Their borders are indistinct and they are soft and compressible, painless, and seemingly fixed to the underlying structure. They spring up de novo in any age group.

![Figure 1. Cause of lymphadenopathy versus site of lymphadenopathy. Percentage shown at each site of adenopathy indicates therapeutic yield for that location. High yield from supraclavicular lymphadenopathy is due to Hodgkin disease, whereas that in upper cervical and preauricular areas is due to atypical mycobacteria. Reproduced with permission from Knight TD, Mu/ne AF, Vassy LE. When is lymph node biopsy indicated in children with enlarged peripheral lymph nodes? Pediatrics. 1982;69:391-396.](image)

![Figure 2. Dysplastic nevus on the finger.](image)

![Figure 3. Benign nevus.](image)

![Figure 4. Malignant melanoma.](image)

![Figure 5. Spitz nevus on the leg. This has a great resemblance to a dysplastic nevus.](image)
Sensory nerves do not injure peripheral motor or nervous system function. Care must be taken that the biopsy for diagnosis may be indicated if a malignancy cannot be excluded.

Lipomas also occur in the subcutaneous tissue and may be located anywhere on the body. Their borders are more discrete than those of hemangiomas, but they are also compressible. Lipomas sometimes are sensitive to pressure because of neural components in the lesion. Paraspinal lipomas may protrude deeply between transverse spinous processes and encroach on spinal nerve foramina. Lipomas occurring in the midline over the spine or tufts of hair occurring in similar locations may indicate the presence of diastematomyelia and tethering of the spinal cord. The latter can be determined by magnetic resonance imaging. Lipomas are excised when the diagnosis is in doubt or if they are symptomatic.

Neuromas, fibromas, or neurofibromas usually are discrete movable lesions in the subcutaneous tissue. If there is a neurologic component, the lesions are usually sensitive to pressure or tapping. Paresthesia may be noted in the area supplied by the involved nerve. These lesions may be soft and fleshy or quite firm to palpation. Numerous café-au-lait cutaneous spots or axillary freckles increase the likelihood that subcutaneous masses are neurofibromata (von Recklinghausen disease). A biopsy of the subcutaneous mass will confirm the diagnosis of a neurofibroma. Care must be taken that the biopsy does not injure peripheral motor or sensory nerves.

DEEP LESIONS

deep lesions attached to underlying structures require biopsy for diagnosis. These may represent malignant lesions, such as rhabdomyosarcomas, fibrosarcomas, or neurofibrosarcomas. Aggressive fibromatoses are lesions that do not metastasize, but require radical excision of the entire muscle group at the site of origin to avert local recurrence.

Lesions with a Predilection for Certain Anatomic Locations

HEAD AND NECK LESIONS

Pilomatrixoma (calcifying epithelioma of Malherbe), mucocele, preauricular tags and sinuses, and sinuses in the neck comprise the cutaneous lesions that have a predilection for the head and neck.

Pilomatrixomas, first described by Malherbe during 1880, are hamartomas of hair follicle origin. They are quite common in children and accounted for 10% of all superficial lumps excised in a series reported by Knight and Reiner during 1983. Pilomatrixomas most frequently are seen on the face, neck, shoulder, or upper extremity. They usually are isolated, but multiple lesions occasionally are noted. Most affected patients are white, and there is a slight predilection for females. Pilomatrixomas are firm, attached to the skin, and have an irregular discoid feel. The overlying skin may appear normal or have a bluish or cyanotic hue. Pressure frequently causes mild pain. Size varies from several millimeters to 2 to 3 cm. Excision should be undertaken for symptomatic lesions or diagnosis.

Mucoceles, derived from mucous glands, occur almost invariably in the buccal mucosa of the lower lip. They are not tender, but easily traumatized by the teeth. Excision relieves the annoyance, but can be delayed until deciduous teeth erupt.

Preauricular tags and sinuses are noted at birth. Other family members frequently have similar lesions. Tags appear in front of the helix and are usually only a cosmetic problem. However, if there is cartilage in the tag, excision is necessary because ligation may leave exposed cartilage and result in a residual lesion. Preauricular sinuses open on the anterior rim of the helix. They measure approximately 1 cm in length and extend into the cartilage. They are asymptomatic unless the lesion is squeezed in the attempt to express the comedone-like plug at the orifice. Trauma from this practice can cause inflammation and abscess formation. The abscess frequently develops anteriorly and may rupture spontaneously, leaving a draining sinus. Asymptomatic preauricular sinuses need no treatment. Infected sinuses should be treated with antibiotics against staphylococci, drained of any abscess, and eventually excised. Excision must include a small piece of the involved helical cartilage to prevent recurrence.

Skin tags in the neck anterior to the sternocleidomastoid muscle are derived from branchial cleft remnants and frequently contain cartilage. Draining sinus tracts in the anterior neck, anterior to the sternocleidomastoid muscle and usually along the lower third, represent remnants of the second branchial cleft. The sinuses are present at birth and discharge a mucoid material. Excision is recommended, even though the lesion may be asymptomatic, and can be performed when the child is nearing the end of infancy to make the required general anesthesia easier.

These sinuses tend to become infected, and a chronically infected and scarred tract can be difficult to eradicate. A variety of lesions present superficially in the head and neck that are not attached to the skin. These include dermoid cysts, exo-

Figure 6. Capillary hemangioma (strawberry birthmark) showing central graying as the lesion matures. Some superficial crusting is evident in the center area.

Figure 7. Omphalomesentric duct opening in the navel of a newborn. There is a central orifice distinguishing this from a routine umbilical granuloma.
Sternocleidomastoid muscle (congenital torticollis), thyroglossal duct and branchial cleft cysts, lymphadenopathy, and histiocytosis X.

Dermoid cysts arise at embryonic lines of fusion from the ectodermal germ layer. The pathology is described as either epidermoid (lined with cutaneous epithelium) or dermoid (contains skin appendages, such as hair, sebaceous glands, or sweat glands). Both are classified as dermoid cysts. There is no sex predilection. The size approximates 1 cm. The most common site is the lateral corner of the brow. Less common sites are the bridge of the nose, the anterior midline of the neck, or the posterior scalp (Fig 8). Surgery is primarily for cosmetic purposes. Rarely, the lesion may penetrate through the tables of the skull to the dura. Roentgenographic studies of the skull have not been helpful in determining if there is a communication with the overlying skin. Excision is only necessary in the postoperative period to restore full range of motion and relieve the head tilt.

Thyroglossal duct cysts account for more than half of all anterior midline neck masses. Less frequently noted masses include dermoid cyst, lymphadenopathy, and ectopic thyroid. The average age at presentation for a thyroglossal duct cyst is 5 y, and there is a history of erythema and tenderness in one third of cases. In contrast to dermoid cysts, these cysts are likely to fluctuate in size. Surgical excision is recommended because of the probability of recurrent infection and development of a draining sinus. Malignancy has been reported in these cysts during the third and fourth decades of life. Because the incidence of ectopic thyroid is so low, thyroid scan is not recommended. However, if ectopic thyroid is discovered at the time of surgical exploration, it is divided in the midline and tucked beneath the strap muscles. Ectopic thyroid should not be removed because it invariably constitutes all of the thyroid tissue in the child.

Because the cyst may track through the hyoid bone and tongue, it should be excised in continuity with the central centimeter of hyoid bone and a core of tongue muscle to the foramen cecum at the base. The recurrence rate with this procedure is 1% or 2%; it is 50% if the cyst alone is removed. If the cyst is infected, penicillin therapy is instituted to control the infection prior to excision.

In addition to occurring over the hyoid bone, ectopic thyroid tissue may occur at the base of the tongue. Cystic masses that occur anterior to dermoid cysts are

to the sternocleidomastoid may originate from a branchial cleft. The differential diagnosis includes lymphadenopathy; tumors of the sternocleidomastoid muscle or other neoplasms, such as neuroblastoma or teratoma; or small cystic hygromas, hemangiomas, or lymphangiomas. Ultrasonographic examination reveals the unilocular cystic nature of a branchial cleft cyst. Excision is for diagnosis and eradication.

Lymphadenopathy may occur anywhere on the body, but it is usually enlarged lymph nodes in the neck that cause a parent to bring a child for evaluation. Most lymphadenopathy has an inflammatory etiology. In the infant, this usually represents infection with pyogenic bacteria. There is a febrile illness followed in a few days by the sudden onset of a tender cervical mass that may be located anterior or posterior to the sternocleidomastoid muscle or under the ramus of the mandible.

Fever and leukocytosis are present, and there may be considerable soft-tissue swelling around the involved nodes. Tenderness is evident. The nodes frequently respond to antibiotic therapy for staphylococci. If not, an abscess forms with erythema and fluctuance (Fig 9). Surgical drainage and culture of the exudate are indicated. Most cases of lymphadenopathy can be managed on an outpatient basis unless the infant appears toxic. In the latter circumstance, hospitalization for intravenous antibiotics is appropriate.

Similar lesions may appear in older children and have a more indolent course. The etiology is likely due to cat scratch disease or a granulomatous process. If diagnosis is required or the mass becomes fluctuant, excision of the mass is preferable to simple drainage. The latter may result in prolonged draining sinuses if the etiology is tuberculosis, fungus, or cat scratch disease.

Nontender discrete nodes that enlarge and persist alarm parent and physician alike. Nodes in the supraclavicular area are particularly worrisome because of the high incidence of neoplastic disease affecting them. Similar nodes in other cervical, axillary, or inguinal areas may represent neoplastic disease, but more than half are reactive lymphoid hyperplasia and will be sterile on culture. Early biopsy is recommended for nodes in the supraclavicular area for children who are ill with fever longer than 1 wk or who experience weight loss, or where the node is fixed to the overlying skin without evidence of inflammation. All other nodes are managed by observation. This consists of accurate measurement of the nodes and strict follow-up. If the nodes regress within 4 to 6 wk, no biopsy is needed. If they persist, biopsy for diagnosis is indicated.

Histiocytosis X, a disease of unknown etiology, may appear as cervical or periauricular lymphadenopathy or as a soft-tissue mass in the head, with a differential diagnosis of metastatic neuroblastoma or rhabdomyosarcoma. Radiographic examination may reveal erosion of the skull by the lesion. Biopsy for diagnosis is indicated.

TRUNK LESIONS
Superficial cutaneous lesions with a predilection for the trunk include pilomatrixoma and supernumerary nipple. The latter appears as a small nipple and areola along the milk line. They are usually single, but multiple lesions may occur. They are asymptomatic and, if they do not resemble a nipple, the patient usually is not concerned about them. Those that resemble nipples are a source of embarrassment and the patient, usually an adolescent, wishes it excised. This is easily done under local anesthesia.

Occasionally, a physician will be consulted for a subareolar breast mass in the preadolescent child. If it is tender and unilateral, it most likely represents infection and a trial course of antibiotics against pyogenic bacteria is indicated. If it is nontender and bilateral, a search should be made for evidence of precocious stimulation. If it is nontender and unilateral and feels symmetrical under the areola, observation is indicated. Unilateral development most frequently occurs in the 7- or 8-y-old female who shows no other signs of puberty. A little patience will be rewarded with beginning enlargement of the other breast plus other signs of impending menarche. Rarely, if ever, should breast tissue be biopsied in the preadolescent female; malignancy is not an issue.

Occasionally, enlargement of the breast buds may occur in the adolescent male, a phenomenon known as adolescent gynecomastia. This may be unilateral in 20% of such males and occurs bilaterally in the remainder. If unilateral, abnormal endocrine secretion is not suspected. If enlargement is bilateral, a search should be made for feminizing endocrine tumors. The latter condition rarely is encountered. Simple adolescent gynecomastia resolves spontaneously several years after its onset. The adolescent male who has difficulty handling the enlarged breast tissue can be relieved of his embarrassment by surgical excision of the tissue, sparing the areola and nipple.

Masses located in the subcutaneous tissues of the abdominal wall in the midline between the umbilicus and xiphoid are most likely to be epigastric hernias. These are small visible masses, ≤1 cm in diameter, and may be evanescent. Epigastric hernias usually are asymptomatic but occasionally cause pain upon exercise. They represent herniation of peritoneal fat through a small defect in the fascia of the linea alba. These lesions are usually single, but may occur multiply. Surgical repair is indicated for symptoms; otherwise, epigastric hernias may be ignored unless they begin to enlarge.

Rarely, a desmoid tumor may be seen in the deep tissues of the abdominal wall in children. These lesions are asymptomatic and grow slowly. Their histology is similar to that of other fibromatoses, and wide local excision is necessary to prevent recurrence. They may be associated with Gardner syndrome.
UPPER EXTREMITY LESIONS
Lesions found in the upper extremity include pilomatrixoma, granuloma annulare, ganglion cysts, and bony exostoses. Ganglion cysts are tense cystic masses that may lie over the wrist, in the palm or dorsum of the hand, or along the fingers. Ganglion cysts may arise from tendon sheaths or the synovium of a joint and rarely exceed 1 cm in size. Frequently, the child complains of pain around the cyst or proximal to it. Treatment is surgical excision, but there is a high rate of recurrence in those with a synovial communication unless the narrow stalk at the base is exposed and ligated. The natural history of these cysts is spontaneous resolution and recurrence.

Granuloma annulare may appear anywhere on the body, but are found most frequently on the extremities. The cause of these lesions remains obscure, but they comprise a benign inflammatory condition involving the skin. Histology reveals mononuclear cells often palisading around foci of altered collagen. The localized lesion is asymptomatic and either flesh-toned or reddish in color. It consists of papules arranged in arciform or annular patterns. The rings are <5 cm in diameter and enlarge centrifugally (Fig 10). Approximately half of affected patients will have solitary lesions. Females predominate at a ratio of 2.5:1. A generalized form occurs in 15% of patients. Subcutaneous granuloma annulare occurs in children. Dermal or subcutaneous nodules may lie close to the periosteum on the lower legs, the pretibial areas, buttoks, hands, scalp, and peri orbital regions. Pseudorheumatoid nodule of childhood (benign rheumatoid nodule) seems identical to subcutaneous granuloma annulare. The histology is identical and both lesions occur in young children in the same sites. These lesions usually regress spontaneously within 2 y; however, the duration may be from a few weeks to several decades. If treatment is given, topical steroids with an occlusive dressing or injected steroids commonly are used.

Bony exostoses derive from osteochondromas. These are essentially benign lesions originating in the periosteum as small cartilaginous nodules. They ossify to become a bony mass and most develop during a period of rapid skeletal growth. They are unusual after skeletal maturation. Approximately 90% are single lesions, and they usually are found on the metaphysis at the end of long bones near the epiphyseal plate. They are most frequently noted at the distal femur, proximal tibia, and proximal humerus. Radiographic examination will reveal the nature of the nodular mass.

Multiple osteochondromatosis is a syndrome that represents an anomaly of skeletal development and involves many exostoses. They are especially conspicuous about the knees and ankles. There can be disturbance in growth, with bowing of the radius and shortening of the ulna. The syndrome is noted in 5% to 10% of all cases of osteochondroma. In more than 50% of patients, there will be an affected parent. Sudden growth of one of these lesions should raise the question of the rare development of malignancy in the form of osteochondrosarcoma. No therapy is required for benign lesions unless they cause pain by exerting pressure on adjacent tissues or skin. Simple excision will relieve the symptoms.

LESIONS OF THE LOWER EXTREMITIES
Lesions with a predilection for the legs include ganglion cysts, Baker cysts, granuloma annulare, and exostoses. Ganglion cysts of the lower extremity are similar to those of the hand, but involve the ankle and feet and occur much less frequently than those of the hand. They are likely to cause symptoms because of the pressure of shoes. A variety of ganglion cysts in the lower extremity is the Baker cyst in the popliteal fossa. Baker cysts are larger than ganglion cysts of the feet and hands and may reach 4 to 5 cm in diameter. They protrude from the synovium of the knee and the hamstrings (usually the medial ones) to lie in the subcutaneous tissues. They are usually asymptomatic, but the patient may complain of an annoying fullness in the popliteal fossa. Spontaneous resolution usually occurs. Surgical excision is indicated if the lesion is symptomatic.

Conclusion
Although the majority of "lumps and bumps" seen in children are relatively benign, several factors that should be pursued in the history-taking and physical examination will aid in diagnosis, including change in size, duration of existence, level of lesion, multiplicity, and pain or other symptoms of inflammation (Table 2). Additionally, certain changes in acquired nevi and conditions associated with lymph node enlargement indicate the need for biopsy. Finally, certain risk factors for malignancy in superficial lesions have been elucidated by Knight and Reiner (1983), who published data from a series of 775 superficial lumps excised at Columbus Children's Hospital. These results did not include data from 269 additional children who underwent excision of a superficial lymph node. Malignancy was found in 1% of the series of 775. The authors found five risk factors that predicted malignancy in four fifths of the malignant lesions: onset during the neonatal period, rapid or progressive growth, skin ulceration, fixation to or location deep within the fascia, and a firm mass >3 cm in diameter. The presence of any of these factors indicates the need for rapid biopsy of the lesion. In the absence of these risk factors, parents can be assured that the lesion is benign with 99.7% accuracy. About 6% of the lesions will resolve spontaneously. More than 90% will persist and slowly enlarge. These can be excised electively at a convenient time for cosmetic purposes, the relief of symptoms, and to ensure treatment of the 0.3% malig-
Table 2. Guidelines for Diagnosis

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<tr>
<th>Factors to be Noted in History and Physical Examination</th>
<th>Multiplicity</th>
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<th>Duration</th>
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<td>Change in size</td>
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<td>Level of lesion</td>
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<tr>
<th>Changes in Acquired Nevi Indicating Need for Biopsy</th>
<th>Changes in size or borders</th>
<th>Itching or pain</th>
<th>Sudden darkening</th>
<th>Ulceration</th>
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<tr>
<th>Indications for Urgent Lymph Node Biopsy</th>
<th>Fever longer than 1 week</th>
<th>Noninflammatory fixation to skin</th>
<th>Supraclavicular location</th>
<th>Weight loss</th>
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<tr>
<th>Risk Factors for Malignancy in Superficial Lesions</th>
<th>Firm mass &gt;3 cm in diameter</th>
<th>Fixation to or location deep to fascia</th>
<th>Onset in neonatal period</th>
<th>Rapid or progressive growth</th>
<th>Skin ulceration</th>
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SUGGESTED READING


PIR QUIZ

6. Superficial lesions of the head and neck that require biopsy for diagnosis are:
   A. Dermoid cysts.
   B. Exostoses.
   C. Histiocytosis X.
   D. Thyroglossal duct cysts.
   E. Congential torticollis.

7. Common benign subcutaneous lesions of the skin include each of the following, except:
   A. Cavernous hemangiomas.
   B. Lipomas.
   C. Neurofibromatosis.
   D. Aggressive fibromatosis.
   E. Ganglion cysts.

8. On first inspection of a superficial skin lesion, it is essential to determine each of the following, except:
   A. Duration.
   B. Size.
   C. Pain.
   D. Determination of level.
   E. Age of patient.

9. Each of the following changes in acquired nevi indicate a need for biopsy, except:
   A. Sudden darkening.
   B. Lymphocyte invasion in the surrounding area.
   C. Change in size.
   D. Itching.
   E. Pain.

10. Treatment of warts may include each of the following, except:
    A. Liquid nitrogen.
    B. Electrofulguration.
    C. Laser.
    D. Excision.
    E. Radiography.

11. Most malignant superficial lesions in children involve:
    A. Thyroglossal ducts.
    B. Lymph nodes.
    C. Cavernous hemangioma.
    D. Neurofibromas.
    E. Nevi.
# Lumps and Bumps in Children

Thomas C. Putnam

*Pediatrics in Review* 1992;13;371

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