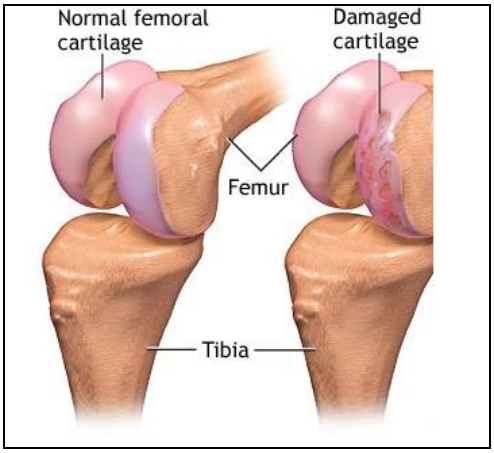
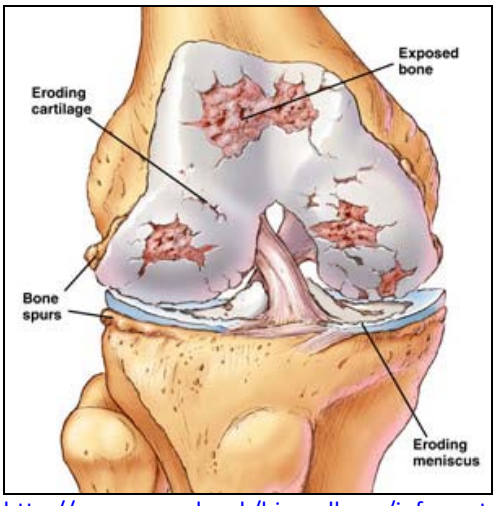
Cartilage Restoration

Frame Title	Voice Over text	Visual presentation	Additional Comments
Introduction	Your Practice Online presents Cartilage Restoration	Graphical text drops in with image on the background  http://stemcelldoc.wordpress.com/tag/regenexx/page/2/ Recreate the above image	
Overview	Articular cartilage is the smooth, shiny, white tissue covering the ends of bones those form a joint. Articular cartilage reduces friction when bones glide over each other, making the movements smooth and painless. It also acts as a shock-absorber to help prevent traumatic injuries to the bones. When cartilage is damaged it can cause painful movements and limited joint mobility and eventually progress to osteoarthritis. Cartilage damage can occur from normal wear and tear of the body's joints as we age as well as from injury or other disease conditions. Because of its avascular nature (absence of blood supply), cartilage cannot repair itself and therefore surgical treatment is usually required to restore cartilage function and prevent progression of the damage into arthritis.	**http://www.youtube.com/watch?v=wEPPhrcH3yE** (this link shows the articular cartilage and its cells) **Articular cartilage-smooth shiny white tissue at bone ends**  http://www.noc.nhs.uk/hipandknee/information/knee/conditions/arthritis.aspx **Articular cartilage wear and tear**	http://orthoinfo.aaos.org/topic.cfm?topic=a00422 http://www.kneeclinic.info/problems_articular_cartilage.php

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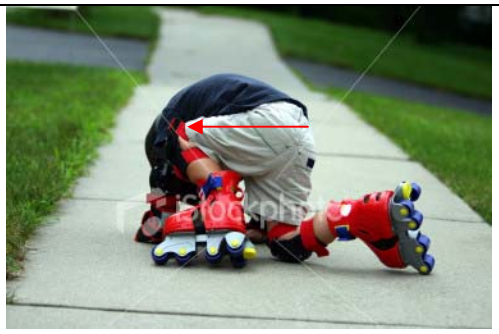
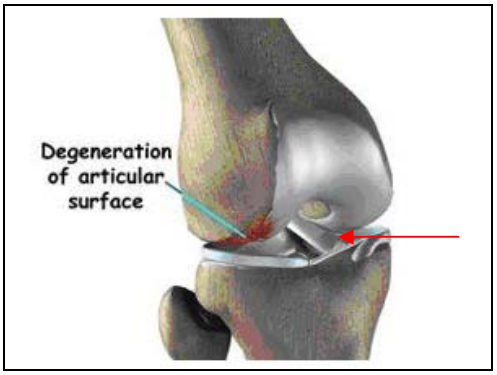
Causes	**Causes** Articular cartilage may be damaged by accidental falls, sports injuries or progressive degeneration (wear and tear). It is possible for cartilage cells to heal, but it depends on the extent of the damage and location of injury. However, the healing capacity is minimal owing to the lack of blood supply.	 **Sports injury-Knee(File #: 1915129)**  http://www.sportsarthroscopyindia.com/what-a.aspx (Recreate this image) **Progressive degeneration**	http://www.orthspec.com/pdfs/Cartilage-Injuries.pdf http://www.sportsmed.org/secure/reveal/admin/uploads/documents/ST%20Articular%20Cartilage%2008.pdf
Diagnosis	**Diagnosis** Your surgeon will perform a physical examination to look for altered range of motion, swelling, and bone alignment. Often, an evaluation with magnetic resonance imaging (MRI) or arthroscopy will be needed as cartilage is uncalcified and does not show up in X-rays.	 **Physical examination(File #: 16807926)**	http://www.sportsmed.org/secure/reveal/admin/uploads/documents/ST%20Articular%20Cartilage%2008.pdf

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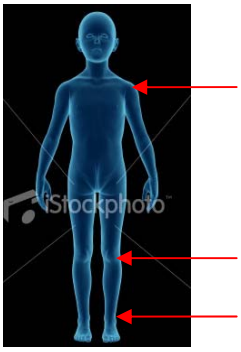
		 **MRI scan knee (File #: 11620774)** **http://www.youtube.com/watch?v=-jIyvIVLYZM** **http://www.youtube.com/watch?v=BI8-Q1LDA7k** (These are video links for arthroscopy procedure) **Arthroscopy**	
Surgery overview	**Surgical Treatment** Young adults with cartilage injury are ideal candidates for cartilage restoration surgery because these methods help prevent the progression of damage into osteoarthritis. The most common joint requiring cartilage restoration is the knee joint and other joints include the shoulder and ankle joints. Damaged cartilage can be treated by two different techniques – repair and regeneration. Repair technique involves replacing damaged cartilage with new cells and extracellular matrix that stimulates healing of the injured cartilage. Regeneration involves replacing the injured cartilage with a new articulating surface that functionally simulates the growth of original cartilage. Surgery is often not recommended in smaller cartilage defects. Defects smaller than 2 cm can be treated arthroscopically and have a good prognosis. Larger defects may require cartilage transplantation.	 **Cartilage injury causing pain and decreased function in young adult (File #: 7825897)**  **Common areas treated by cartilage restoration- knee, shoulder, ankle joints (File #: 2554020)**	http://orthoinfo.aaos.org/topic.cfm?topic=a00422 http://www.kneeclinic.info/problems_articular_cartilage.php

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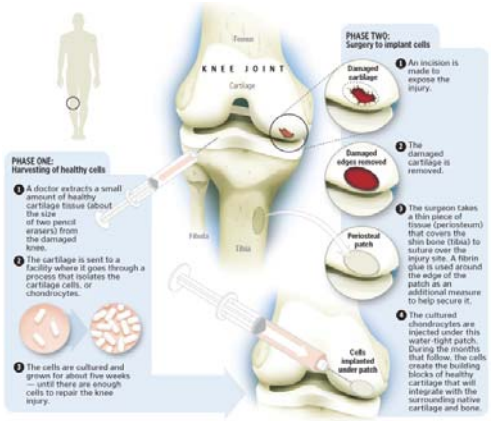
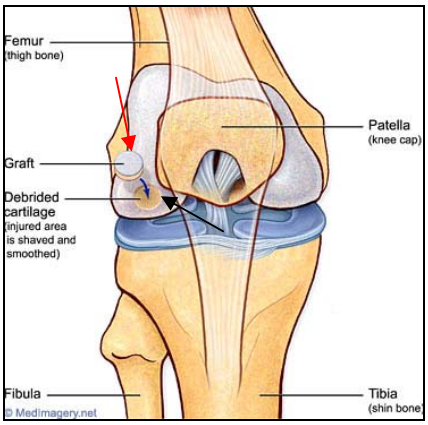
		 http://www.noyeskneeinstitute.com/index.php/cartilage-repair/ (Recreate using above explanation) **Repair-** replacing injured cartilage with new cells and extracellular matrix  http://airheadrockedpsiko.blogspot.com/?zx=51affc53fdd9e119 (Black arrow—injured cartilage removed Red arrow—Graft placed) **Regeneration-** replacing injured cartilage with a new articulating surface **Principles of Cartilage restoration**	

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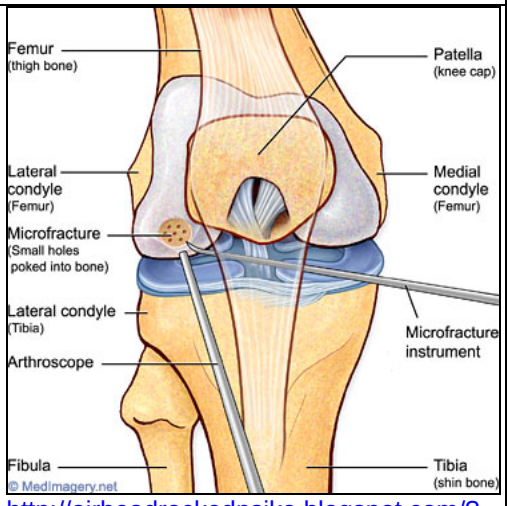
Surgical Procedures	**Surgical Treatment** Most cartilage restoration procedures can be performed arthroscopically, a minimally invasive surgery using arthroscope, a small flexible tube with a light and video camera at the end that enables to view inside the joints and perform surgery. During arthroscopy a few small puncture incisions are made around the joint. In certain cases, open surgery may be required to access the affected area requiring longer incisions. Your surgeon will discuss the best surgical options for your child's particular condition. The surgical procedures for cartilage restoration include: • Microfracture • Drilling • Abrasion arthroplasty • Autologous Chondrocyte Implantation • Osteochondral Autograft Transplantation • Osteochondral Allograft Transplantation	http://www.youtube.com/watch?v=IIkwoPbCOwU Arthroscopic technique video link	http://www.sportsmed.org/secure/reveal/admin/uploads/documents/ST%20Articular%20Cartilage%2008.pdf http://orthoinfo.aaos.org/topic.cfm?topic=a00422
	Microfracture Microfracture technique involves poking multiple holes using arthroscope into the subchondral bone below the cartilage with a sharp tool called an awl. This creates a blood supply to reach the damaged cartilage and stimulates the formation of new cartilage. Young patients with a single lesion and healthy bone are suitable candidates for microfracture procedure. **Drilling** Drilling is an arthroscopic procedure similar to microfracture in which multiple holes are made in the	 http://airheadrockedpsiko.blogspot.com/?zx=51affc53fdd9e119	http://orthoinfo.aaos.org/topic.cfm?topic=a00422

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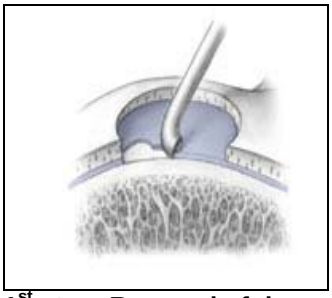
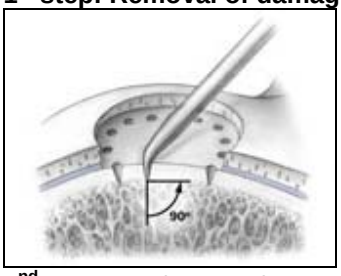
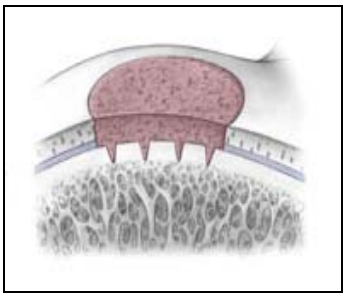
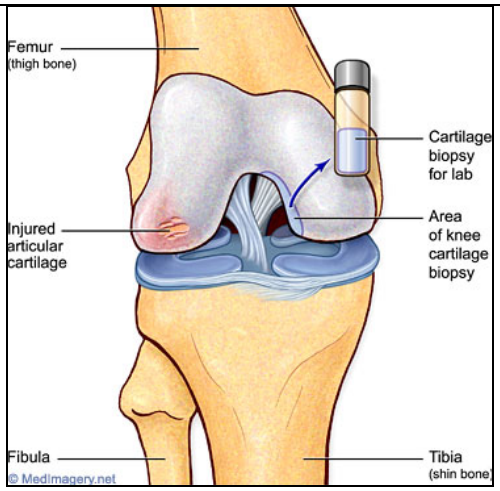
	subchondral bone with the help of a surgical drill or wire to create a healing response. The limiting factor of this procedure is the heat produced by the drilling can injure the surrounding tissues, therefore some surgeons do not recommend this procedure.	**Microfracture technique**  **1st step: Removal of damaged cartilage**  **2nd step: Awl is used to make holes in the subchondral bone**  **Healing response**	
	Autologous Chondrocyte Implantation Autologous chondrocyte implantation (ACI) is accomplished in two steps. The first step involves growing new cartilage cells followed by the implantation of these new cells into the defect. The first step is performed arthroscopically during which healthy cartilage cells are removed from a non-weight bearing area of the bone. These cells are then cultured in a laboratory for 3-5 weeks to increase their number. Implantation of the new cartilage cells is performed through an open surgical procedure called arthrotomy.	 **Healthy cartilage cells harvested for culture** **http://www.youtube.com/watch?v=v-e4EtqHvqY&NR=1**	http://orthoinfo.aaos.org/topic.cfm?topic=a00422

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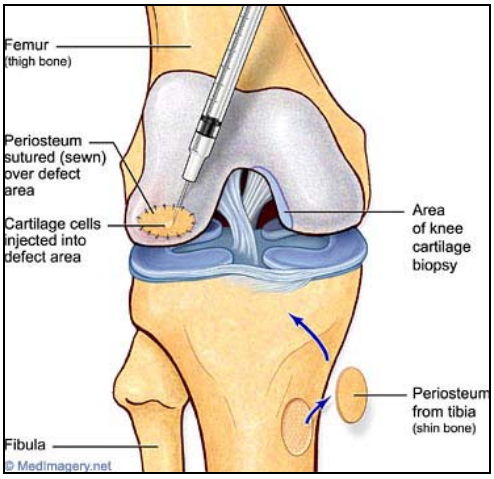
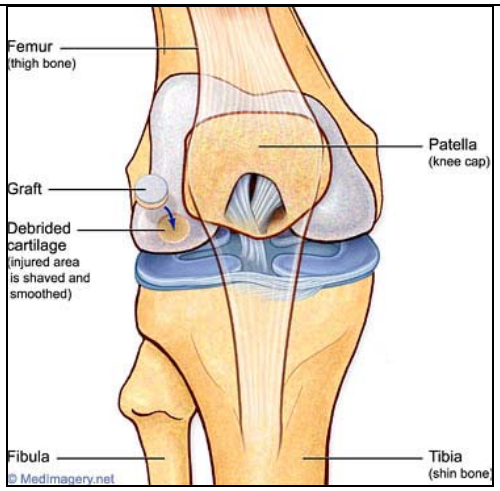
	Arthrotomy involves preparation of the defect following which a layer of the bone-lining (periosteum) is stitched over the defect and sealed with fibrin glue. The cultured cells are then injected into the defect just below the cover. Autologous chondrocyte implantation is indicated in younger patients who have a single, larger lesion over 2 cm diameter. As the patient's own cells are used, there is no risk of tissue rejection.	(Link for cartilage biopsy)  **Arthrotomy-Periosteum stitched over the defect and injection of cultured cells below it** http://airheadrockedpsiko.blogspot.com/?zx=51affc53fdd9e119 **Autologous Chondrocyte Implantation**	
	Osteochondral Autograft Transplantation Osteochondral autograft transplantation is a procedure in which healthy cartilage tissue is taken from the non-weight bearing part of the bone and placed into the defect area creating a smoother surface on the cartilage of the joint. This procedure is done for smaller defects and can be performed with arthroscopic technique.	 http://airheadrockedpsiko.blogspot.com/?zx=51affc53fdd9e119	http://orthoinfo.aaos.org/topic.cfm?topic=a00422

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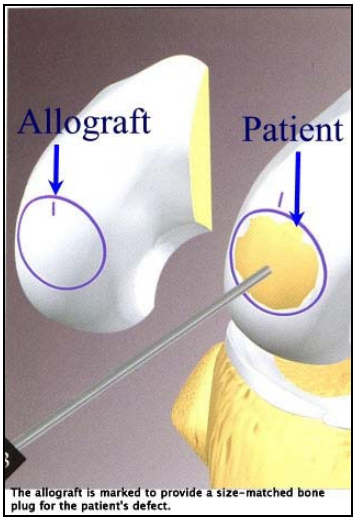
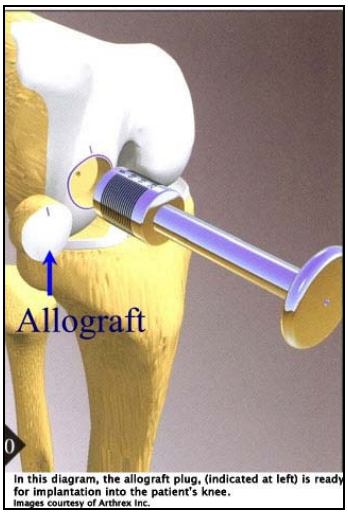
	Osteochondral Allograft Transplantation Osteochondral allograft transplantation is performed when the cartilage defect is large enough for an allograft to be used. An allograft, a block of cartilage or bone obtained from a cadaver donor, is used. The allograft is sterilized and prepared so as to fit exactly into the defect area. This procedure does require a larger, open incision.	 http://knol.google.com/k/knee-surgery# **Open procedure-Skin incision**  **Allograft block taken from donor bone**  **Placement of the prepared allograft** http://www.ismoc.net/knee/OCA.html **Osteochondral Allograft Transplantation**	http://orthoinfo.aaos.org/topic.cfm?topic=a00422

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Post-operative Care	After the completion of surgery, you will be advised to practice certain post-operative care measures to ensure better outcomes. They include: • **Suture care**: A dressing will be placed over the sutures and you will be instructed on when it can be removed (usually after 3 days).You may apply ice over the dressing for 20 minutes every hour to decrease swelling and pain. • **Exercises**: Physical therapy is usually started within 1-2 weeks of surgery to help restore motion to the affected joint. • **Activity restrictions:** Your surgeon will give you activity restrictions to follow during the healing process depending on which joint is involved.	 **Liquid food to start with (File #: 7333692)**  http://www.sportsarthroscopyindia.com/knee.aspx **Apply ice over dressing for 30 minutes**  **Physical therapy 1-2 weeks after surgery (File #: 16365003)**	http://www.orthspec.com/pdfs/Cartilage-Injuries.pdf

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		 **Use of crutches(File #: 6669775)**  **Return to school(File #: 16139223)**	
	Risks and Complications As with any surgery, cartilage restoration is associated with certain risks and complications. • Graft delamination – Detachment of the grafts from the subchondral bone and the surrounding cartilage. • Allergic response, transfer of disease and infection, and graft rejection in allograft transplants • Injury to healthy cartilage Some of the risks related to any orthopaedic surgery can include: • Post-operative bleeding		

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	• Deep vein thrombosis • Infection • Stiffness of the joint • Numbness around the incisions • Injury to vessels or nerves		