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Chapter 1 : Spinal tumor: MedlinePlus Medical Encyclopedia

The most common of these types of tumors develop in the spinal cord's arachnoid membrane (meningiomas), in the nerve roots that extend out from the spinal cord (schwannomas and neurofibromas) or at the spinal cord base (filum terminale ependymomas).

Published online Sep 9. This article has been cited by other articles in PMC. ABSTRACT Autophagy is an intracellular recycling and degradation process, which is important for energy metabolism, lipid metabolism, physiological stress response and organism development. During Drosophila development, autophagy is up-regulated in fat body and midgut cells, to control metabolic function and to enable tissue remodelling. Atg9 is the only transmembrane protein involved in the core autophagy machinery and is thought to have a role in autophagosome formation. During Drosophila development, Atg9 co-located with Atg8 autophagosomes, Rab11 endosomes and Lamp1 endosomes-lysosomes. Autophagosomes can then undergo a sequential maturation process by interacting with endosomes to form amphisomes and then lysosomes to generate autolysosomes; which eventually results in the degradation of engulfed cytoplasmic material Gordon and Seglen, ; Berg et al. This catabolic process is an important mechanism for the bulk degradation of cytoplasmic constituents, the clearance of protein aggregates, the recycling of aged or defective organelles and for combatting intracellular pathogens Mizushima et al. While the core molecular machinery involved in autophagy has been identified Tsukada and Ohsumi, ; Thumm et al. Over 30 autophagy related genes Atg have been discovered, mainly from studies in yeast Tsukada and Ohsumi, ; Nakatogawa et al. Upon the induction of autophagy, by for example starvation, most of these Atg proteins are localised to a perivacuolar structure called the pre-autophagosome structure PAS; Suzuki et al. This lipid pool drives the nucleation of the phagophore and recruitment of other autophagy-related proteins to the isolation membrane Lamb et al. The integral membrane properties of Atg9 and its detection in different membrane compartments, including small vesicles that reside in close proximity to the Golgi, mitochondria and the PAS, have led to the suggestion that Atg9 is involved in membrane delivery to the expanding phagophore Mari et al. This vesicular fusion may provide a membrane platform on which the isolation membrane can then be formed Yamamoto et al. While Atg9 might have a role in the formation of membrane platforms, it is sequestered to but not integrated into autophagosomes Orsi et al. Atg9 co-locates with endosomes following the induction of autophagy Young et al. Amphisome formation, involving the heterotypic fusion of autophagosomes and endosomes, is known to utilise a range of vesicular machinery including, Rab11 Savina et al. However, the exact involvement of this vesicular machinery and the regulatory mechanism is not clear. For example, while Rab11 is a marker for recycling endosomes it is also detected on multivesicular endosomes, and is involved in amphisome formation Fader et al. In addition, Rab11 has a role in Atg9 trafficking from the plasma membrane to autophagic compartments Ravikumar et al. This trafficking of Atg9 by Rab11 compartments appears to be vital for autophagosome initiation, but has not been fully investigated in relation to amphisome formation Ravikumar et al. Other autophagy initiators also have functions in autophagosome maturation; for example, the AtgAtg5 initiation complex part of the AtgAtg5-Atg16 complex , which is involved in autophagosome maturation via an interaction with the tethering protein TECRP1 during autolysosome formation Chen et al. As the only integral membrane protein in the core autophagy machinery, Atg9 may play a role in endosome and lysosome recruitment, acting to facilitate vesicular fusion in manner similar to that proposed for its role in membrane recruitment to the phagophore Takahashi et al. Drosophila provides an ideal model system to investigate the role of Atg9 in autophagy; as in the fly, autophagy is induced in response to physiological stresses, such as nutrient restriction Mulakkal et al. Autophagy is also up-regulated during Drosophila metamorphosis from larvae to adult-hood Butterworth et al. Here we have used the large size of Drosophila fat body cells and organelles, and the capacity for genetic manipulation in the fly, to further investigate the role of Atg9 in autophagy. Upon Atg9 depletion these intraluminal vesicles were no longer detected, suggesting that Atg9 has a specific role in intraluminal vesicle formation in autophagic compartments. RESULTS Atg9 depletion reduced the number and size of autophagosomes at a time point in Drosophila development when autophagy is

normally up-regulated Drosophila Atg9 has previously been investigated in the autophagic response to starvation and hypoxia Pircs et al. Here we investigated Atg9 in relation to either Atg8 another autophagy marker , Rab11 an endosomal marker or Lamp1 an endosomal-lysosomal marker , in fat body tissue at puparium formation 0 h PF , when autophagy is known to be up-regulated Rusten et al. Small Rab11 positive vesicles were also observed in close proximity to larger RabGPF compartments and some of these compartments contained Atg9 Fig. Atg9 was mainly detected as discrete punctate staining when associated with Atg8, Rab11 and Lamp1 compartments Fig.

Chapter 2 : Spinal cord tumor - Diagnosis and treatment - Mayo Clinic

Surgical removal is the primary treatment for spinal tumors. Recovery from spinal tumor surgery, however, can be just as important a step as the operation itself.

Spinal magnetic resonance imaging MRI. MRI uses a powerful magnetic field and radio waves to produce accurate images of your spine, spinal cord and nerves. MRI is usually the preferred test to diagnose tumors of the spinal cord and surrounding tissues. A contrast agent that helps highlight certain tissues and structures may be injected into a vein in your hand or forearm during the test. Some people may feel claustrophobic inside the MRI scanner or find the loud thumping sound it makes disturbing. In certain situations, a general anesthetic may be necessary. This test uses a narrow beam of radiation to produce detailed images of your spine. A CT scan is only rarely used to help diagnose spinal tumors. The only way to determine the exact type of a spinal tumor is to examine a small tissue sample biopsy under a microscope. The biopsy results will help determine treatment options. Treatment Ideally, the goal of spinal tumor treatment is to eliminate the tumor completely, but this goal may be complicated by the risk of permanent damage to the spinal cord and surrounding nerves. Doctors also must take into account your age and overall health. The type of tumor and whether it arises from the structures of the spine or spinal canal or has spread to your spine from elsewhere in your body also must be considered in determining a treatment plan. Spinal tumor neck surgery Spinal tumor neck surgery Using microsurgical techniques, a tumor is gently teased out of the spinal cord in the cervical spine. Treatment options for most spinal tumors include: During observation, your doctor will likely recommend periodic CT or MRI scans at an appropriate interval to monitor the tumor. This is often the treatment of choice for tumors that can be removed with an acceptable risk of spinal cord or nerve injury damage. Newer techniques and instruments allow neurosurgeons to reach tumors that were once considered inaccessible. The high-powered microscopes used in microsurgery make it easier to distinguish tumor from healthy tissue. Doctors also can monitor the function of the spinal cord and other important nerves during surgery, thus minimizing the chance of injuring them. In some instances, very high-frequency sound waves might be used during surgery to break up tumors and remove the fragments. But even with the latest technological advances in surgery, not all tumors can be totally removed. Recovery from spinal surgery may take weeks or longer, depending on the procedure. You may experience a temporary loss of sensation or other complications, including bleeding and damage to nerve tissue. Pediatric neurosurgery consultation Radiation therapy. This may be used to eliminate the remnants of tumors that remain after surgery, to treat inoperable tumors or to treat those tumors where surgery is too risky. Medications may help ease some of the side effects of radiation, such as nausea and vomiting. Modifications may range from simply changing the dosage of radiation to using sophisticated techniques such as 3-D conformal radiation therapy. A standard treatment for many types of cancer, chemotherapy uses medications to destroy cancer cells or stop them from growing. Your doctor can determine whether chemotherapy might be beneficial for you, either alone or in combination with radiation therapy. Side effects may include fatigue, nausea, vomiting, increased risk of infection and hair loss. Because surgery and radiation therapy as well as tumors themselves can cause inflammation inside the spinal cord, doctors sometimes prescribe corticosteroids to reduce the swelling, either after surgery or during radiation treatments. Although corticosteroids reduce inflammation, they are usually used only for short periods to avoid serious side effects such as muscle weakness, osteoporosis, high blood pressure, diabetes and an increased susceptibility to infection. Request an Appointment at Mayo Clinic Clinical trials Explore Mayo Clinic studies testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this disease. One such treatment is acupuncture. During acupuncture treatment, a practitioner inserts tiny needles into your skin at precise points. Research shows that acupuncture may be helpful in relieving nausea and vomiting. Acupuncture might also help relieve certain types of pain in people with cancer. Coping and support Learning that you have a spinal tumor can be overwhelming. But you can take steps to cope after your diagnosis. Find out all you can about your specific spinal tumor. Write down your questions and bring them to your appointments. As your doctor answers your questions, take notes or ask a friend or family member to come

along to take notes. Find someone you can share your feelings and concerns with. You may have a close friend or family member who is a good listener. Or speak with a clergy member or counselor. Other people with spinal tumors may be able to offer unique insights. Ask your doctor about support groups in your area. Online discussion boards, such as those offered by the Spinal Cord Tumor Association, are another option. Take care of yourself. Choose a healthy diet rich in fruits, vegetables and whole grains whenever possible. Check with your doctor to see when you can start exercising again. Get enough sleep so that you feel rested. Reduce stress in your life by taking time for relaxing activities, such as listening to music or writing in a journal. Preparing for your appointment If you have signs and symptoms that are common to spinal tumors â€" such as persistent, unexplained back pain, weakness or numbness in your legs, or changes in your bowel or bladder function, call your doctor promptly. After your doctor examines you, you may be referred to a doctor who is trained to diagnose and treat cancer oncologist , brain and spinal cord conditions neurologist, neurosurgeon or spine surgeon , or disorders of the bones orthopedic surgeon. Note any family history of brain or spinal tumors, especially in a first-degree relative, such as a parent or sibling. Take a family member or friend along. Sometimes it can be difficult to remember all of the information provided to you during an appointment. Someone who accompanies you may remember something that you missed or forgot. Write down questions to ask your doctor. Questions to ask your doctor at your initial appointment include: What may be causing my symptoms? Are there any other possible causes? What kinds of tests do I need? Do these tests require any special preparation? What do you recommend for next steps in determining my diagnosis and treatment? Should I see a specialist? Questions to ask an oncologist or neurologist include: Do I have a spinal tumor? What type of tumor do I have? How will the tumor grow over time? What might be the consequences? What are the goals of my treatment? Am I a candidate for surgery? What are the risks? Am I a candidate for radiation? Is there a role for chemotherapy? What treatment approach do you recommend? What is the long-term outlook for my condition? Do I need a second opinion? What to expect from your doctor Your doctor is likely to ask you a number of questions. Thinking about your answers ahead of time can help you make the most of your appointment. A doctor who sees you for a possible spinal tumor may ask: What are your symptoms? When did you first notice these symptoms? Have your symptoms gotten worse over time? If you have pain, where does the pain seem to start? Does the pain spread to other parts of your body? Have you participated in any activities that might explain the pain, such as a new exercise or a long stretch of gardening? Have you experienced any weakness or numbness in your legs? Have you had any difficulty walking? Have you had any problems with your bladder or bowel function? Have you been diagnosed with any other medical conditions? Are you currently taking any over-the-counter or prescription medications? Do you have any family history of noncancerous or cancerous spinal tumors?

Chapter 3 : CAA1 - Proteins and nucleic acids encoding same - Google Patents

Spinal tumors can be benign (noncancerous) or malignant (cancerous). Malignant tumors typically develop because a primary cancer in another part of the body spreads (metastasizes) to the spine; in rare cases, the malignancy grows primarily in the spine itself.

T he development of stereotactic and functional neurosurgery is highlighted by the many innovative contributions made by neuroscientists in an attempt to reference intracranial points to a specific coordinate system using precise measurements. Clarke, 17 provided the foundation on which Ernest Spiegel and colleagues 29 could apply this technique to humans in This was soon followed by the exponential growth and technological development of stereotactic systems designed for intracranial neurosurgical procedures. Spinal Cord Stereotaxy Stereotaxis has not been limited in its use to intracranial operations. The earliest documented use of the principle of guiding devices for directing probes to their targets appeared in the work of Dittmar 6 in Attachment of a locating device to the clamps in a longitudinal axis permitted precise movements of two fine knives in the vertical and horizontal planes. Drawings displaying the original device of Woroschiloff secured to the vertebrae A and the manipulator used to guide the electrodes B. Reproduced with permission from Karger, Basel. The devices of Dittmar and Woroschiloff should be considered precursors to true stereotaxis, a concept brought to fruition by Horsley and Clarke many years later, because they did not rely on a Cartesian or polar coordinate system. These fundamental principles form the basis for stereotaxis, which allows any point in space to be referenced to a specific coordinate system using precise measurements. The first true stereotactic instrument designed for use on the spinal cord was reported by Clarke 3 in The device consisted of a cradle with four pivotable legs that could be firmly secured to surgically exposed vertebrae. Attached to the cradle, parallel to the cord surface, was a traveling stage that supported a needle holder capable of graduated movements in three planes. The accuracy of the lesions was confirmed by histological sections. Investigation of the Central Nervous System. The Johns Hopkins Press, As with cranial procedures, stereotaxis was initially limited to neurophysiological experiments. When Spiegel, et al. However, the development of spinal cord stereotaxis lagged behind. One major impediment to the use of stereotaxis in the human spinal cord was the lack of a stereotactic atlas. Although Taren, et al. It was not until , when Mullan, et al. Although the lateral techniques 21, 28 and, later, the anterior approach of Lin, et al. Soon after the introduction of percutaneous cordotomy, came the first report of a true stereotactic procedure performed on the human spinal cord. In , Rand and coworkers 27 at the University of California at Los Angeles reported two cases in which they detailed the use of the Randâ€”Wells Mark II stereotactic guide system for cryogenic lesioning of the cervical spinal cord. The stereotactic apparatus was fixed to the skull at three points and the C1â€”2 intralaminar space was placed at the center of the lateral circles of the arc system Fig. Using air myelograms and teleroentgenograms, a cryoprobe was inserted percutaneously so that it could lie against the anterior quadrant of the cervical spinal cord. Although the stereotactic technique worked well in their two patients, cryocordotomy did not achieve the same long-lasting pain relief as that achieved using strontium or radiofrequency lesions. Photograph showing the Randâ€”Wells Mark II stereotactic guide system used for cryocordotomy procedures. The success of percutaneous cordotomy and the advances of stereotactic surgery led Crue and associates 4 to perform a posterior percutaneous trigeminal tractotomy in Using the Toddâ€”Wells stereotactic frame, these surgeons were able to angle a needle upward above the arch of C-1 and below the posterior rim of the foramen magnum into the brainstem successfully to lesion the descending trigeminal nucleus and tract in a patient with trigeminal neuralgia. In the following year, these surgeons applied their posterior stereotactic approach to the spinal cord of patients with intractable pain due to advanced neoplastic disease. They also noted that the spinal cord exhibited considerable movement in the anteroposterior and rotational planes, which could alter the accurate placement of target lesions. Based on experimental work in cat and human cadavers, they used a line 3 to 4 mm lateral to the midline of the odontoid on a posteroanterior x-ray view as a landmark. They then passed an electrode at a right angle through the C1â€”2 interspace until it reached the anterior floor of the cervical canal and made multiple lesions as the

needle was withdrawn Fig. Drawings displaying the Toddâ€”Wells stereotactic apparatus as it is adapted for posterior percutaneous tractotomies left and a seriographic Aâ€”C demonstration of the procedure right. Another contribution to the development of spinal cord stereotaxis came from the work of Puletti and Blomquist 26 at the University of Wisconsin. They devised a technique for recording single neuron potentials in the human spinal cord and provided two illustrative examples. A microelectrode holder capable of vertical movements was fastened to a micromanipulator, which could be moved in two translational planes. The micromanipulator was bolted to a Scoville retractor that, when placed in an open laminectomy wound, provided a constant distance between the electrode holder and the spinal cord during respiratory cycles Fig. Originally appeared, J Neurosurg A major contribution to spinal stereotaxis came from the work of Edward Hitchcock 9â€”16 at the University of Edinburgh in Scotland. Based on cadaveric and surgical observations, he noted that the upper cervical cord had the least mobility due to the lower cranial nerves and a large first dentate ligament when the neck was in the fully flexed position. His first attempt was in a year-old man with metastatic teratoma. Histological examination confirmed the placement of the lesion; however, he noted several problems with the Leksell frame, including difficulty with frame fixation for a posterior cervical approach. He also had doubts regarding the accuracy of the lesion because the target was at the extreme corner of the frame. The square frame was of constructed aluminum alloy with three-point skull fixation Fig. Using teleradiography and specifying the odontoid process as a reference point, the target site chosen on the basis of the desired analgesic level could be related to the stereotactic apparatus. The frame had two bars that allowed for vertical and horizontal movements to set the electrode length and laterality. In his initial report Hitchcock detailed two cases of successful high cervical spinothalamic tractotomies. He later expanded his technique to include stereotactic trigeminal tractotomies and myelotomies in the surgical treatment of intractable pain. Up to this point spinal cord stereotaxis was limited to the cervicomedullary region. Their instrument resembled that of Woroschiloff and required fixation to the vertebral arch in an open laminectomy wound. The target point was reached by referring to model maps of single segments in the lumbar enlargement, which were made in the Anatomy Institute of the Comenius University in Bratislava. Over a year period, he and his colleagues performed 88 procedures, including 66 C1â€”2 procedures for pain, 19 thoracolumbar procedures for spasticity, and three sacral procedures for neurogenic bladders. In , Nashold and Cosman unpublished data designed and tested a human spinal cord stereotactic instrument built by the Radionics Corporation. It had a small aluminum frame and an electrode drive that could be fixed to the spinal lamina after the spinal cord was exposed Fig. The electrode holder was advanced by a vernier drive mechanism and the radiofrequency electrode could be manipulated in three dimensions as well as angled. The frame was tested in animals, but its use in humans was limited to producing midline myelotomies by making small radiofrequency coagulations. Photograph showing the Nashold and Cosman spinal cord stereotactic instrument and electrode for producing radiofrequency midline myelotomies. Zlato has compiled an impressive collection of topometric maps from cadaveric human spinal cords; an example of an atlas representation of a cervical spinal cord segment is depicted in Fig. Using computerized tomography CT images to determine the transverse and sagittal diameters of the spinal cord at a site of intervention, Zlato. Although he concedes that spinal cord stereotaxis is accompanied by several problems intrinsic to the anatomy and individual variability of the cord itself, his atlas may play an important role in the future of stereotactic surgery. Drawings depicting the stereotactic apparatus of Zlato designed to collect topometric coordinate data from human spinal cords. Photomicrograph showing transverse C-5 segment obtained from cadaveric human spinal cord with superimposed X- and Y-coordinates of the rectangular system. This is probably due to the logistics and time necessary to perform the procedures without any proven significant benefit. Also, the mobility of the spinal cord yields a certain degree of inaccuracy, which can be intolerable when dealing with the precise target lesion necessary for spinal cord surgery. More recently, the pendulum has shifted toward greater use of stereotaxis for the spinal column. As percutaneous and endoscopic techniques have been developed, attempts have been made to incorporate the principles of stereotaxis to refine their accuracy. In , Heikkinen, 8 a Finnish neurosurgeon, reported his technique, which uses a modification of the standard Laitinen frame attached to the operating table. The patient was relieved of his symptoms for 3 months before experiencing a recurrence. The angles and trajectory

lengths between the entry and target points are defined in relation to an external skin fiducial mark with the electronic cursor on the CT computer screen. The discectomy is then performed with the patient under local anesthesia on the gantry table. Stereotactic percutaneous lumbar discectomy. With the advent of frameless stereotaxis, the clinical utility of stereotactic technology for operations on the spine has expanded even further. Cadaveric and clinical data are being accumulated on the use of frameless stereotaxis in the accurate placement of pedicle screws for spinal fusions. For example, Nolte, et al. Using a space pointer Northern Digital, Waterloo, Ontario, Canada and the Neurological Surgery Planning System, 18, 32 they were able to place 20 pedicle screws without perforating the pedicular walls Fig. Reproduced with permission, Spine However, frameless stereotaxy is still in the early stages of refinement. In the Dartmouth experience with lumbar spine operations using a frameless operating microscope, a Obviously, more clinical data must be collected before the utility of frameless stereotaxis in spinal operations can be determined. However, the outlook appears promising, especially as technology advances, and greater accuracy should translate into less patient morbidity. As further refinements are achieved, frameless stereotaxy may also come to play a role in intramedullary surgery. Summary In summary, spinal cord stereotaxy is not new to the field of functional and stereotactic neurosurgery. Long before the invention of Horsley and Clarke came the first instruments of Dittmar and Woroschiloff. Although spinal cord stereotaxis has not achieved the same technical advances as intracranial stereotaxis, it has increased our understanding of spinal cord anatomy and physiology. Intramedullary spinal cord frame stereotaxis may never prove to be beneficial, but as percutaneous techniques for disc disease and frameless stereotaxis continue to be refined, spinal cord stereotaxy may still have a future.

Chapter 4 : Survival Rates for Selected Adult Brain and Spinal Cord Tumors

Overview. This page provides a quick glossary of tumor terms, an overview of spinal anatomy, a description of the different types of spinal tumors, typical symptoms caused by spinal tumors, and the methods of their diagnosis and treatment.

Atembewegungen erweisen sich bei der Strahlentherapie von Lungentumoren als problematisch. In dieser Studie werden anhand von zwei Bewegungsphantomen die Effekte von Tumorbewegungen auf die applizierte Dosisverteilung untersucht. Die Phantome erlauben die Simulation translatorischer, sinusperiodischer Bewegungen; ihre Bauweise unterscheidet sich jedoch deutlich. Entsprechend der zur Planerstellung korrespondierenden Atemphase werden zwei Szenarien betrachtet: Der Einfluss von Bewegungsamplitude und -periode Messreihen: H2 Strahlenther Onkol ; Sondernr 1: Mittelwerte und Standardabweichung 1SD der Differenzen und Referenzwerte zwischen Referenzplan klinisch und Plan mit Direktrekonstruktion wurden analysiert. H4 Strahlenther Onkol ; Sondernr 1: We have previously shown that survivin displays a radiation resistance factor and molecular target for radiosensitisation in colorectal cancer. As the first survivin inhibitors have recently entered phase I clinical trials, we aimed to determine whether inhibition of survivin by the use of antisense oligonucleotides ASO; Eli-Lilly product LY enhances the in vivo radiation response in a xenograft mouse model. After days, when average tumor volume has reached approx. LSN mismatch control; Group 5: Irradiation of the tumors was performed using a linear accelerator at a dose rate of 0. Furthermore, survivin expression in tumor cells was assayed by immunohistochemistry in tumor specimens. These data confirmed a radiosensitising effect of survivin inhibition in vivo and further suggested the protein as a promising molecular target to improve radiation response in colorectal cancer. MR-tomographische Tumorkontrolle, Visuserhalt, klinisch-endokrinologische Folgewirkungen. Die mediane Dosis betrug 54 Gy. Bei 5 Augen kam es zu einer Tumorregression. Der Visuserhalt nach 3 und 5 Jahren betrug Bei 12 Augen kam es zu einer Verbesserung des Visus. H7 Strahlenther Onkol ; Sondernr 1: Alle Patienten wurden hypo-fraktioniert, dosiseskaliert Gy D95 Gesamtdosis in Fraktionen behandelt. V2 Strahlenther Onkol ; Sondernr 1: V3 Strahlenther Onkol ; Sondernr 1: Die D5 Dosis im Spinalkanal wurde auf 42Gy limitiert. Set-up Fehler wurden vor jeder Behandlungsfraktion mittels Tischverlagerung korrigiert. Alle bis auf eine Patientin waren lokal kontrolliert. Eine dauerhafte Besserung der Schmerzen wurde bei allen Patienten erreicht; eine radiogene Myelopathie oder Neuropathie wurde nicht beobachtet. Die Dosis-eskalierte Behandlung von spinalen Metastasen resultierte in sehr guter lokaler Kontrolle ohne schwerwiegende Nebenwirkungen. V4 Strahlenther Onkol ; Sondernr 1: Jedoch fehlt meist eine Kontrolle der intrafraktionellen Bewegung des Patienten bzw. Dies kann durch Beobachtung des Patienten anhand externer Marker oder direkte Beobachtung des Tumors geschehen, wobei auch hier oftmals Marker zur eindeutigen Lokalisation herangezogen werden. In einer selbstentwickelten Software wird ein charakteristischer Bereich des Tumors markiert und in einer Suchmaske abgelegt. Es wurden die Daten von 25 Patienten mit insgesamt Feldern ausgewertet. Zudem ist die Zuordnung des Objektes zum Tumor oftmals fraglich. V5 Strahlenther Onkol ; Sondernr 1: Previous phantom experiments and clinical trials during in-beam or shortly after offline carbon ion and proton irradiation demonstrated the potential of this technique for millimetre verification of the beam range and lateral field position in rigidly immobilized sites. PET imaging can also detect deviations between planned and applied treatment, e. Thus, several existent or upcoming ion beam therapy centers are considering the use of PET quality assurance. The method of choice between dedicated in-beam detectors within the treatment room and nearby commercial tomographs is still a topic of debate. Counting statistics is a major quantity responsible for the image quality and the amount of usable clinical information. For a given detector arrangement, ion species, dose fractionation scheme as well as tumor site and size, the measurable signal depends on the time course of the beam delivery and PET acquisition. In all imaging scenarios, the measuring time is limited by considerations on patient throughput for in-room detectors and comfort for long scans. Additionally, biological clearance of the produced activity increases with the time after treatment, affecting spatial distribution and intensity of the measurable signal. This work quantitatively compares the detectable signal for in-beam and offline PET imaging of proton and

carbon ion irradiation of skull-base and para-spinal tumors at different accelerator systems. The results indicate that in-beam PET acquisitions at synchroton-based facilities can provide a stronger or at least comparable intensity of the measurable signal with better correlation with the delivered dose especially for protons in comparison to offline approaches, provided that efficient PET systems enabling detection of isotope decays during beam extraction are implemented. V6 Strahlenther Onkol ; Sondernr 1: An dieser europaweit ersten Schwerionentherapie-Pilotanlage sind bis heute ca. Dieses so genannte in-beam PET-Verfahren ist die zurzeit einzige bekannte Methode zur in-situ und in-vivo Verifikation der Dosisapplikation bei der Bestrahlung mit Ionen. Ferner werden sporadische Abweichungen zwischen geplanter und realisierter Teilchenreichweite nachgewiesen. V7 Strahlenther Onkol ; Sondernr 1: Ein Verfahren zur Reduktion von atembewegungsbedingten Positionierungsunsicherheiten ist der kontrollierte Atemanhalt. Jedoch sind die Aufnahmezeiten mit ca. Vor der Rekonstruktion wurden diese detektiert und entfernt. Dazu wurde eine Kugel mit hohem Absorptionskoeffizienten Glasmurmel neben das aufgenommene Phantom platziert. V8 Strahlenther Onkol ; Sondernr 1: Hierzu werden die Patienten mit im Hause entwickelten Lagerungs- und Fixierungssystemen positioniert. Abweichungen einzelner Markerpositionen von bis zu 1 cm wurden beobachtet. Die erwartete Verbesserung durch Matchen der Marker hat sich nicht gezeigt. Eine prospektive Untersuchung Timmermann B. Es handelte sich dabei um 23 Sarkome, 19 Hirntumoren, 6 Chordome oder Chondrosarkome und 3 andere Histologien. Eine Metastasierung fand sich nur bei einem Kind vor PT. Dabei fanden sich in der Rezidivanalyse ausschliesslich in-fieldRezidive. Eine Fernmetastasierung trat bei keinem der Kinder auf. V83 Strahlenther Onkol ; Sondernr 1: One study question investigated the prognostic value of 18F fluorodesoxyglucose FDG positron emission tomography PET following chemotherapy. The aim was to identify patients pts. Exclusion criteria were diabetes mellitus, elevated fasting blood sugar level and skelettal involvement with risk of instability. The negative predictive value NPV was calculated based on those pts. In Method 1, the NPV is the proportion of such patients with a progression or relapse within 12 months of the panel date. V84 Strahlenther Onkol ; Sondernr 1: Im Sommer wurde ein standardisierter Fragebogen an alle Strahlentherapien in Deutschland versendet. Verteilung auf die einzelnen Erkrankungen, Anteil an kurativen Behandlungen und Teilnahme an Studien, Vorliegen eines speziellen Ansprechpartners sowie technische Aspekte bei Bestrahlungen im Kindesalter. Weniger als 5 behandelte Kinder pro Jahr gaben 23 Strahlentherapien an, mehr als 20 Kinder pro Jahr wurden in 15 Abteilungen behandelt. Der Median lag bei Kindern pro Jahr. Zudem gibt es viele Abteilungen, die weniger als 5 Kinder pro Jahr behandeln. Die Anzahl der Kinder pro Erkrankungssituation ist noch einmal geringer. V85 Strahlenther Onkol ; Sondernr 1: Das mediane Alter betrug 15,6 Jahre, der mediane Nachbeobachtungszeitraum 3,2 Jahre. V86 Strahlenther Onkol ; Sondernr 1: MSCC patients have a markedly reduced life expectancy. For most of these patients, short-course RT appears preferable. This study is a prerequisite for a planned randomized trial which will be initiated as a multicenter study soon. Secondary endpoints were to compare the two RT schedules for functional outcome and OS. The study was designed as a two arm prospective non-randomized study. In addition, the following potential prognostic factors were evaluated: Radiotherapy RT is an important treatment option for emergencies in oncology. In a standardized structured questionnaire was sent to all RT institutions. Number and type of staff involved, number of patients, over time distribution and expense, treatment indications and concepts of emergency RT were assessed. In addition, treatment outcome for the different indications was evaluated. The PCS was structured and analyzed according to the model for quality assessment set up by Donabedian in three major components: For the baseline of a total of 3 emergency radiotherapy indications with a mean of 28 per institution were reported. Forty percent of all institutions provide a special 24 h service at night or weekends. Ninety percent of all emergencies were referred to RT between 8 a. The applied doses for emergency RT ranged between 2 Gy and 8 Gy median: Time expense was reported with a median of 90 min. The outcome analysis based on the treatment results of 1 patients: A clear dose-response relationship could not be established, but single doses of over 3 Gy in vena cava superior syndrome exhibited a significant advantage. This study represents the largest database in literature on emergency RT.

Chapter 5 : Atg9 is required for intraluminal vesicles in amphisomes and autolysosomes

Ideally, the goal of spinal tumor treatment is to eliminate the tumor completely, but this goal may be complicated by the risk of permanent damage to the spinal cord and surrounding nerves. Doctors also must take into account your age and overall health.

Unlike adults, children have not achieved complete skeletal growth, which doctors must take into account when considering treatment. Other factors to consider are spinal stability, surgical versus nonsurgical interventions and preservation of neurological function. Incidence and Prevalence Intracranial brain tumors account for 85 to 90 percent of all primary central nervous system CNS tumors. Primary tumors arising from the spinal cord, spinal nerve roots and dura are rare compared to CNS tumors that arise in the brain. Overall prevalence is estimated at one spinal tumor for every four intracranial lesions. About 10, Americans develop primary or metastatic spinal cord tumors each year. Intramedullary tumors are rare, accounting for only five to 10 percent of all spinal tumors. Benign tumors such as meningiomas and neurofibromas account for 55 to 65 percent of all primary spinal tumors. Meningiomas most frequently occur in women between the ages of 40 and Metastatic spinal tumors are the most common type of malignant lesions of the spine, accounting for an estimated 70 percent of all spinal tumors. Causes The cause of most primary spinal tumors is unknown. Some of them may be attributed to exposure to cancer-causing agents. Spinal cord lymphomas, which are cancers that affect lymphocytes a type of immune cell , are more common in people with compromised immune systems. There appears to be a higher incidence of spinal tumors in particular families, so there is most likely a genetic component. In a small number of cases, primary tumors may result from presence of these two genetic diseases: In this hereditary disorder, benign tumors may develop in the arachnoid layer of the spinal cord or in the supporting glial cells. However, the more common tumors associated with this disorder affect the nerves related to hearing and can inevitably lead to loss of hearing in one or both ears. This rare, multi-system disorder is associated with benign blood vessel tumors hemangioblastomas in the brain, retina and spinal cord, and with other types of tumors in the kidneys or adrenal glands. Symptoms Non-mechanical back pain , especially in the middle or lower back, is the most frequent symptom of both benign and malignant spinal tumors. This back pain is not specifically attributed to injury, stress or physical activity. However, the pain may increase with activity and is often worse at night. Pain may spread beyond the back to the hips, legs, feet or arms and may worsen over time â€” even when treated by conservative, nonsurgical methods that can often help alleviate back pain attributed to mechanical causes. Depending on the location and type of tumor, other signs and symptoms can develop, especially as a malignant tumor grows and compresses on the spinal cord, the nerve roots, blood vessels or bones of the spine. Impingement of the tumor on the spinal cord can be life-threatening in itself. Additional symptoms can include the following: Loss of sensation or muscle weakness in the legs, arms or chest Difficulty walking, which may cause falls Decreased sensitivity to pain, heat and cold Loss of bowel or bladder function Paralysis that may occur in varying degrees and in different parts of the body, depending on which nerves are compressed Scoliosis or other spinal deformity resulting from a large, but benign tumor Diagnosis A thorough medical examination with emphasis on back pain and neurological deficits is the first step to diagnosing a spinal tumor. Radiological tests are required for an accurate and positive diagnosis. Application of radiation to produce a film or picture of a part of the body can show the structure of the vertebrae and the outline of the joints. X-rays of the spine are obtained to search for other potential causes of pain, i. X-rays are not very reliable in diagnosing tumors. It also is very good at visualizing bony structures. Magnetic resonance imaging MRI: A diagnostic test that produces three-dimensional images of body structures using powerful magnets and computer technology. An MRI can show the spinal cord, nerve roots and surrounding areas, as well as enlargement, degeneration and tumors. After radiological confirmation of the tumor, the only way to determine whether the tumor is benign or malignant is to examine a small tissue sample extracted through a biopsy procedure under a microscope. Staging classifies neoplasms abnormal tissue according to the extent of the tumor, assessing bony, soft tissue and spinal canal involvement. A doctor may order a whole body scan utilizing nuclear technology, as well as a

CT scan of the lungs and abdomen for staging purposes. Treatment Decisions Treatment decision-making is often multidisciplinary, incorporating the expertise of spinal surgeons, medical oncologists, radiation oncologists and other medical specialists. Nonsurgical Treatment Nonsurgical treatment options include observation, chemotherapy and radiation therapy. Tumors that are asymptomatic or mildly symptomatic and do not appear to be changing or progressing may be observed and monitored with regular MRIs. Some tumors respond well to chemotherapy and others to radiation therapy. However, there are specific types of metastatic tumors that are inherently radioresistant i. Surgery Indications for surgery vary depending on the type of tumor. Primary spinal tumors may be removed through complete en bloc resection for a possible cure. In patients with metastatic tumors, treatment is primarily palliative , with the goal of restoring or preserving neurological function, stabilizing the spine and alleviating pain. Generally, surgery is only considered as an option for patients with metastases when they are expected to live 12 weeks or longer, and the tumor is resistant to radiation or chemotherapy. Indications for surgery include intractable pain, spinal-cord compression and the need for stabilization of impending pathological fractures. For cases in which surgical resection is possible, preoperative embolization may be used to enable an easier resection. This procedure involves the insertion of a catheter or tube through an artery in the groin. The catheter is guided up through the blood vessels to the site of the tumor, where it delivers a glue-like liquid embolic agent that blocks the vessels that feed the tumor. When the blood vessels that feed the tumor are blocked off, bleeding can often be controlled better during surgery, helping to decrease surgical risks. The posterior back approach allows for the identification of the dura and exposure of the nerve roots. Multiple levels can be decompressed, and multilevel segmental fixation can be performed. The anterior front approach is excellent for tumors in the front of the spine and effectively reconstructing defects caused by removal of the vertebral bodies. This approach also allows placement of short-segment fixation devices. Thoracic and lumbar spinal tumors that affect both the anterior and posterior vertebral columns can be a challenge to resect completely. Not infrequently, a posterior back approach followed by a separately staged anterior front approach has been utilized surgically to treat these complex lesions. A required period of post-surgery physical rehabilitation may involve a stay in a rehabilitation hospital for a period of time. Outcome Outcome depends greatly on the age and overall health of the patient and on whether the spinal tumor is benign or malignant, primary or metastatic. In the case of primary tumors, the goal is to remove the tumor completely, leading optimally to the potential cure of the malignancy. In the case of metastatic tumors, the goal is almost always palliative, with treatment aimed at providing the patient with an improved quality of life and possibly prolonged life expectancy. The AANS does not endorse any treatments, procedures, products or physicians referenced in these patient fact sheets. This information is provided as an educational service and is not intended to serve as medical advice.

Chapter 6 : History of spinal cord stereotaxy : Journal of Neurosurgery

The field of spinal cord stereotaxy has not received the same amount of attention as supratentorial surgery, but there have been significant contributions to the field that have helped to further our understanding of spinal cord anatomy and physiology.

Also disclosed are vectors, host cells, antibodies and recombinant methods for producing the polypeptides and polynucleotides, as well as methods for using same. More specifically, the invention relates to nucleic acids encoding cytoplasmic, nuclear, membrane bound, and secreted polypeptides, as well as vectors, host cells, antibodies, and recombinant methods for producing these nucleic acids and polypeptides. Heart disease is the primary cause of death in most western societies. These syndromes represent a variety of stenotic and occlusive vascular disorders thought to be initiated by platelet activation either on vessel walls or within the lumen by blood-borne mediators but are manifested by platelet aggregates which form thrombi that restrict blood flow. For example, Thrombospondinlike proteins associate with the extracellular matrix and inhibits angiogenesis in vivo. In vitro, Thrombospondin-like proteins block capillary-like tube formation and endothelial cell proliferation. The antiangiogenic activity is mediated by a region that contains 3 type 1 properdin or thrombospondin repeats. In addition, Selectin-like proteins such as P-selectin, also called GMP, CD62, or selectin P, is a kD adhesion molecule, expressed at the surface of activated cells, that mediates the interaction of activated endothelial cells or platelets with leukocytes. In endothelial cells, the protein is localized to the membranes of Weibel-Palade bodies, the intracellular storage granules for von Willebrand factor. Many disease states are characterized by uncontrolled cell proliferation. These diseases involve a variety of cell types and include disorders such as cancer, psoriasis, pulmonary fibrosis, glomeruloneplmitis, atherosclerosis and restenosis following angioplasty. Oncogenesis can result from an imbalance. These nucleic acids and polypeptides, as well as variants, derivatives, homologs, analogs and fragments thereof, will hereinafter be collectively designated as "NOVX" nucleic acid or polypeptide sequences. Tn some embodiments, the NOVX nucleic acid molecule will hybridize under stringent conditions to a nucleic acid sequence complementary to a nucleic acid molecule that includes a protein-coding sequence of a NOVX nucleic acid sequence. The invention also includes an isolated nucleic acid that encodes a NOVX polypeptide, or a fragment, homolog, analog or derivative thereof. Also included in the invention is an oligonucleotide, e. In certain embodiments, the NOVX polypeptides include an amino acid sequence that is substantially identical to the amino acid sequence of a human NOVX polypeptide. The invention also features antibodies that immunoselectively bind to NOVX polypeptides, or fragments, homologs, analogs or derivatives thereof. In another aspect, the invention includes pharmaceutical compositions that include therapeutically- or prophylactically-effective amounts of a therapeutic and a pharmaceutically-acceptable carrier. The therapeutic can be, e. In a further aspect, the invention includes, in one or more containers, a therapeutically- or prophylactically-effective amount of this pharmaceutical composition. In a further aspect, the invention includes a method of producing a polypeptide by culturing a cell that includes a NOVX nucleic acid, under conditions allowing for expression of the NOVX polypeptide encoded by the DNA. If desired, the NOVX polypeptide can then be recovered. In another aspect, the invention includes a method of detecting the presence of a NOVX polypeptide in a sample. In the method, a sample is contacted with a compound that selectively binds to the polypeptide mzder conditions allowing for formation of a complex between the polypeptide and the compound. The complex is detected, if present, thereby identifying the NOVX polypeptide within the sample. The invention also includes methods to identify specif c cell or tissue types based on their expression of a NOVX. Also included in the invention is a method of detecting the presence of a NOVX nucleic acid molecule in a sample by contacting the sample with a NOVX nucleic acid probe or primer, and detecting whether the nucleic acid probe or primer bound to a NOVX nucleic acid molecule in the sample. In a further aspect, the invention provides a method for modulating the activity of a NOVX polypeptide by contacting a cell sample that includes the NOVX polypeptide with a compound that binds to the NOVX polypeptide in an amount sufficient to modulate the activity of said polypeptide. The compound

can be, e. Also within the scope of the invention is the use of a therapeutic in the manufacture of a medicament for treating or preventing disorders or syndromes including, e. The polypeptides can be used as irrnnunogens to produce antibodies specific for the invention, and as vaccines. They can also be used to screen for potential agonist and antagonist compounds. The invention further includes a method for screening for a modulator of disorders or syndromes including, e. Binding of the test compound to the NOVX polypeptide indicates the test compound is a modulator of activity, or of latency or predisposition to the aforementioned disorders or syndromes. Also within the scope of the invention is a method for screening for a modulator of activity, or of latency or predisposition to an disorders or syndromes including, e. The test animal expresses a recombinant polypeptide encoded by a NOVX nucleic acid. Expression or activity of NOVX polypeptide is then measured in the test animal, as is expression or activity of the protein in a control animal which recombinantly-expresses NOVX polypeptide and is not at increased risk for the disorder or syndrome. Next, the expression of NOVX polypeptide in both the test animal and the control animal is compared. A change in the activity of NOVX polypeptide in the test animal relative to the control animal indicates the test compound is a modulator of latency of the disorder or syndrome. In yet another aspect, the invention includes a method for determining the presence of or predisposition to a disease associated with altered levels of a NOVX polypeptide, a NOVX nucleic acid, or both, in a subject e. The method includes measuring the amount of the NOVX polypeptide in a test sample from the subject and comparing the amount of the polypeptide in the test sample to the amount of the NOVX polypeptide present in a control sample. An alteration in the level of the NOVX polypeptide in the test sample as compared to the control sample indicates the presence of or predisposition to a disease in the subject. Preferably, the predisposition includes, e. Also, the expression levels of the new polypeptides of the invention can be used in a method to screen for various cancers as well as to determine the stage of cancers. Tn a further aspect, the invention includes a method of treating or preventing a pathological condition associated with a disorder in a mammal by administering to the subject a NOVX polypeptide, a NOVX nucleic acid, or a NOVX-specific antibody to a subj ect e. In preferred embodiments, the disorder, includes, e. W yet another aspect, the invention can be used in a method to identity the cellular receptors and downstream effectors of the invention by any one of a number of techniques commonly employed in the art. These include but are not limited to the two-hybrid system, affinity purification, co-precipitation with antibodies or other specific-interacting molecules. Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety. In the case of conflict, the present specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting. Other features and advantages of the invention will be apparent from the following detailed description and claims. Included in the invention are the novel nucleic acid sequences and their polypeptides. The various NOVX nucleic acids and polypeptides according to the invention are useful as novel members of the protein families according to the presence of domains and sequence relatedness to previously described proteins. Additionally, NOVX 10 nucleic acids and polypeptides can also be used to identify proteins that are members of the family to which the NOVX polypeptides belong. The NOVX genes and their corresponding encoded proteins are useful for preventing, treating or ameliorating medical conditions, e. Pathological conditions can be diagnosed by determinng the amount of the new protein in a sample or by 15 determining the presence of mutations in the new genes. Specific uses are described for each of the sixteen genes, based on the tissues in which they are most highly expressed. Uses include developing products for the diagnosis or treatment of a variety of diseases and disorders. Specifically, the nucleic acids and polypeptides according to the invention may be used as targets for the identification of small molecules that modulate or inhibit, e. In one embodiment of the present invention, NOVX or a fragment or derivative thereof may be administered to a subject to treat or prevent a disorder associated with decreased expression or activity of NOVX. The NOVX nucleic acids and proteins of the invention are useful in potential S diagnostic and therapeutic applications and as a research

tool. These also include potential therapeutic applications such as the following: Additional utilities for the NOVX nucleic acids and polypeptides according to the invention are disclosed herein. The novel NOV1 nucleic acid sequences maps to the chromosome

Chapter 7 : DEGRO-Ã–GRO - PDF Free Download

Most spinal tumors have spread (metastasized) from another area of the body For patients with cancer elsewhere in the body, any new complaint of spine pain or neurological deficits requires an immediate evaluation to determine if the cancer has spread to the spine.

Segment polarity genes and their influences constitute an important aspect of Drosophila development. What is meant by segment polarity, and why is this significant? Once segmentation is established through the expression of pair rule genes , the anterior portion of each parasegment the term for embryonic segments takes on a different fate from the posterior portion. Segment polarity refers to this seeming polarization within each segment, resulting in differing cell fates. The requisite polarity in segments, ultimately responsible for proper development of Drosophila wings and legs, is established through the action of segment polarity genes. An analogy can be made to human segment polarity. Call the thumb the anterior aspect of the human hand; the posterior aspect would be the fifth or "little" finger. Without the action of segment polarity genes, humans might well be "all thumbs," or worse, no thumbs. The earliest action of hedgehog establishes the polarity of the 14 parasegments in the trunk thorax and abdomen of the fly, segments fated to develop into head, thorax and abdomen. Particularly interesting to developmental biologists is segmental specialization in the wing. The part of the embryo destined to become the adult wing is composed of the posterior part of parasegment 2, and the anterior part of parasegment 3. It acts on the adjacent more anterior segment to overcome repression by Patched and this results in the induction of decapentaplegic. DPP then defines the compartment border between the anterior and posterior halves of the wing Zecca, For more of the confusing nomenclature surrounding any discussion of segments, and an attempt to clarify it, see engrailed. The HH signaling pathway is traversed by means of phosphorylation. This is a process by which an enzyme attaches phosphate residues to other signaling molecules. PKA signals downstream to repress wingless and dpp. HH overcomes the repressive conspiracy of Patched and PKA and allows the transcription of wg and dpp. The two signaling molecules WG and DPP proceed to define the the border between anterior and posterior compartments in segmentation. Cells producing Wingless and DPP do not always overlap, as they do in the eye and in the segmentation process. In the leg , in the antennal portion of the eye-antennal disc and in the wing , cells producing Wingless and DPP are separate. In wing for example, DPP synthesis takes place in the dorsal aspects of the disc, while Wingless synthesis is in the anterior aspect Diaz-Benjumea, b. In summary, hedgehog is a necessary element in the establishment of polarity during segmentation of the fly, and during the development of appendages. It is made by anterior compartments in the embryo that become the posterior compartments of the developing adult. Signals from PKA and Fused integrate downstream of Fused to overcoming repression of target genes wg and dpp in adjacent compartments. Very little information is available about gene expression during the larval period, a developmental interval critical to the formation of the adult. To what extent does gene expression during this period resemble that in the embryonic stages, and how does gene expression during the larval period contribute to segment polarity in the adult? In fact, all the genes expressed during embryonic segment polarity also play a similar role in the formation of the adult. Most of the larval cuticle of Drosophila is secreted by large, polyploid cells that derive directly, without cell division, from cells in the epidermis of the embryo. By contrast, cells destined to form the cuticle of the adult abdomen are present as clusters of small, non-dividing diploid cells the anterior dorsal, posterior dorsal and ventral histoblast nests located at stereotyped postions in the larval epidermis. These cells, just as do their embryonic counterparts, express engrailed, hedgehog, wingless, patched, cubitus interruptus and sloppy paired in a stereotyped manner dependent on their positions within each segment. Each segment is subdivided into an anterior A and posterior P compartment, distinguished by activity of the selector gene engrailed en in P but not A compartment cells. The ventral epidermis of each abdominal segment forms a flexible cuticle, the pleura, with a small plate of sclerotised cuticle, the sternite, centered on the ventral midline. The pleura is covered with a uniform lawn of hairs, all pointed posteriorly, whereas the sternite contains a stereotyped pattern of bristles. Posterior compartments are to a large degree devoid of hairs and bristles, while the sternite cuticle of

the A compartment consists of an anterior-to posterior progression of six types of cuticle distinguished by ornamentation and pigmentation. Just anterior to the posterior compartment, A6 is unpigmented, with hairs and none of the larger ornaments called bristles. A5 is darkly pigmented with hairs and bristles of large size. A4 and A3 are darkly and lightly pigmented respectively with moderately sized hairs and bristles. A2 is lightly pigmented with hairs, and A1, adjacent to the next more anteriorly located "posterior" compartment is unpigmented without hairs Struhl, a. Hedgehog Hh , a protein secreted by engrailed expressing P compartment cells, spreads into each A compartment across the anterior and the posterior boundaries to form opposing concentration gradients that organize cell pattern and polarity. Anteriorly and posteriorly situated cells within the A compartment respond in distinct ways to Hh: Essentially, this leaves the patched expressing stripe immediately posterior to each P compartment and the adjacent more posterior cuticle, to be decorated with bristles, like a "no-mans land," as far as secretion of signaling proteins is concerned. Anterior compartment cells form polarized structures that, in the more anterior part of the compartment, point down the Hh gradient and, in the posterior part of the compartment, point up the gradient - therefore all structures point posteriorly. It has been shown that ectopic Hh can induce cells in the middle of each A compartment to activate en. Where this happens, A compartment cells are transformed into an ectopic P compartment and reorganize pattern and polarity both within and around the transformed tissue. Hh could pattern the A compartment by a simple gradient mechanism; the concentration of Hh would be read as a scalar to determine the type of cuticle secreted. Although this role is supported by the experiments in which Hh is ectopically expressed, there are some instances in which the slope of the presumed concentration gradient of Hh does not correspond with the orientation of hairs and bristles. Interestingly, only a subset of A compartment cells respond to ectopic Hh by activating engrailed and subsequently adopting a P identity. These cells occur in the middle of the A compartment, and therefore are not normally exposed to Hh secreted by the normal P compartment. It is clear that the A compartment is finely structured in terms of cell identity and fate Struhl, a. A second paper Struhl, b deals directly with the instances in which cell polarity does not correspond to the presumed concentration gradient of Hh and considers whether Hh acts directly or by a signal relay mechanism. For cell type, a scalar property differing with position along the AP axis , both manipulations cause strictly autonomous transformations: Hence, it is infererd that Hh acts directly on A compartment cells to specify the various types of cuticular structures that they differentiate Struhl, b. By contrast, these same manipulations cause non-autonomous effects on cell polarity, a vectorial property. For example, PKA mutant clones in the A3 and A4 region alter polarity of hairs and bristles both within the clone and outside it. In general, wild-type cells positioned laterally and posteriorly to the mutant clone form hairs and bristles that point centripetally towards the clone; thus, behind the clone, cells form hairs and bristles that point anteriorly. The region of wild-type tissue showing this reversed polarity can be up to 4 cell diameters wide. Of great interest is the effect of PKA and smo mutant clones in the anterior portion of A compartment, the "no-mans land" described above. PKA and smo mutant clones in the anterior region of the A comparment alter cell type much as they do in the posterior portion, but some clones of smo cells in the A1 region form hairs that have reversed polarity and these hairs point anteriorly. Consequently, it is surmised that Hh influences cell polarity indirectly, possibly by inducing other signaling factors Struhl, b. Evidence is presented that Hh does not polarize abdominal cells by utilizing either Decapentaplegic or Wingless, the two morphogens through which Hh acts during limb development. If Hh were to work through Wg to influence polarity, removal of wg from clones of cells that are activated in the Hh pathway should eliminate that influence. Neither the change in cell type nor the alterations in cell polarity cause by the loss of PKA activity appear to be due to the ectopic expression of wg. Likewise, eliminating dpp from PKA mutant clones fails to alter the polarity phenotype Struhl, b. How might Hh polarize cells via a signal-relay mechanism? One clue is that within and surrounding some PKA mutant clones the hairs and bristles point inwards, towards the center. Because mutant cells in the center of the clone would be surrounded by X-secreting cells, they might be exposed to higher levels of X than mutant cells at the periphery. If cells were oriented by the direction of maximal change the vector in the concentration of X, cells both inside and outside of the clone would point towards the center of the clone. Such a propagation model does not demand that X be diffusible, because polarity could be organized by local cell-cell interactions,

which spread as in a game of dominoes Struhl, b. Like the Drosophila embryo, the abdomen of the adult consists of alternating anterior A and posterior P compartments. However the wing is made by only part of one A and part of one P compartment. In the embryo, abdomen and wing P compartment cells express the selector gene engrailed and secrete Hedgehog protein while A compartment cells need the patched and smoothened genes in order to respond to Hedgehog. Clones of cells were produced with altered activities for the engrailed, patched and smoothened genes. Four new aspects of compartments and the expression of engrailed in the abdomen have been uncovered. The cells of the dorsal epidermis of the adult abdomen in Drosophila exhibit two properties: The scalar properties are represented by the presence of subdomains within both the A and P compartments. These domains correspond largely to the territories of a1, a2 no bristles and a3, a4, a5 cuticle with bristles. Removal of the Notch N gene from these two regions gives different outcomes: N- clones in a2 cuticle make epidermal cells, while those in a3 do not. It follows that the cells composing a2 non-neurogenic and a3 neurogenic are fundamentally distinct. The P compartment is also subdivided. Thus, the loss of en from posterior P cells converts them from making p1 cuticle to either a1 or a2, depending on whether they can receive the Hh signal. The removal of en from anterior P cells causes them to make either a5 or a3 cuticle, again depending on whether they can receive Hh Lawrence, a. Why should there be such a subdivision of the compartments? It is not known what agent discriminates between the two domains in either compartment; perhaps one regulatory gene would be sufficient for both: The domains are not maintained by cell lineage. Analogous domains are found in the legs, where A compartment cells respond to Hh by expressing high levels of either Decapentaplegic or Wingless, depending on whether they are located dorsally or ventrally in the appendage. This dorsoventral bias in response is established early in development, and then maintained, not by lineage, but by feedback between Wg- and Dpp-secreting cells Lawrence, a. The vector property of the epidermis is represented by the orientation of adult hairs. For simplicity, this discussion will be restricted to the posterior domain of the A compartments. This suggests that away from the compartment boundaries, cells also produce X, the quantity depending on the amount of Hh received. In the anterior part of P these clones have normal polarity. In the posterior part of P the whole clone displays reversed polarity, as do some cells outside the clone. In order to understand this at least, in part , consider the behaviour of ptc- clones in the A compartment: At the back of the A compartment they are near that border and have little or no effect on polarity, but when closer to the front of A, they repolarize several rows of cells in the surround. This is explained as follows: But far from the source, where the local concentration of X would be low, any effects would appear greater. Likewise, if there were a polarizing factor similar to X in the P compartment, then clones of en minus cells that produce complete or partial borders might become ectopic sources of this factor: During Drosophila eye development, Hedgehog Hh protein secreted by maturing photoreceptors directs a wave of differentiation that sweeps anteriorly across the retinal primordium.

Chapter 8 : Spinal Tumors â€“ Types, Symptoms, Diagnosis and Treatment

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Chapter 9 : Signs and Symptoms of Adult Brain and Spinal Cord Tumors

A spinal tumor is a growth that develops within your spinal canal or within the bones of your spine. A spinal cord tumor, also called an intradural tumor, is a spinal tumor that that begins within the spinal cord or the covering of the spinal cord (dura). A tumor that affects the bones of the spine.