EFFECTS OF ELECTROMAGNETIC STIMULATION ON OSTEOGENIC DIFFERENTIATION OF HUMAN MESENCHYMAL STROMAL CELLS SEEDED ONTO GELATIN CRYOGEL

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Bone tissue engineering typically uses biomaterial scaffolds, osteoblasts or cells that can become osteoblasts, and biophysical stimulations to promote cell attachment and differentiation. In this study, we investigated the effects of an electromagnetic wave on mesenchymal stromal cells isolated from the bone marrow and seeded upon gelatin cryogel disks. In comparison with control conditions without electromagnetic stimulus, the electromagnetic treatment (magnetic field, 2 mT; frequency, 75 Hz) increased the cell proliferation and differentiation and enhanced the biomaterial surface coating with bone extracellular matrix proteins. Using this tissue-engineering approach, the gelatin biomaterial, coated with differentiated cells and their extracellular matrix proteins, may be used in clinical applications as an implant for bone defect repair.
A COMPARISON OF ANTIBIOTIC RELEASE BETWEEN A CEMENT SCAFFOLD, A PERFORATED CEMENT SCAFFOLD AND A CEMENT SCAFFOLD MIXED TO CALCIUM SULPHATE: IN VITRO STUDY

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One of the most dangerous possible complications in joint replacement is infection due to bacteria adhere to prosthesis surface making biofilm difficult to erase. The gold standard treatment consists in prosthesis removal, placement of antibiotic-impregnated cement spacer and systemic antibiotics therapy. When the infection heals a new prosthesis is implanted. The antibiotic-impregnated spacer is important to maintain the prosthesis space and to guarantee a local high concentration of antibiotics. The release of the antibiotic by the cement happens at its surface so that, increasing this, the concentration of antibiotic should be increased as well. The aim of the present study is to verify the different release of antibiotic in plasma by different groups of scaffolds to identify the best solution to make the antibiotic spacer in septic prosthesis revision. Six groups of three antibiotic impregnated cement cube-shaped have been done. The first, made by only antibiotic and cement, the second by a double concentration of the antibiotic and cement, the third made by the antibiotic cement and perforated in every surface with a needle before hardening, the fourth similar to the previous but with a double concentration of antibiotic, the fifth by antibiotic-impregnated cement mixed with calcium sulphate pellets, the sixth similar to the previous with a double concentration of antibiotic. The cubes were immersed in plasma and the concentration of antibiotic released valued at specific times. The perforated cement scaffold demonstrated the best result during the first four weeks.
SCAFFOLDS COMBINED WITH STEM CELLS AND GROWTH FACTORS IN HEALING OF PSEUDOTUMORAL LESIONS OF BONE.

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Reconstructions of large lesions or defects often require a bone graft or a bone substitute to promote healing. In common practice the reconstruction of a bone defect is dependent on the site and size of the lesion: in long bones intercalary defects may be managed with Ilizarov technique of bone transport and distraction osteogenesis or the use of a free or pedicled vascularized bone graft, or with Masquelet technique. For cavitary defects the available surgical options include autograft, allograft or xenograft or the use of synthetic scaffolds to promote bone regeneration. In order to promote a faster bone healing tissue engineering proposed the application of enriched graft to fill bone defects. The employment of enriched bone graft has been our choice in the last years to fill contained defects following curettage of a pseudotumoral lesion of bone. We report our clinical experience in terms of safety and success of these procedures at a long-term follow up.
Pulsed electromagnetic fields (PEMF) have been used for several years to supplement bone healing. However, the mode of action of this non-invasive method is still debated and quantification of its effect on fracture healing is widely varied. At cellular and molecular level, PEMF has been advocated to promote the synthesis of extracellular matrix proteins and exert a direct effect on the production of proteins that regulate gene transcription. Electromagnetic fields may also affect several membrane receptors and stimulate osteoblasts to secrete several growth factors such as bone morphogenic proteins 2 and 4 and TGF-beta. They could also accelerate intramedullary angiogenesis and improve the load to failure and stiffness of the bone. Although healing rates have been reported in up to 87% of delayed unions and non-unions, the efficacy of the method is significantly varied while patient or fracture related variables could not be clearly associated with a successful outcome.
REGIONAL ANESTHESIA IN A CHILD WITH SOTOS SYNDROME

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OSGOOD SCHLATTER LESION: HISTOLOGIC FEATURES OF SLIPPED ANTERIOR TIBIAL TUBERCLE

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No study reports the histological features of the various zone of the anterior tubercle of the tibia in the different stages of the Osgood-Schlatter (O-S) lesion. For this reason we carried on an histological study. Specimens were taken from 13 patients with O-S lesion prior to surgery. In 4 cases in the apophyseal stage lesions were present in an altered fibrocartilage anterior to the ossification centre. In 9 cases in the epiphyseal stage varying degrees of reparative tissues were observed in the bed of the fragment of the secondary ossification centre. In 3 of them a zone of lesion was observed within the fibrocartilage anterior to the ossification centre. These results suggest that the slippage of the patellar tendon insertion may be progressive and caused by pathological fibrocartilage.
SIDE EFFECTS OF RADIATION IN MUSCULOSKELETAL ONCOLOGY:
CLINICAL EVALUATION OF RADIATION-INDUCED FRACTURES

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Running head: Side effects of radiation therapy

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Radiation therapy and chemotherapy, while they remain an essential part of the multidisciplinary treatment of cancers, they have led to unwanted complications. Radiation-induced complications include wound and bone, growth, nervous system, tumorigenic, lung, gastrointestinal, hepatic and other complications. In this article we review the side effects of radiation therapy in musculoskeletal oncology emphasizing on bone, present our long experience, and discuss the current literature regarding radiation-induced bone complications and their management and outcome.
Aim: to clarify the reliability of two clinical meniscal tests, McMurray’s and Apley’s and the MRI imaging, in order to establish how to reduce unjustified arthroscopies. Methods: 102 patients were selected out of 160. All patients were submitted to a triple clinical examination (by a young surgeon and two skilled surgeons), MRI and an arthroscopic procedure. The investigated clinical tests were McMurray’s and Apley’s test. The positivity or negativity of the tests and MRI were compared to arthroscopic findings. Arthroscopy is considered the gold standard for the diagnosis of meniscal lesions. We measured the length of the meniscal lesions in order to correlate it to the clinical findings. Results: From the clinical examination, we got the following data: McMurray’s test: sensitivity 79.7%, specificity 78.5%, accuracy 79.4%, positive likelihood ratio 3.7, negative likelihood ratio 0.2. Apley’s test: sensitivity 83.7%, specificity 71.4%, accuracy 80.3%, positive likelihood ratio 2.9, negative likelihood ratio 0.2. The composite assessment is strictly dependent on how the discordance of the two tests is evaluated. The assessment of the clinical tests was done even in relation to medial or lateral meniscal lesion. No statistical difference was found about the length of the meniscal tear. MRI gave the following results: sensitivity 78.3%, specificity 85.7%, accuracy 80.3%. Conclusions: If we use, as diagnostic means, McMurray’s and Apley’s clinical tests and MRI as imaging procedure, we have an accuracy of about 80%. It is important to keep in mind that it is not possible to have the absolute certainty of make a correct diagnosis in case of meniscal lesions. Patients, too, have to be informed about the risk of a negative arthroscopy.
TENDINOPATHY AND INFLAMMATION: SOME TRUTHS

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Overuse tendinopathies are a common cause of pain and disability in athletes. According to histological findings, it is a “failed healing response” to overuse tendon injury. In obesity, macrophages and mast cells migrate to adipose tissue, and the resulting decreased availability of immune circulating cells should be responsible for less effective immune responses to acute tendon injury. In diabetic patients, free glucose molecules attach to collagen, alter collagen solubility, increase resistance to enzymatic degradation, and impair cross linking, contributing to the subsequent development of chronic tendinopathy secondary to a failed healing response to a tendon insult. Prolonged systemic, low-grade inflammation and impaired insulin sensitivity act as a risk factor for a “failed healing response” after an acute tendon insult, and predispose to the development of chronic overuse tendinopathies. Further studies may reveal novel therapeutic treatment approaches.
The need for bone grafting procedures to replace skeletal defects has become more considerable because of increased opportunities to save major bone loss. We report our experience and a critical analysis about the role of bone grafts and bone graft substitutes in prosthesis hip surgery replacement.
Insulin-like growth factor binding proteins (IGFBPs) are a group of secreted proteins, which bind to IGF-I (and IGF-II) with high affinity and modulate the biological actions of IGFs. Abundant evidence points the importance of the IGF-I/IGFBP system on both cell growth and differentiation. A role for the IGF-I/IGFBP system in the regulation of normal human cartilage has been previously reported. In this context, recent studies suggest an emerging role for IGFBPs in the failure of cartilage during osteoarthritis (OA). Indeed, increased IGFBP levels have been reported in both the articular cartilage and synovial fluid from patients with OA. Overexpression of IGFBPs, by altering the bioavailability and function of IGFs, is likely to deliver IGFs-independent signals for chondrocyte survival. This, at least in part, might explain the degenerative changes of the cartilage in OA. Further studies are necessary to clarify the mechanisms that cause the overexpression of IGFBPs in patients with OA. Advances in our understanding of the relationship between osteoarthritis and the IGF-I/IGFBP system may lead to new treatment strategies for this degenerative disease.
ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE IS CYTOTOXIC AND CAUSES OXIDATIVE STRESS, EVEN WHEN MODIFIED.

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USE OF COLLAGEN SCAFFOLD AND AUTOLOGOUS BONE MARROW CONCENTRATE AS A ONE-STEP CARTILAGE REPAIR IN THE KNEE: HISTOLOGICAL RESULTS OF SECOND-LOOK BIOPSIES AT 1 YEAR FOLLOW-UP.

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Chondral articular defects are a key concern in orthopaedic surgery. To overcome the disadvantages of autologous chondrocyte implantation (ACI) and to improve the outcomes of autologous matrix-induced chondrogenesis (AMIC), the latter technique is currently augmented with bone marrow concentrate injected under or seeded onto the scaffold. However, to date, only a little is known about histological outcomes of either the AMIC technique or AMIC associated with bone marrow concentrate. This study aimed to evaluate the quality of the repair tissue obtained from biopsies harvested during second-look arthroscopy after arthroscopic AMIC augmented with bone marrow concentrate. We analysed five second-look core biopsies harvested at 12 months follow-up. At the time of biopsy the surgeon reported the quality of the repair tissue using the standard ICRS Cartilage Repair Assessment (CRA). Every biopsy together with patient data was sent to our centre to undergo blind histological evaluation (ICRS II Visual Histological Assessment Scale) and data analysis. Five asymptomatic patients (mean age 43.4 years) had isolated lesions (mean size was 3.7 cm²) at the medial femoral condyle. All the implants appeared nearly normal (ICRS CRA) at arthroscopic evaluation and had a mean overall histological (ICRS II) of 59.8 ±14.5. Hyaline-like matrix was found in only one case, a mixture of hyaline/fibrocartilage was found in one case and fibrocartilage was found three cases. Our clinical and histological data suggest that this procedure achieved a nearly normal arthroscopic appearance and a satisfactory repair tissue, which was possibly still maturing at 12 months follow-up. Further studies are needed to understand the true potential of one-step procedures in the repair of focal chondral lesions in the knee.
This paper deals with the characterizations made during the development of a nano-HAp loaded chitosan scaffold, obtained by the freeze-drying technique combined with a novel “in situ” crystal growth method. The nano-composites were characterized by a highly porous and interconnected structure. The XRD patterns and calculated domain sizes of the HAp nano-crystals nucleated on the chitosan scaffolds are very similar to the ones recorded for deproteinated bone apatite. Both osteoblasts (MG63) and mesenchimal cells (hMSC) were showing good proliferation and adhesion onto the scaffolds. The presence of extensive filopodia and excellent spreading in and around the interconnected porous structure, indicated a strong cellular adhesion and growth. Moreover a good hMSC osteogenic differentiation has been verified. The observations related to well-developed structure morphology, physicochemical properties and high cytocompatibility suggest that the obtained chitosan–nHA porous scaffolds are potential candidate materials for bone regeneration.
Platelet-rich plasma (PRP) is increasingly used in the management of tendon injury in sports, supposedly accelerating the process of healing, tissue regeneration, and return to play. However, the scientific clinical evidence to support its use is scanty, and more level I studies need to be performed to justify its widespread use.
Polytherapy, namely the simultaneous application of three fundamental elements necessary for bone regeneration (growth factors, osteogenic cells and osteoconductive scaffolds) seems to lead to a very high success rate in the treatment of complex non-union (NU) cases and critical bone defects. NU are reported in 5-10% of long bone fractures. The use of autologous bone grafts has been long-considered the gold standard for the treatment of these cases. However the harvesting procedure from the iliac crest increases surgery time and presents some donor site complications which may be elevated. In recent years, surgeons have some alternatives to autologous grafting such as: application of organic or synthetic bone substitute, application of mesenchymal stromal cells (MSC) or growth factors (GF). In the literature there are many studies available about their application in monotherapy, but unfortunately the healing rate doesn’t exceed 90%. Polytherapy seems to be a logical option to improve the healing rate, nevertheless, there are not still extensive studies that validate this strategy and moreover, some questions are not resolved.
Prosthetic joints loosening in absence of infection is the most common reason for revision surgery and is known as aseptic loosening. A significant role in the pathogenesis of implant failure undoubtedly played by the generation of wear debris, mainly from the load bearing joint surfaces, and the cellular reaction through the formation of tissue membrane around implants. This article analyzes histologic, immunohistochemical ad ultrastructural aspects of periprosthetic tissue membrane collected at time of surgical revision, paying attention on cell host response to different materials: metals, polyethylene and ceramics. Dimension of particles seems to be crucial in the activation of different cell population to wear debris.
SPINAL INFECTION MULTIDISCIPLINARY MANAGEMENT PROJECT (SIMP): FROM DIAGNOSIS TO TREATMENT GUIDELINE


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Spine infections require a multidisciplinary approach to be treated and solved. A guide line to drive physicians in the deep complexity of such a disease is extremely helpful. SIMP suggests a flow-chart built up on clear concepts such as right and well managed antibiotic therapy, sound stability of the spine, correct and smart use of the standard and functional imaging techniques, such as f18 FDG PET/CT. In 16 months a total of 41 patients have been treated for spondylodiscitis, discitis and vertebral osteomyelitis by our team of physicians and 25 patients have been enrolled in a prospective study whose target is the assessment of the SIMP flow-chart and of every single aspect that characterize it.
The study assessed the spontaneous repair of large critical full-thickness defects (FTD) in not mature and still growing sheep model and compared repaired tissue after Pridie’s technique to the same technique combined with type I collagen matrix. Thirty-six FTD were divided into group 1 (untreated), group 2 (treated according to Pridie’s technique with 10.2 as value ratio of marrow stimulation), and group 3 (treated using Pridie’s marrow stimulation technique, and covered by a type I collagen matrix). The histological exam at 12 months showed fibrous repair of the untreated defects. In group 2 the reparative tissue showed a prevalence of fibrocartilaginous tissue. The mean ICRS visual assessment scale score was 8.9. In group 3 the reparative tissue was similar to the normal surrounding cartilage. The mean ICRS visual assessment scale score was 14.7. Subchondral drilling with defined ratio between the stimulated marrow area and the lesion area could improve the quality of FTD repair in articular cartilage in not mature and still growing stifle sheep model if combined with type I collagen matrix.
AN ORIGINAL METHOD FOR THE EVALUATION OF IN VIVO CONTROLLED RELEASE OF THE CERAMIC MATERIALS

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In recent years, the use of ceramic materials in orthopaedics and dentistry is becoming increasingly popular. However, it is important to know their biological and mechanical properties to optimize their use. The aim of this study is to describe a specific method to assess in vivo the effects of chronic release of ceramic materials implanted, in relation also to the type of material, pellets or powders. This was achieved by implanting ceramic powders and pellets, formed by low cohesion grains, in the patellar tendon of 48 New Zealand adult rabbits (24 with powders and 24 with pellets). The motion of the joint allowed easily and progressively the release of grains, detached from surface of the pellets and released to the joint space. Animals were sacrificed at different intervals (1, 3, 6, 12 months). Retrieved knee joints underwent X-Ray, histological and ultrastructural analysis.
BONE INTEGRATION OF NEW “STEMLESS” HIP IMPLANTS (PROXIMA VS. NANOS). A DXA STUDY: PRELIMINARY RESULTS


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The development of short femoral prostheses has the advantage to preserve bone and soft tissues, restore hip geometry, permit mini-invasive techniques and allow quickly return to an active life, but very few studies described bone reaction to these new designed prostheses. The aim of the present study was to evaluate the osseointegration of two different partial neck retained stemless hip prosthesis at one year after surgery, measured by the changes of periprosthetic bone mineral density (BMD) in 5 regions of interest (ROIs) using a dual-energy X ray absorptiometry (DXA) device. The signs of stress-shielding were evaluated by standard radiographs. Thirty-two uncemented primary total hip arthroplasty (THA) patients allocated into 2 groups were evaluated. In the first group (n=19) a Proxima (De-Puy-J&J) hip stem was implanted. In the second group (n=12) a Nanos (Smith & Nephew) hip stem was used. We found that both the implants preserve metaphyseal bone stock and increase periprosthetic BMD. In Nanos prostheses a significant higher BMD values were observed in region of interest (ROI) 3 and 4 (p<0.05). No differences were found in ROIs 1, 2, and 5. Proxima stem seem to produce a physiological strain distribution in the femur. No signs of stress-shielding were present in both the implants. In conclusion, this preliminary DXA analysis showed a physiological integration of both the stems that reproduces the biomechanical stress of proximal femur. New designed short stem implants showed optimal osseointegration after one year, and therefore appears an excellent alternative to traditional long stem hip prostheses.
The purpose of the present study was to evaluate the effect of local application of Autologous Conditioned Plasma (ACP) on the treatment of full-thickness cartilage injuries of the knee. The hypothesis of the study was that ACP can enhance healing response of injured cartilage. A full-thickness chondral lesion on the weight-bearing area of the medial femoral condyle was performed in 30 sheep. Animals were divided into 2 groups, according to postoperative treatment: in group 1, weekly injections of ACP for five times were performed; in group 2, lesions were left untreated. Animals were sacrificed at 3, 6 and 12 months after treatment. A histological evaluation was performed according to a modified O’Driscoll histological score. Comparison between groups for each time interval was performed with the Student’s $t$-test. Significance was set at $P < 0.05$. A post-hoc power analysis was performed according to the hypothesis of the study. Histological evaluation at 3 and 6 months showed that group 1 had significantly greater total score than group 2. At 12 months, no significant difference was observed between groups. In conclusion, local injections of ACP for treatment of full-thickness cartilage injuries did not produce hyaline cartilage. However, it promoted reparative response of the cartilage defect until 6 months after treatment.
Optimal management of deep infections in orthopedic and trauma surgery is often challenging. Traditional prophylactic and treatment approaches are based on the systemic administration of relatively high doses of antibiotics, which may result in a number of side effects. Furthermore, systemically administered antimicrobials may not reach adequate concentration at the desired site. Finally, traditional approaches are based on two-step protocols, thus delaying definite fixation. In recent years, antibiotic-coated intramedullary nails (ACINs) have been introduced, which offer the advantage of delivering antibiotics locally, thus increasing their local concentrations and length of action. In addition, ACINs offer the great advantage of combining antimicrobial prophylaxis/treatment and stabilization in a single step. Preliminary evidence by small clinical studies appears to support the effectiveness of ACINs in the management of chronic osteomyelitis and infected non-unions, with high rates of infection eradication and bone union. However, randomized clinical trials are needed to definitely establish ACINs’ effectiveness and safety.
Curettage is one of the most common method for surgical treatment of bone metastasis. Local adjuvant improve most commonly used for improving the effect of curettage in local cancer surgery may exerted their effects either chemically either physically; in Orthopedic Oncology the most common are phenol, liquid nitrogen, laser, and cement. This article reviewed the main characteristics of the most common chemical and physical agents used in bone oncology, emphasizing the toxic effects of some of them, especially phenol and liquid nitrogen.
Current evidences in revision hip arthroplasty suggest to treat severe acetabular bone loss with dedicated implants, such as anti-protrusio cages, stemmed cups, modular systems supplied with iliac flanges and obturatory hook. However recent literature is reporting satisfactory outcomes with simple elliptical Trabecular Metal cups. Purpose of the study was to evaluate mid-term results of such a surgical procedure. All hip revisions performed from 2008 to 2009 with implantation of a TMT multi-hole acetabular cup without augmentations were retrospectively reviewed. The cases with low-degree acetabular bone loss (stage I and II according to GIR classification), with surgical report poorly describing the bone defect, with inadequate pre- and post-operative x-rays were ruled out. Twenty-five cases were identified, but four were lost to follow-up. The twenty-one patients were 71 year-old on average (from 60 to 82), with stage IV bone loss in 6 cases and stage III bone loss in 15 cases. Mean interval from surgery to evaluation was 20.9 months (from 13 to 30). The evaluation included bone-prosthesis contact estimation, component position, survivorship, complications, final Harris Hip Score, presence of periprosthetic radiolucencies. Host bone-prosthesis contact was estimated to be about 35%. Only three implant were subsequently reoperated (for infection, early migration, recurrent dislocation). The HHS among non-reoperated 18 patients was 81.96 on average (from 63.44 to 95.82). Six cases showed thin radiolucencies in one of the three Charnley zones, while three cases showed radiolucencies in two. None of these images was evolutive, thus they were not considered signs of loosening. The mid-term results of this series confirm the hypothesis that a porous tantalum acetabular cup is an effective option to deal with difficult acetabular revisions. Although no extra-acetabular fixation device is available, the very high surface friction guaranteed by the material and the supplemental stability provided by trans-acetabular screws seem to be sufficient to allow satisfactory reimplantation even in severely damaged pelves.
The debate is still ongoing about the long term effects of the minimvasive vertebral augmentation techniques and their usefulness in treating more complex cases where a bone inducing effect more than a merely bone substitution would be suitable, such as the vertebral fractures in young patients. We previously developed a clinically relevant gene therapy approach using modified dermal fibroblasts for inducing bone healing and bone formation in different animal models. The aim of this study is to show the feasibility of a minimally invasive percutaneous intrasomatic ex vivo gene therapy approach to treat thoracolumbar vertebral fractures and anterior column bone defects in a goat model.
Hand chondroma is a particular cartilaginous tumour, being clinically benign, but morphologically malignant. This study investigates the expression of VEGF together with other growth factors and proliferation markers such as TGFβ2, Ki-67, TNF, FGF1, P53 in 8 cases of hand chondroma treated with curetage, in order to define the ethiopathogenesis of this tumour and the clinical significance of the resulting immunohistochemical profile, with particular respect to angiogenesis. VEGF was expressed in all cases; 5 cases were positive for TGFβ2 and 3 for PDGF. None of the other factors was expressed. On the basis of histologic results a specific model of tumour progression based on the indicators of angiogenesis could be related to hand tumours, in which VEGF expression should be the first stadium of the tumour aggressiveness, and the following PDGF, TGF 2 expression should be accompanied with a morphological outline worsening. Nevertheless the non constant expression of these indicators and the absent expression of proliferated indicators can explain the scant tendency to the relapse in presence of accurate curettage. It is important to remember that the cellular polymorphism typical of the cartilaginous tumours does not allow the application of an only oncogenesis model.
Cartilage defects represent a common problem in orthopaedic practice. The knee is frequently involved and the medial femoral condyle is the most common localization. Predisposing factors are: traumas, inflammatory conditions and biomechanics alterations. Several surgical options are available once correct diagnosis is given and accurate patient evaluation has been performed. The aim of our study was to prospectively evaluate functional results of modified autologous matrix induced chondrogenesis (AMIC) technique in a population of patients affected by focal cartilage defects. A population of 17 patients was enrolled in this study. 10 patients were male, mean age at the time of surgery was 39 years, right side was involved in 11 cases. All patients were evaluated with accurate physical exam and complete imaging study. At an average FU of 36 months, mean IKDC score and Lysholm score improved from 32 to 82 and from 38 to 74. 13 patients out of 17 (76.5%) were satisfied or extremely satisfied with their functional result. MRI control showed reduction of the defect area and subchondral oedema in 10 cases (58.8%). AMIC technique is a relatively new option in the treatment of full thickness cartilage lesions. It enhances the advantages of microfractures since the Chondrogide membrane protects and stabilizes the blood plug acting as a matrix for new cartilage formation. First reports on AMIC technique, show comparable results to autologous chondrocyte implantation (ACI) with the advantage of a single stage technique and no donor site morbidity. AMIC technique represents a new option in the treatment of full thickness cartilage defect. It is safe and reliable. Our data are in accordance with previously reported series in literature and confirm the good objective and subjective results of this procedure.
Ceramic materials, as Alumina and Zirconia, has made an improvement in the choice of new biomaterials for the load bearing application in dental and orthopaedic implants. These materials has shown mechanical resistance to high stress related to weight bearing and low debris in time. For this reason they are indicated on young patients implant, with high demanding activities and long life expectance. In literature however the risk of chronic inflammation due to chronic wear debris release and the possibility of carcinogenesis, is still to be definitively investigated. Another point to investigate is the acute reaction of the tissue in case of acute release of powders of these materials. The aim of this study was to investigate the possible local and systemic acute effects of ceramic precursors in form of powders of different size when released into articular joint. Powders of ZTA were implanted in the knee joint of twenty-four New Zealand white adult rabbits, that were sacrificed at 1, 3, 6, and 12 months. Radiographic, histological and immunohistochemistry analysis were conducted on periprosthetic tissue and peripheral organs, to verifying local host response and systemic toxic effects.
ORTHOPAEDIC RESEARCH IN ITALY: STATE OF THE ART

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The most significant results in experimental and clinical orthopaedic research in Italy within the last three years have been primarily in major congenital diseases, bone tumors, regenerative medicine, joint replacements, spine, tendons and ligaments. The data presented in the following discussion is comparable with leading international results, highlighting Italian orthopaedic research excellence as well as its shortcomings.