Development of an Electromechanical Grade to Assess Human Knee Articular Cartilage Quality*Sim S, Chevrier A, Garon M, Quenneville E, Lavigne P and Buschmann MD*Ann Biomed Eng. doi: 10.1007/s10439-017-1879-4. (2017)

Quantitative assessments of articular cartilage function are needed to aid clinical decision making. Our objectives were to develop a new electromechanical grade to assess quantitatively cartilage quality and test its...

https://www.ncbi.nlm.nih.gov/pubmed/28653292

Control of lung vascular permeability and endotoxin-induced pulmonary oedema by changes in extracellular matrix mechanics*Akiko Mammoto, Tadanori Mammoto, Mathumai Kanapathipillai, Chong Wing Yung, Elisabeth Jiang, Amanda Jiang, Kristopher Lofgren, Elaine P.S. Gee and Donald E. Ingber*Nat Commun. 2013;4:1759. doi: 10.1038/ncomms2774.

Increased vascular permeability contributes to many diseases, including acute respiratory distress syndrome, cancer and inflammation. Most past work on vascular barrier function has focused on soluble regulators, such as tumour-necrosis...

https://www.ncbi.nlm.nih.gov/pubmed/23612300

Electromechanical probe and automated indentation maps are sensitive techniques in assessing early degenerated human articular cartilage*Sim S, Chevrier A, Garon M, Quenneville E, Lavigne P, Yaroshinsky A and Buschmann M D*Journal of Orthopaedic Research, 35(4), 858-867.

Recent advances in the development of new drugs to halt or even reverse the progression of Osteoarthritis at an early-stage requires new tools to detect early degeneration of articular cartilage. We investigated the ability of an electromechanical...

https://onlinelibrary.wiley.com/doi/10.1002/jor.23330/full

https://www.ncbi.nlm.nih.gov/pubmed/27279435

Electromechanical properties of human osteoarthritic and asymptomatic articular cartilage are sensitive and early detectors of degeneration*Hadjab I, Sim S, Karhula S.S, Kauppinen S. Garon M, Quenneville E, Lavigne P, Lehenkari P.P and Buschmann MD*Osteoarthritis Cartilage. doi: https://doi.org/10.1016/j.joca.2017.12.002. (2017)

Objective: To evaluate cross-correlations of ex vivo electromechanical properties with cartilage and subchondral bone plate thickness, as well as their sensitivity and specificity regarding early cartilage degeneration in human tibial...

https://www.sciencedirect.com/science/article/pii/S1063458417313572

Evaluation of a novel technique to map the mechanical properties of an entire articular surface in indentation*Sim S, Quenneville E, Garon M, Hoemann CD, Hurtig M and Buschmann MD*International Cartilage Repair Society (ICRS), Turkey, 2013, Podium presentation (11.2.9)

Purpose: Mechanical testing of articular cartilage is recommended by the FDA for products intended for the repair or replacement of knee cartilage. One experimental configuration that has many practical advantages is indentation. However, one...

Sim-ICRS2013-Presentation.pdf

Validation of a surgical wound healing model in Sprague-Dawley rats*Authier S, Fournier S, Chaurand F, Gordon C, Garon M, Cloutier L and Troncy E*Paper presented at the 27th Annual Meeting of the American College of Toxicology (November 2006)

BACKGROUND: Wound healing is a biological process that can be altered by drugs in specific therapeutic classes. The aim of the study was to validate a wound healing rat model with tensile strength measurements.

<br...

Authier-ACT2006_Wound_Healing-Poster.pdf

</br...

Assessment of Human Articular Cartilage Issued from Asymptomatic & TKR Donors*Hadjab I, Sim S, Quenneville E, Garon M and Buschmann MD*Biomedical Engineering Society 2015 in Tampa, Floride

Introduction: Cartilage degeneration is a progressive process and currently, only end-stage surgical treatments such as total knee replacement (TKR) lead to an improved condition. To prevent or delay this surgery, several less invasive...

Guided subchondral bone marrow stimulation through a novel biomaterial microparticle approach*Hoemann C, Guzman-Morales J, Chen G, Picard G, Veilleux D, Sim S, Garon M, Quenneville E, Buschmann MD, Lafantaisie-Favreau CH and Hurtig M*Presentation #335.2 on Fri May 20 from 16:30 to 18:15 in Room 516C at World Congress on Biomechanics, Montreal, May 2016

Hyaline-like cartilage repair can be occasionally elicited by bone marrow stimulation procedures however mainly in younger patients, indicating the need for further treatments to improve success rates in middle-aged patients. Traditional...

https://mywbc.org/lectures/view/4119

Mapping Articular Cartilage Biomechanical Properties of Normal and Osteoarthritis Mice Using Indentation*Lavoie JF, Sim S, Quenneville E, Garon M, Moreau A, Buschmann MD and Aubin CE*2015 International Cartilage Repair Society, May 7-11 2015, Chicago, Illinois, USA. Podium presentation (ID: 23.2.9)

Purpose: Due to their size (~1mm), mouse models pose significant challenges to map biomechanical properties over their articular surfaces. The purpose of this study was to determine if an automated indentation technique could be used to map...

Lavoie-2015B-ICRS-Presentation.pdf

Mapping Articular Cartilage Biomechanical Properties of Normal and Osteoarthritic Mice Using Indentation*Lavoie JF, Sim S, Quenneville E, Garon M, Moreau A, Buschmann MD and Aubin CE*Osteoarthritis Research Society International (OARSI), 2015 April 30, Seattle, WA, United States

Purpose: Due to their size (~1mm), mouse models pose significant challenges to map biomechanical properties over their articular surfaces. The purpose of this study was to determine if an automated indentation technique could be used to...

Lavoie-2015c-ICRS-Abstract.pdf

Mapping Articular Cartilage Biomechanical Properties of Normal and Osteoarthritic Mice Using Indentation*Lavoie JF, Sim S, Quenneville E, Garon M, Moreau A, Buschmann MD and Aubin CE*Osteoarthritis and Cartilage 23 Suppl. 2, p. A254 (2015)

Purpose: Due to their size (~1mm), mouse models pose significant challenges to map biomechanical properties over their articular surfaces. The purpose of this study was to determine if an automated indentation technique could be used to map...

Lavoie-2015E.pdf

Novel Technique to Map the Biomechanical Properties of Entire Mice Articular Surfaces Using Indentation*Sim S, Lavoie JF, Moreau A, Quenneville E, Garon M, and Buschmann MD*Osteoarthritis and Cartilage, 22(1), 541. World Congress on Osteoarthritis, April 2014, Paris, France.

Purpose: An important measure of articular cartilage function in health and disease is its biomechanical properties. While much research has mouse models of osteoarthritis, the assessment of biomechanical properties in these small joints is...

Sim-OARSI2014-Poster.pdf

Novel Technique to Map the Biomechanical Properties of Entire Articular Surfaces Using Indentation to Identify Degenerated (Osteoarthritis-like) Cartilage*Sim S, Chevrier A, Garon M, Quenneville E and Buschmann MD*7th World Congress on Biomechanics, 2014, Boston, MA, USA. Poster 2229

Introduction: A currently unsatisfied need in Arthritis and cartilage research is to assess the function of the entire articular cartilage surface both quantitatively and non-destructively. The objective of this study was to investigate the...

Sim-2014e-WCB2014-Poster.pdf

Sim-2014d-ICoBT2014-Presentation.pdf

Indentation Method to Map Mechanical Properties of Articular Surface to Identify Degenerated Regions

Sim S, Chevrier A, Garon M, Quenneville E and Buschmann MD 2014 Annual Meeting of the Biomedical Engineering Society, 2014, San Antonio, TX, USA. Podium presentation (ID: OP-Sat-3-4)

Introduction: The identification and quantitative grading of early degenerated regions over an entire articular surface remains a challenging quest. The objective of this study was to investigate the ability of a novel technique to...

Sim-2014g-abstract.pdf

Sim-2014G (BMES2014 Presentation).pdf

Correlation of Non-destructive Electromechanical Probe (Arthro-BST) Assessment with Histological Scores and Mechanical Properties in Human Tibial Plateau

Sim S, Chevrier A, Garon M, Quenneville E and Buschmann MD Orthopeadic Research Society Annual Meeting in Las Vegas, 2015, Poster 1228

The purpose of the study was to investigate if electromechanical properties of human tibial plateau correlate strongly with histological scores and with biomechanical properties as in human distal femurs (Sim et al., 2014). Six pairs of tibial...

Sim-2015a-ORS2015-Poster.pdf

Relevance of the Spatial Distribution of Mechanical Properties of Articular Cartilage in Animal Studies

Sim S, Hadjab I, Garon M, Quenneville E, and Buschmann MD Orthopeadic Research Society Annual Meeting in Las Vegas, 2015, Poster 0359

Introduction: In cartilage regeneration and repair, mechanical testing of articular cartilage characterizes functional restoration of the repair site [1] and can detect early degeneration of articular cartilage [2]. However, the experimental...

Sim-2015b-ORS2015-Poster.pdf

Sim-2015E-ICRS-Presentation.pdf

Evaluation of Entire Ovine Cartilage Repair Articular Surfaces: Mechanical and Electromechanical Assessment

Sim S, Hadjab I, Garon M, Quenneville E, Hurtig MB, Buschmann MD and Hoemann CD Transactions of International Cartilage Repair Society (ICRS), Chicago, 2015, 7-11 May 2015, e-Poster: P87

Purpose: To demonstrate the ability of non-destructive electromechanical device and automated indentation technique in assessing the quality of cartilage in a sheep model of cartilage repair.

Methods: Ex vivo...

Sim-2015F-ICRS-Abstract.pdf

Sim-2015F-ICRS-ePoster.pdf

Sim-2015F-ICRS-Poster.pdf

Wound Healing Revealed by a Novel Automated Indentation Technique

Sim S, Garon M, Quenneville E and Buschmann MD Canadian Connective Tissue Conference 2015 in Quebec, Canada

Introduction: Mechanical characterization of wound healing in skin samples mostly relies on uniaxial tensile rupture tests, which provide local information along the wound and are disruptive for samples (Chao et al., 2011). In this study, we...

Sim-2015H-CCTC-Presentation.pdf

Sim-2015H-CCTC-Abstract-with-images.pdf

Development of a Sequence of Mechanical Tests for Articular Cartilage at a Single Location*Sim S, Chartrand A, Lavallee AP, Tessier J, Garon M, Quenneville E and Buschmann MD*Orthopeadic Research Society Annual Meeting in Orlando, 2016

In a recent study, our group has highlighted the importance of considering the natural topographic variability of the mechanical properties over the articular surface, particularly in the context of cartilage repair, where it can screen the effect of...

Sim-2016A-ORS2016-Poster.pdf

Cartilage Stiffness and Thickness Distributions Revealed by an Automated Indentation Technique in the Temporomandibular Joint*Sim S, Matuska A, Garon M, Quenneville E, McFetridge P and Buschmann MD*TMJ Bioengineering Conference - V, September 12-13, 2016, Barcelona, Spain

The purpose of this study was to evaluate the capability of an automated indentation technique to reveal the topographical variation of mechanical properties over the entire articular surface of the temporomandibular joint (TMJ), especially the...

Sim-2016B (TMJ Bioengineering 2016 Abstract Proof).pdf

Sim-2016B (TMJ Bioengineering 2016 Presentation).pptx

Correlation of Non-destructive Electromechanical Probe (Arthro-BST) Assessment with Histological Scores, Biochemical Composition and Mechanical Properties in Human Knee Joints*Sim S, Chevrier A, Quenneville E, Garon M and Buschmann MD*Transactions of the 60th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, USA, Poster 0439, 2014

Introduction: Histological scoring, biochemical analyses and biomechanical testing (unconfined compression) are often seen as gold standard characterizations for articular cartilage but can present major drawbacks in the context of animal and...

Sim-ORS2014a.pdf

Novel Technique to Map the Biomechanical Properties of Entire Articular Surfaces Using Indentation to Identify Osteoarthritis-like Regions*Sim S, Chevrier A, Garon M, Quenneville E and Buschmann MD*Transactions of the 60th Annual Meeting of the Orthopaedic Research Society, 2014, New Orleans, LA, USA, 2015, Poster #2015

Introduction: It is challenging to identify and grade degenerated regions of the entire articular surface both quantitatively and non-destructively. Therefore, the objective of this study was to investigate the ability of a novel technique to...

Sim-ORS2014b.pdf

Age-dependence of the Pattern of Cartilage Electromechanical Properties in the Ovine Stifle Joint*Sim S, Picard G, Quenneville E, Garon M and Buschmann MD*Transactions of the 59th Annual Meeting of the Orthopaedic Research Society, San Antonio, TX, USA, 2013.

Introduction: The biochemical composition and mechanical/electromechanical properties of articular cartilage evolve during growth. The objective of this study was to examine the age-dependence in the distribution pattern of electromechanical...

Sim-2013b-Poster.pdf

Streaming Potential-Based Arthroscopic Device Can Detect Changes Immediately Following Localized Impact in an Equine Impact Model of Osteoarthritis*Changoor A, Quenneville E, Garon M, Hurtig MB and Buschmann MD*Osteoarthritis and Cartilage, Vol. 17, Supplement 1, S53, World Congress on Osteoarthritis, September 2009, Montreal, Quebec, Canada. (2009)

Early Post-traumatic Osteoarthritis (PTOA) can be asymptomatic but represents a possible window of opportunity for therapeutic intervention before disease progression. Impact models are ideal for studying these strategies because the location and...

Changoor-OARSI2009-poster.pdf

Comparison Between In Vitro and Simulated Arthroscopy Electromechanical Measurements of Human Articular Surfaces Using the Arthro-BST*Sim S, Becher C, Garon M, Quenneville E, Hurschler C and Buschmann MD*International Cartilage Repair Society 2016 in Sorrento, Italy. Poster 132

Purpose: The output of the Arthro-BST was originally streaming potentials integral (SPI) parameter (Abedian-2013). Since then, the output has changed to a quantitative parameter (QP) (Sim-2014). The purpose of this study was to reanalyzed old...

Sim-2016C (ICRS2016 Poster).pdf

Sim-2016C (ICRS2016 Abstract Proof).pdf

Sim-2016C (ICRS2016 ePoster).pdf

https://cslide.ctimeetingtech.com/icrs2016/confcal/quenneville

The Verification of the Mechanical Properties of Binder Jetting Manufactured Parts by Instrumented Indentation Testing*Zhou Y, Tang Y, Hoff T, Garon M and Fiona Yaoyao Zhao*43rd Proceedingsof the North American Manufacturing Research. Volume 1, Pages 327–342. (2014)

In order to figure out the mechanical properties of free form biomedical parts made by Additive Manufacturing (AM), Instrumented Indentation Testing (IIT) is introduced to measure the Young's modulus from the free surface of the parts. The research...

https://www.researchgate.net/publication/283958401_The_Verification_of_the_Mechanical_Properties_of_Binder_Jetting_Manufactured_Parts_by_Instrumented_Indentation_Testing

Combined Mechanical Characterizations Increases Sensitivity in the Assessment of Human Cartilage Degeneration*Sim S, Hadjab I, Chevrolat L-A, Masse M, Tong AL, Lavigne P, Garon M, Quenneville E and Buschmann MD*Accepted for a podium presentation at ORS 2017

Introduction: We published a recent study showing superior sensitivity of electromechanical and indentation (instantaneous response) assessments versus well-established techniques, including histological Mankin score, to characterize...

Sim-2017A (ORS2017 Abstract Proof).pdf

Non-destructive electromechanical assessment (Arthro-BST) of human articular cartilage correlates with histological scores and biomechanical properties*Sim S, Chevrier A, Garon M, Quenneville E, Yaroshinsky A, Hoemann CD and Buschmann MD*Osteoarthritis Cartilage, 22(11) 1926-35. (2014)

OBJECTIVE:The hand-held Arthro-BST™ device is used to map electromechanical properties...

https://www.ncbi.nlm.nih.gov/pubmed/25168362

Electromechanical probe and automated indentation maps are sensitive techniques in assessing early degenerated human articular cartilage*Sim S, Chevrier A, Garon M, Quenneville E, Lavigne P, Yaroshinsky A, Hoemann CD and Buschmann MD*J Orthop Res, 35(4) 858-867. (2017) Epub 2016 Jun 22

https://www.ncbi.nlm.nih.gov/pubmed/27279435

Freeze-Dried Chitosan-PRP Injectable Surgical Implants for Meniscus Repair: Pilot Feasibility Studies in Ovine Models*Ghazi Zadeh L, Chevrier A, Hurrtig MB, Farr J, Rodeo S, Hoemann CD and Buschmann MD*Regen Med Ther, 1(1) 16-29. (2017)

Clinical management of meniscus tears often involves partial meniscectomy, which can lead to Osteoarthritis (OA). Meniscus repair augmentation strategies are being developed to compensate for the tissue's limited healing response. The purpose...

https://thescipages.org/Articles/regenerative-medicine/rmt-1-002.pdf

The effect of two nonresorbable suture types on the mechanical performance over a metal suture anchor eyelet*Acton D, Perry A, Evans R, Butler A, Stephens P, Bruce W, Goldberg J, Sonnabend D and Walsh W*Knee Surgery, Sports Traumatology, Arthroscopy, 2004, 12(2), 165-168

An understanding of the mechanical properties of different suture materials is valuable when selecting the most appropriate suture and repair technique. Sutures should be strong, easy to handle and have high knot security. The introduction of suture...

https://www.researchgate.net/publication/9886886_The_effect_of_two_nonresorbable_suture_types_on_the_mechanical_performance_over_a_metal_suture_anchor_eyelet

Heightened aberrant deposition of hard-wearing elastin in conduit arteries of prehypertensive SHR is associated with increased stiffness and inward remodeling*Arribas SM, Briones AM, Bellingham C, Gonzalez MC, Salaices M, Liu K, Wang Y and Hinek A*Am J Physiol Heart Circ Physiol, 2008, 295(6), H2299-2307

Elastin is a major component of conduit arteries and a key determinant of vascular viscoelastic properties. Aberrant organization of elastic lamellae has been reported in resistance vessels from spontaneously hypertensive rats (SHR) before the...

https://www.ncbi.nlm.nih.gov/pubmed/18849339

Sensitivity of indentation testing to step-off edges and interface integrity in cartilage repair*Bae W, Law A, Amiel D and Sah R*Ann Biomed Eng, 32(3), 360-369. (2004)

Step-off edges and tissue interfaces are prevalent in cartilage injury such as after intra-articular fracture and reduction, and in focal defects and surgical repair procedures such as osteochondral graft implantation. It would be useful to assess...

Indentation probing of human articular cartilage: effect on chondrocyte viability*Bae W, Schumacher B and Sah R*Osteoarthritis and Cartilage, 15(1), 9-18. (2007)

BACKGROUND: Clinical arthroscopic probes based on indentation testing are being developed. However, the biological effects of certain design parameters (i.e., tip geometry and size) and loading protocols (i.e., indentation depth, rate, and ...

Novel fluoro-terpolymers for coatings applications*Baradie B and Shoichet MS.*Macromolecules, 38(13), 5560-5568. (2005)

A series of thermally stable, elastomeric and hydrophobic fluoro-terpolymers of tetrafluoroethylene (TFE), vinyl acetate (VAc), and poly(dimethylsiloxane) methyl acrylate-terminated (PDMSMA), P(TFE-ter-VAc-ter-PDMSMA), were synthesized in...

https://pubs.acs.org/doi/full/10.1021/ma047792s

Biomechanical models for radial distance determination by the rat vibrissal system*Birdwell JA, Solomon JH, Thajchayapong M, Taylor MA, Cheely M, Towal RB, Conradt J and Hartmann MJ*Journal of neurophysiology, 98(4), 2439-2455. (2007)

Rats use active, rhythmic movements of their whiskers to acquire tactile information about three-dimensional object features. There are no receptors along the length of the whisker; therefore all tactile information must be mechanically transduced...

https://jn.physiology.org/content/98/4/2439

A comparative biomechanical analysis of term fetal membranes in human and domestic species*Borazjani A, Weed BC, Patnaik SS, Feugang JM, Christiansen D, Elder SH, Ryan PL and Liao J*American journal of obstetrics and gynecology, 204(4), 365. e325-365. e336. (2011)

OBJECTIVE: The purpose of this study was to biomechanically characterize and compare human, porcine, equine, and ovine fetal membranes.

STUDY DESIGN: Noncontact metrology was used for topographic...

Tensile properties in collagen-rich tissues of Quarter Horses with hereditary equine regional dermal asthenia (HERDA)*Bowser J, Elder S, Pasquali M, Grady J, Rashmir-Raven A, Wills R and Swiderski C*Equine Vet J. 2014 Mar;46(2):216-22. doi: 10.1111/evj.12110. Epub 2013 Aug 30.

REASONS FOR PERFORMING STUDY: Hereditary equine regional dermal asthenia (HERDA) is an autosomal recessive disorder of Quarter Horses characterised by skin fragility. Horses with HERDA have a missense mutation in peptidyl-prolyl cis-trans...

https://www.ncbi.nlm.nih.gov/pubmed/23738970

Development and Validation of Large-Sized Engineering Cartilage Constructs in Full-Thickness Chondral Defects in a Rabbit Model*Brenner J*Master thesis Queen's University. (2012)

Long-term applicability of current surgical interventions for the repair of articular cartilage is jeopardized by the formation of mechanically inferior repair tissue. Cartilage tissue engineering offers the possibility of developing functional...

https://hdl.handle.net/1974/6988

Development of large engineered cartilage constructs from a small population of cells*Brenner JM, Kunz M, Tse MY, Winterborn A, Bardana DD, Pang SC and Waldman SD*Biotechnology progress, 29(1), 213-221. (2013)

Confronted with articular cartilage's limited capacity for self-repair, joint resurfacing techniques offer an attractive treatment for damaged or diseased tissue. Although tissue engineered cartilage constructs can be created, a substantial...

Mechanical response of ankle ligaments at low loads*Butler AM and Walsh WR*Foot & ankle international, 25(1), 8-12. (2004)

BACKGROUND: The aim of this study was to examine the mechanical behavior of human ankle ligaments at low forces. Predominantly, ankle ligaments have been studied under the auspices of ligament injury. While the mechanical properties of a...

Assessment of a Regenerative Therapy Strategy for Chondral Defects in Articular Cartilage*Carroll A*Thesis Queen’s University, 2015

Osteoarthritis is one of the leading causes of disability in adults over the age of 40 years, and there is currently no curative measure for the disease. As a result, there is a critical need for a strategy that can promote cartilage regeneration. Of...

https://hdl.handle.net/1974/13628

Association of 3-dimensional cartilage and bone structure with articular cartilage properties in and adjacent to autologous osteochondral grafts after 6 and 12 months in a goat model*Chan EF, Liu IL, Semler EJ, Aberman HM, Simon TM, Chen AC, Truncale KG and Sah RL*Cartilage, 3(3), 255-266. (2012)

The articular cartilage of autologous osteochondral grafts is typically different in structure and function from local host cartilage and thereby presents a remodeling challenge. The hypothesis of this study was that properties of the articular...

https://car.sagepub.com/content/3/3/255.abstract

A new radiopaque embolizing agent for the treatment of endoleaks after endovascular repair: Influence of contrast agent on chitosan thermogel properties*Coutu JM, Fatimi A, Berrahmoune S, Soulez G and Lerouge S*Journal of Biomedical Materials Research Part B: Applied Biomaterials, 101(1), 153-161. (2013)

A new injectable radiopaque embolizing agent has been developed, based on chitosan thermogelling properties. Different commercial contrast agents (Isovue®, Visipaque®, and Conray®) were associated with chitosan-?-glycerophosphate. Their impact on...

https://espace.etsmtl.ca/970/

Enhanced mechanical properties in cellulose nanocrystal-poly(oligo ethylene glycol methacrylate) injectable nanocomposite hydrogels through control of physical and chemical cross-linking*De France KJ, Chan K.J.W, Cranston ED and Hoare T*Biomacromolecules. 2016 Feb 8;17(2):649-60. doi: 10.1021/acs.biomac.5b01598. Epub 2016 Jan 15.

While injectable hydrogels have several advantages in the context of biomedical use, their generally weak mechanical properties often limit their applications. Herein, we describe in situ-gelling nanocomposite hydrogels based on poly(oligoethylene...

https://pubs.acs.org/doi/10.1021/acs.biomac.5b01598

https://www.ncbi.nlm.nih.gov/pubmed/26741744

Determining the modulus of intact bovine vertebral cancellous bone tissue: Development and validation of a protocol*Engbretson AC*Master thesis Queen's University. (2010)

Cancellous, or spongy, bone accounts for nearly 80% of the human skeleton’s internal surface area, despite comprising only 20% of its mass. It is made up of a network of struts and plates that provide lightweight internal support to mammalian...

https://qspace.library.queensu.ca/bitstream/1974/5993/1/Engbretson_Andrew_C_201008_MASc.pdf.pdf

Tuning the Microenvironment: Click-Crosslinked Hyaluronic Acid-Based Hydrogels Provide a Platform for Studying Breast Cancer Cell Invasion*Fisher SA, Anandakumaran PN, Owen SC and Shoichet MS*Adv. Funct. Mater. 2015. DOI: 10.1002/adfm.201502778

A big challenge in cell culture is the non-natural environment in which cells are routinely screened, making in vivo phenomena, such as cell invasion, difficult to understand and predict. To study cancer cell invasion, extracellular matrix (ECM)...

https://www.ecf.utoronto.ca/~molly/publications/tuning%20the%20microenvironment...breast%20cancer%20cell%20invasion%20(in%20press).pdf

Development of scaffold-free elastic cartilaginous constructs with structural similarities to auricular cartilage*Giardini-Rosa R, Joazeiro PP, Thomas K, Collavino K, Weber J and Waldman SD*Tissue Engineering Part A. Volume 20, Numbers 5 and 6, 2014, pp 1012-26 (2014)

External ear reconstruction with autologous cartilage still remains one of the most difficult problems in the fields of plastic and reconstructive surgery. As the absence of tissue vascularization limits the ability to stimulate new tissue growth,...

https://www.ncbi.nlm.nih.gov/pubmed/24124666

Injectable Interpenetrating Network Hydrogels via Kinetically Orthogonal Reactive Mixing of Functionalized Polymeric Precursors*Gilbert T, Smeets NMB and Hoare T*ACS Macro Letters, 2015, 4, 1104-1109.

The enhanced mechanics, unique chemistries, and potential for domain formation in interpenetrating network (IPN) hydrogels have attracted significant interest in the context of biomedical applications. However, conventional IPNs are not directly...

https://pubs.acs.org/doi/abs/10.1021/acsmacrolett.5b00362

Evaluation of a bioabsorable polylactide film in a large animal model for the reduction of retrosternal adhesions*Iliopoulos J, Cornwall G, Evans R, Manganas C, Thomas K, Newman D and Walsh W*Journal of Surgical Research, 118(2), 144-153. (2004)

OBJECTIVES: An adult pig model of retrosternal adhesion formation via an inferior hemisternotomy was used to evaluate the formation and development of pericardial and retrosternal adhesions, as well as adhesion reduction using two thicknesses...

https://www.ncbi.nlm.nih.gov/pubmed/15100003

The Aortic Wrap Procedure - A Surgical Method of Treating Age-Related Aortic Dilatation and Stiffness*Iliopoulos J*PhD Thesis, University of New South Wales, Sydney. (2006)

Introduction: There is progressive stiffening and dilatation of the aorta and large elastic arteries with aging as a result of the repetitive cyclic stress they are exposed to throughout life. Aortic stiffening has a number of detrimental...

https://www.unsworks.unsw.edu.au/primo_library/libweb/action/dlDisplay.do?vid=UNSWORKS&docId=unsworks_1296

Shear mechanics of the TMJ disc - relationship to common clinical observations*Juran CM, Dolwick MF, and McFetridge PS*J Dent Res. 2013 Feb, 92(2):193-8.

The temporomandibular joint (TMJ) is a complex hinge and gliding joint that induces significant shear loads onto the fibrocartilage TMJ disc during jaw motion. The purpose of this study was to assess regional variation in the disc's shear loading...

https://www.ncbi.nlm.nih.gov/pubmed/?term=Shear+Mechanics+of+the+TMJ+Disc%3A+Relationship+to+Common+Clinical+Observations

https://www.researchgate.net/publication/233724951_Shear_Mechanics_of_the_TMJ_Disc_Relationship_to_Common_Clinical_Observations

Micro-CT visualization and indentation properties of whole meniscus following mercury exposure*Kolaczek S, Changoor A, Hurtig M, Gordon K and Getgood A*Annual Meeting of the ORS, New Orleans, Louisiana, USA, March 15-18, 2014.

A major risk factor for knee osteoarthritis (OA) is meniscal injury or excision. Surgeons now advocate for meniscal repair or allografts rather than excision with this knowledge in hand. Clinical assessment of the meniscal load sharing is limited...

https://prgmobileapps.com/AppUpdates/ors/Abstracts/abs1330.html

Engineering of Hyaline Cartilage with a Calcified Zone Using Bone Marrow Stromal Cells*Lee WD, Hurtig MB, Pilliar RM, Stanford WL and Kandel RA*Osteoarthritis and Cartilage (2015), doi: 10.1016/j.joca.2015.04.010

In healthy joints, a zone of calcified cartilage (ZCC) provides the mechanical integration between articular cartilage and subchondral bone. Recapitulation of this architectural feature should serve to resist the constant shear force from the...

https://www.ncbi.nlm.nih.gov/pubmed/25891750

Soft Tissue Phantoms for Realistic Needle Insertion - A Comparative Study*Leibinger A, Forte AE, Tan Z, Oldfield MJ, Beyrau F, Dini D and Rodriguez y Baena F*Annals of Biomedical Engineering. pp 1-11 (2015)

Phantoms are common substitutes for soft tissues in biomechanical research and are usually tuned to match tissue properties using standard testing protocols at small strains. However, the response due to complex tool-tissue interactions can differ...

https://link.springer.com/article/10.1007/s10439-015-1523-0/fulltext.html

Characterization of the effect of microfracture surgery and angle of incidence on the structural properties of femoral bone*Liang LD, Wagner A, Steeds J, Hurtig M and Gordon K*Studies by Undergraduate Researchers at Guelph, 7(1), 56-61. (2013)

Microfracture surgery is one of the most common treatment options for knee osteoarthritis, a chronic inflammatory disease of the knee joint. However, a recent study by Theodoropoulos et al. (2012) has shown that there are significant variations in...

https://journal.lib.uoguelph.ca/index.php/surg/article/view/2848

Effects of demineralized bone matrix on tendon-bone healing in an intra-articular rodent model*Lovric V, Chen D, Yu Y, Oliver RA, Genin F and Walsh WR*The American journal of sports medicine, 40(10), 2365-2374. (2012)

BACKGROUND: Techniques to improve and accelerate tendon-bone healing could be advantageous in anterior cruciate ligament (ACL) reconstruction. Effects of demineralized bone matrix (DBM) on intra-articular tendon-bone healing have not been...

https://www.ncbi.nlm.nih.gov/pubmed/22984131

The effect of terminal sterilization on structural and biophysical properties of a decellularized collagen-based scaffold; implications for stem cell adhesion*Matuska AM and McFetridge PS*J Biomed Mater Res Part B, 2014, pp 1-10
Terminal sterilization induces physical and chemical changes in the extracellular matrix (ECM) of ex vivo-derived biomaterials due to their aggressive mechanism of action. Prior studies have focused on how sterilization affects the mechanical...

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4443929/

Biomechanical and biochemical outcomes of porcine temporomandibular joint disc deformation*Matuska AM, Muller S, Dolwick MF and McFetridge PS*Archives of Oral Biology. 64, 2016, 72–79
Objective: The structure–function relationship in the healthy temporomandibular joint (TMJ) disc has been well established, however the changes in dysfunctional joints has yet to be systematically evaluated. Due to the poor understanding of...

In vivo dynamic loading reduces bone growth without histomorphometric changes of the growth plate*Menard AL, Grimard G, Valteau B, Londono I, Moldovan F and Villemure I*J Orthop Res. 2014 Sep;32(9):1129-36. doi: 10.1002/jor.22664. Epub 2014 Jun 6.
This in vivo study aimed at investigating the effects of dynamic compression on the growth plate. Rats (28 days old) were divided into three dynamically loaded groups, compared with two groups (control, sham). A device was implanted on the 6th and...

https://www.ncbi.nlm.nih.gov/pubmed/24902946
https://www.researchgate.net/publication/262931706_In_Vivo_Dynamic_Loading_Reduces_Bone_Growth_Without_Histomorphometric_Changes_of_the_Growth_Plate

Static and Dynamic Compression Application and Removal on the Intervertebral Discs of Growing Rats*Menard AL, Grimard G, Massol E, Londono I, Moldovan F and Villemure I*Journal of Orthopaedic Research Month 2015, pp.1-9. (2015)
Fusionless implants are used to correct pediatric progressive spinal deformities, most of them spanning the intervertebral disc. This study aimed at investigating the effects of in vivo static versus dynamic compression application and removal on...

https://www.ncbi.nlm.nih.gov/pubmed/24902946

Bone growth resumption following in vivo static and dynamic compression removals on rats*Menard AL, Grimard G, Londono I, Beaudry F, Vachon P, Moldovan F and Villemure I*Bone. 81 pp. 662-8 doi: 10.1016/j.bone.2015.09.013. (2015)
Mechanical loadings influence bone growth and are used in pediatric treatments of musculoskeletal deformities. This in vivo study aimed at evaluating the effects of static and dynamic compression application and subsequent removal on bone growth,...

https://www.ncbi.nlm.nih.gov/pubmed/26416149

Hyaluronic acid click hydrogels emulate the extracellular matrix*Owen SC, Fisher SA, Tam RY, Nimmo CM and Shoichet MS*Langmuir, 29(24), 7393-7400. (2013)
Hydrogels are used to create 3D microenvironments with properties that direct cell function. The current study demonstrates the versatility of hyaluronic acid (HA)-based hydrogels with independent control over hydrogel properties such as mechanics,...

https://pubs.acs.org/doi/abs/10.1021/la305000w
https://www.ncbi.nlm.nih.gov/pubmed/23343008

The shear mechanical properties of diabetic and non-diabetic plantar soft tissue*Pai S and Ledoux WR*Journal of biomechanics, 45(2), 364-370. (2012)
Changes in the plantar soft tissue shear properties may contribute to ulceration in diabetic patients, however, little is known about these shear parameters. This study examines the elastic and viscoelastic shear behavior of both diabetic and...

https://www.ncbi.nlm.nih.gov/pubmed/22079385

Longitudinal Stent Deformation: Importance of Stent Type and Stent Apposition*Pitne, M, van Niekerk E, Dokos S, Pelletier M and Walsh WR*American Journal of Biomedical Engineering, 3(3), 63-69. (2013)

Information on stent longitudinal strength is limited to benchtop models using unconstrained stents, consequently having uncertain clinical significance. This study investigated the effects of stent apposition and tube (artery) compliance on stent...

https://article.sapub.org/10.5923.j.ajbe.20130303.03.html

Low Magnitude High Frequency Vibration Accelerated Cartilage Degeneration but Improved Epiphyseal Bone Formation in Anterior Cruciate Ligament Transect Induced Osteoarthritis Rat Model*Qin J, Chow S KH, Guo A, Wong WN., Leung KS and Cheung WH*Osteoarthritis and Cartilage. July 2014, Vol.22(7):1061–1067. (2014)

Objectives: To evaluate the effects of low-magnitude high-frequency vibration (LMHFV) on degenerated articular cartilage and subchondral bone in anterior cruciate ligament transection (ACLT) induced osteoarthritis (OA) rat model.

<br...

https://www.sciencedirect.com/science/article/pii/S1063458414010838

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Growth Factor Stimulation Improves the Structure and Properties of Scaffold-Free Engineered Auricular Cartilage Constructs*Rosa RG, Joazeiro PP, Bianco J, Kunz M, Weber JF, et al*PLoS ONE 9(8): e105170. doi:10.1371/journal.pone.0105170. (2014)

The reconstruction of the external ear to correct congenital deformities or repair following trauma remains a significant challenge in reconstructive surgery. Previously, we have developed a novel approach to create caffold-free, tissue engineering...

https://www.ncbi.nlm.nih.gov/pubmed/25126941

Tissue engineered nucleus pulposus tissue formed on a porous calcium polyphosphate substrate*Seguin CA, Grynpas MD, Pilliar RM, Waldman SD and Kandel RA*Spine, 29(12), 1299-1306. (2004)

STUDY DESIGN: This study describes the formation of nucleus pulposus tissue using a novel tissue engineering approach. OBJECTIVES: To determine if a construct composed of nucleus pulposus tissue on the surface of a calcium polyphosphate...

https://www.ncbi.nlm.nih.gov/pubmed/15187628

https://www.researchgate.net/publication/8518908_Tissue_Engineered_Nucleus_Pulposus_Tissue_Formed_on_a_Porous_Calcium_Polyphosphate_Substrate

Differential roles of endothelin-1 in angiotensin II-induced atherosclerosis and aortic aneurysms in apolipoprotein E-null mice*Suen RS, Rampersad SN, Stewart DJ and Courtman DW*The American journal of pathology, 179(3), 1549-1559. (2011)

Because both endothelin-1 (ET-1) and angiotensin II (AngII) are independent mediators of arterial remodeling, we sought to determine the role of ET receptor inhibition in AngII-accelerated atherosclerosis and aortic aneurysm formation. We...

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3157254/

Elastic modulus of 316 stainless steel lattice structure fabricated via binder jetting process*Tang Y, Zhou Y, Hoff T, Garon M and Zhao FY*Materials Science and Technology 32(7):1743284715Y.000 ·June 2015 DOI: 10.1179/1743284715Y.0000000084

This study mainly evaluates the elastic modulus of 316 stainless steel lattice structures fabricated via binder jetting process. In this present research, both solid and lattice samples are designed and fabricated by binder jetting process for two...

https://www.maneyonline.com/doi/10.1179/1743284715Y.0000000084

https://www.researchgate.net/publication/279157683_Elastic_modulus_of_316_stainless_steel_lattice_structure_fabricated_via_binder_jetting_process

Experimental Evidence of Mechanical Isotropy in Porcine Lung Parenchyma*Weed B, Patnaik S, Rougeau-Browning M, Brazile B, Liao J, Prabhu R and Williams LN*Materials 2015, 8 , 2454-2466; doi:10.3390/ma8052454

Pulmonary injuries are a major source of morbidity and mortality associated with trauma. Trauma includes injuries associated with accidents and falls as well as blast injuries caused by explosives. The prevalence and mortality of these injuries has...

https://www.researchgate.net/publication/276518603_Experimental_Evidence_of_Mechanical_Isotropy_in_Porcine_Lung_Parenchyma

Injectable Interpenetrating Network Hydrogels via Kinetically Orthogonal Reactive Mixing of Functionalized Polymeric Precursors*Trevor G, Niels M. B. Smeets and Hoare T*ACS Macro Letters, September 16, 2015, 1104–9. doi:10.1021/acsmacrolett.5b00362

The enhanced mechanics, unique chemistries, and potential for domain formation in interpenetrating network (IPN) hydrogels have attracted significant interest in the context of biomedical applications. However, conventional IPNs are not directly...

https://dx.doi.org/10.1021/acsmacrolett.5b00362

Defective Bone Mineralization and Osteopenia in Young Adult Fgfr3-/- Mice*Valverde-Franco G, Liu H, Davidson D, Chai S, Valderrama-Carvajal H, Goltzman D, Ornitz DM and Henderson JE*Hum Mol Genet, 13(3), 271-284

Mutations that cause constitutive activation of fibroblast growth factor receptor 3 (FGFR3) result in skeletal disorders that are characterized by short-limbed dwarfism and premature closure of cranial sutures. In previous work, it was shown that...

https://www.ncbi.nlm.nih.gov/pubmed/14681299

Defects in articular cartilage metabolism and early arthritis in fibroblast growth factor receptor 3 deficient mice*Valverde-Franco G, Binette JS, Li W, Wang H, Chai S, Laflamme F, Tran-Khanh N, Quenneville E, Meijers T, Poole AR, Mort JS, Buschmann MD and Henderson JE*Human molecular genetics, 15(11), 1783-1792. (2006)

Fibroblast growth factor (FGF) receptor 3 has been identified as a key regulator of endochondral bone development and of post-natal bone metabolism through its action on growth plate chondrocytes and osteoblasts, respectively. It has also been shown...

https://www.ncbi.nlm.nih.gov/pubmed/16624844

Stochastic resonance is a method to improve the biosynthetic response of chondrocytes to mechanical stimulation*Weber JF and Waldman SD*Journal of Orthopaedic Research 08/2015; DOI:10.1002/jor.23000

Cellular mechanosensitivity is an important factor during the mechanical stimulation of tissue engineered cartilage. While the application of mechanical stimuli improves tissue growth and properties, chondrocytes also rapidly desensitize under...

The Effects of Oxidative Stress on the Compressive Damage Thresholds of C2C12 Mouse Myoblasts: Implications for Deep Tissue Injury*Yao Y, Xiao Z, Wong S, Hsu YC, Cheng T, Chang CC, Bian L and Mak AF*Ann Biomed Eng. 2015 Feb;43(2):287-96. doi: 10.1007/s10439-014-1239-6. Epub 2015 Jan 6.

Deep tissue injury (DTI) is a severe kind of pressure ulcers formed by sustained deformation of muscle tissues over bony prominences. As a major clinical issue, DTI affects people with physical disabilities, and is obviously related to the...

https://www.ncbi.nlm.nih.gov/pubmed/25558846

https://www.researchgate.net/publication/270596382_The_Effects_of_Oxidative_Stress_on_the_Compressive_Damage_Thresholds_of_C2C12_Mouse_Myoblasts_Implications_for_Deep_Tissue_Injury

Experimental Investigation of Mechanical and Thermal Properties of Silica Nanoparticle-Reinforced Poly(acrylamide) Nanocomposite Hydrogels*Zaragoza J, Babhadiashar N, O'Brien V, Chang A, Blanco M, Zabalegui A, H Lee and Asuri P*PLoS ONE 10(8): e0136293. doi:10.1371/journal. pone.0136293. (2015)

Current studies investigating properties of nanoparticle-reinforced polymers have shown that nanocomposites often exhibit improved properties compared to neat polymers. However, over two decades of research, using both experimental studies and...

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4547727/

Infarcted rat myocardium: Data from biaxial tensile and uniaxial compressive testing and analysis of collagen fibre orientation*Sirry MS, Butler JR, Patnaik SS, Brazile B, Bertucci R, Claude A, McLaughlin R, Davies NH and Liao J*Data in Brief 8 (2016) 1338–1343

Myocardial infarction was experimentally induced in rat hearts and harvested immediately, 7, 14 and 28 days after the infarction induction. Anterior wall infarct samples underwent biaxial tensile and uniaxial compressive testing. Orientation of...

https://www.researchgate.net/publication/305922724_Infarcted_rat_myocardium_Data_from_biaxial_tensile_and_uniaxial_compressive_testing_and_analysis_of_collagen_fibre_orientation

A composite hydrogel for brain tissue phantoms*Forte AE, Galvan S, Manieri F,y Baena FR and Dini D*Materials & Design, 112, 227-238 (2016)

Synthetic phantoms are valuable tools for training, research and development in traditional and computer aided surgery, but complex organs, such as the brain, are difficult to replicate. Here, we present the development of a new composite hydrogel...

https://ac.els-cdn.com/S0264127516312370/1-s2.0-S0264127516312370-main.pdf?_tid=0a46be54-8b1f-11e6-a1e0-00000aab0f26&acdnat=1475687791_980f587a916a30065ad493e138d771b0

Biomechanical Characterisation of the Human Auricular Cartilage - Implications for Tissue Engineering*Griffin MF, Premakumar Y, Seifalian M, Szarko and Butler PEM*Annals of Biomedical Engineering, 2016. Punlished online, 14Jul2016. DOI: 10.1007/s10439-016-1688-1

Currently, autologous cartilage provides the gold standard for auricular reconstruction. However, synthetic biomaterials offer a number of advantages for ear reconstruction including decreased donor site morbidity and earlier surgery. Critical to...

https://www.researchgate.net/publication/305339732_Biomechanical_Characterisation_of_the_Human_Auricular_Cartilages_Implications_for_Tissue_Engineering

Impact of storage conditions on electromechanical, histological and histochemical properties of osteochondral allografts*Mickevicius T, Pockevicius A, Kucinskas A, Gudas R, Maciulaitis J, Noreikaite A and Usas A*BMC Musculoskeletal Disorders, 16(1), 314. (2015)

Background: Osteochondral allograft transplantation has a good clinical outcome, however, there is still debate on optimization of allograft storage protocol. Storage temperature and nutrient medium composition are the most critical factors...

Mickevicius-2015A

https://www.researchgate.net/publication/283263142_Impact_of_storage_conditions_on_electromechanical_histological_and_histochemical_properties_of_osteochondral_allografts

Electromechanical Assessment of Human Knee Articular Cartilage with Compression-Induced Streaming Potentials*Becher C, Ricklefs M, Willbold E, Hurschler C, and Abedian R*Cartilage, 7(1) 62-69. (2016)

To assess the electromechanical properties of human knee articular cartilage with compression-induced streaming potentials for reliability among users and correlation with macroscopic and histological evaluation tools and sulfated glycosaminoglycan...

Becher-2015.pdf

25th Anniversary Article: Engineering Hydrogels for Biofabrication*Malda J, Visser J, Melchels FP, Jüngst T, Hennink WE, Dhert WJA, Groll J and Hutmacher DW*Adv. Mater., 25: 5011–5028. doi:10.1002/adma.201302042 (2013)

With advances in tissue engineering, the possibility of regenerating injured tissue or failing organs has become a realistic prospect for the first time in medical history. Tissue engineering - the combination of bioactive materials with cells to...

https://www.researchgate.net/publication/256612829_25th_Anniversary_Article_Engineering_Hydrogels_for_Biofabrication

Tailoring hydrogel surface properties to modulate cellular response to shear loading*Meinert C, Schrobback K, Levett PA, Lutton C, Sah R and Klein TJ*Acta biomaterialia, October 2016. DOI: 10.1016/j.actbio.2016.10.011

Biological tissues at articulating surfaces, such as articular cartilage, typically have remarkable low-friction properties that limit tissue shear during movement. However, these frictional properties change with trauma, aging, and disease,...

https://www.researchgate.net/publication/309092382_Tailoring_hydrogel_surface_properties_to_modulate_cellular_response_to_shear_loading

A fibril-network-reinforced biphasic model of cartilage in unconfined compression*Soulhat J, Buschmann MD and Shirazi-Adl A*Journal of Biomechanical Engineering, Jun, 121(3), 340-347. (1999)

Cartilage mechanical function relies on a composite structure of a collagen fibrillar network entrapping a proteoglycan matrix. Previous biphasic or poroelastic models of this tissue, which have approximated its composite structure using a...

https://www.ncbi.nlm.nih.gov/pubmed/10396701

Effect of synovial fluid on boundary lubrication of articular cartilage*Schmidt TA and Sah RL*Osteoarthritis Cartilage. 2007 Jan;15(1):35-47. Epub 2006 Jul 21

OBJECTIVES: The lubrication of articulating cartilage surfaces in joints occurs through several distinct modes. In the boundary mode of lubrication, load is supported by surface-to-surface contact, a feature that makes this mode...

https://www.ncbi.nlm.nih.gov/pubmed/16859933

Characterization of tissue engineered cartilage products - Recent developments in advanced therapy*Maciulaitis J, Rekstyte S, Usas A, Jankauskaite V, Gudas R, Malinauskas M and Maciulaitis R*Pharmacological Research 113 (2016) 823–832

Legislative requirements for the quality of pharmacological agents underwent certain evolution when new type of therapies emerged. This relates to cell based medicines, such as tissue engineered cartilage products (TECP) which are increasingly...

https://www.researchgate.net/publication/310464880_Characterization_of_tissue_engineered_cartilage_products_Recent_developments_in_advanced_therapy_PR_16_JM

Review Paper: Fifty years of brain tissue mechanical testing: From in vitro to in vivo investigations*Chatelin S, Constantinesco A and Willinger R*Biorheology 47 (2010) 255–276. DOI 10.3233/BIR-2010-0576

Beginning in the 1960s many studies have been performed to investigate the mechanical properties of brain. In this paper we point out the difficulties linked with in vitro experimental protocols as well as the advantages of using recently developed...

https://www.researchgate.net/publication/50395536

Evaluation of genipin for stabilization of decellularized porcine cartilage*Elder S, Pinheiro A, Young C, Smith P and Wright E*J Orthop Res. 2016 Nov 18. doi: 10.1002/jor.23483

Abstract

We speculate that an acellular osteochondral xenograft may be a good alternative to allografts for repair of focal articular cartilage lesions. In order to make a xenograft resistant to enzymatic degradation and to...

https://www.ncbi.nlm.nih.gov/pubmed/?term=Evaluation+of+genipin+for+stabilization+of+decellularized+porcine+cartilage

Strengthening of C2C12 mouse myoblasts against compression damage by mild cyclic compressive stimulation*Yao Y and Mak AF* J Biomech. 2016 Dec 8;49(16):3956-3961. doi: 10.1016/j.jbiomech.2016.11.050. Epub 2016 Nov 16

Abstract

Deep tissue injury (DTI) is a severe kind of pressure ulcers formed by sustained deformation of muscle tissues over bony prominences. As a major clinical issue, DTI affects people with physical disabilities, and is obviously...

https://www.ncbi.nlm.nih.gov/pubmed/27884430

https://www.researchgate.net/publication/310657610_Strengthening_of_C2C12_mouse_myoblasts_against_compression_damage_by_mild_cyclic_compressive_stimulation

Improved cartilage integration and interfacial strength after enzymatic treatment in a cartilage transplantation model*van de Breevaart Bravenboer J, In der Maur CD, Bos PK, Feenstra L, Verhaar JA, Weinans H, van Osch GJ* Arthritis Res Ther. 2004;6(5):R469-76. Epub 2004 Aug 6

The objective of the present study was to investigate whether treatment of articular cartilage with hyaluronidase and collagenase enhances histological and mechanical integration of a cartilage graft into a defect. Discs of 3 mm diameter were taken...

https://www.researchgate.net/publication/8334961_Improved_cartilage_integration_and_interfacial_strength_after_enzymatic_treatment_in_a_cartilage_transplantation_model

https://www.ncbi.nlm.nih.gov/pubmed/15380046

Comparison of natural crosslinking agents for the stabilization of xenogenic articular cartilage*Pinheiro A, Cooley A, Liao J, Prabhu R and Elder S* J Orthop Res. 2016 Jun;34(6):1037-46. doi: 10.1002/jor.23121. Epub 2015 Dec 18.

Abstract

Osteochondral xenografts are potentially inexpensive, widely available alternatives to fresh allografts. However, antigen removal from xenogenic cartilage may damage the extracellular matrix and reduce compressive stiffness....

https://www.ncbi.nlm.nih.gov/pubmed/?term=Comparison+of+natural+crosslinking+agents+for+the+stabilization+of+xenogenic+cartilage

Biomechanical Characterization of Human Soft Tissues Using Indentation and Tensile Testing*Griffin M, Premakumar Y, Seifalian A, Butler PE and Szarko M* Journal of Visualized Experiments?: JoVE. 2016;(118):54872. doi:10.3791/54872.

Abstract

Regenerative medicine aims to engineer materials to replace or restore damaged or diseased organs. The mechanical properties of such materials should mimic the human tissues they are aiming to replace; to provide the...

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5226394/

Study of the evolution of the osteoarthritis pathology and the mechanical properties of cartilage in a spontaneous osteoarthritis model in the Dunkin-Hartley guinea pigs.*Legrand C, Centonze P, Comblain F, Lambert C, Sanchez C and Henrotin Y* Osteoarthritis and Cartilage, 25, s314-s315.

https://orbi.ulg.ac.be/bitstream/2268/209545/1/495.pdf

Injectable and degradable Poly(oligoethylene glycol methacrylate)-based hydrogels-synthetic versatility for improved biomaterial design*Bakaic E, Smeets N, Imbrogno S and Hoare T*Oral #327.3 on Friday, May 20 from 14:00 to 15:00 in room 524 during World Biomaterials Congress, Montreal, May 2016.

Introduction: Poly(ethylene glycol) (PEG)-based hydrogels are attractive biomaterials due to their hydrophilic, non-cytotoxic and non-immunogenic properties[1]. We recently reported on in situ-gelling PEG-analogue hydrogels based on...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.00728/event_abstract?sname=10th_World_Biomaterials_Congress

Strain Rate Dependence in the Structure Property Relationship of Porcine Brain*Begonia MG, Liao J, Horstemeyer MF and Williams LN*Paper presented at the ASME 2009 Summer Bioengineering Conference. (2009)

This study examines the internal microstructure evolution of porcine brain during mechanical deformation. Strain rate dependency of porcine brain was investigated under quasi-static compression for strain rates of 0.00625, 0.025, and 0.10 s(-1)....

Novel Biomechanical Indentation Test Demonstrates Joint Surface Weakening in Mice Lacking Fibroblast Growth Factor Receptor 3 (FGFR3)*Binette JS, Laflamme F, Li W, Valverde-Franco G, Tran-Khanh N, Quenneville E, Henderson JE and Buschmann MD*Paper presented at the 11th Canadian Connective Tissue Conference, Montreal, QC, Canada. (2005)

Recent advances in murine molecular genetics has enabled the production of mice with targeted disruption of genes that regulate cartilage and bone metabolism. These mice represent excellent models to study the 0 16 Wild Type etiology and progression...

Binette-CCTC2005-poster.pdf

Mechanically tunable hydrogels for delivery of adipose derived stem cells*Carroll A, Anjum F, Young S, Flynn L and Amsden BG*Oral# 442.7 on Saturday, May 21 from 16:30 to 18:30 in room 524 during World Biomaterials Congress, Montreal, May 2016

Introduction: Chondroitin sulphate is an important component GAG found in articular cartilage and has a chondroinductive effect on adipose derived stem cells (ASCs). Methacrylate chondroitin sulphate (MCS) has therefore been chosen as a basis...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.02555/event_abstract?sname=10th_World_Biomaterials_Congress

Highly oriented in situ gelling nanocomposite hydrogels as tissue engineering scaffolds for promoting directional cell growth*De France K, Yager KG, Chan KJ, Hoare TR and Cranston ED*Poster #P.0554 on Thursday, May 19 from 15:00 to 16:30 in room 220BCD (P3) during World Biomaterials Congress, Montreal, May 2016

Introduction: Patterned hydrogels and polymer scaffolds have attracted attention as platforms for directed cell growth due to the significant impacts cell alignment has on tissue regeneration, mechanical properties and various other cell...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.01953/event_abstract?sname=10th_World_Biomaterials_Congress

Viscoelastic properties of collagen hydrogels*Drouin B, L évesque L, Lain éA, Rosella E, Loy C and Mantovani D*Poster #P.0890 on Thursday, May 19 from 15:00 to 16:30 in room 220BCD (P5) during World Biomaterials Congress, Montreal, May 2016

Introduction: Because of their exceptional biological properties, reconstituted collagen gels are widely used as scaffolds even though their low elastic modulus (~ 500 Pa) limits their applications[1],[2]. The mechanical properties of collagen...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.00535/event_abstract?sname=10th_World_Biomaterials_Congress

Fully injectable hydrazone-thiosuccinimide and hydrazone-disulfide interpenetrating polymer network hydrogels by kinetically orthogonal cross-linking of functionalized PNIPAM and PVP precur*Gilbert T and Hoare T*Poster #P.0058 on Thursday, May 19 from 15:00 to 16:30 in room 220BCD (P1) during World Biomaterials Congress, Montreal, May 2016.

Introduction: IPNs are produced by interlocking two chemically distinct networks in each other's free volume fraction. This interlocking and the potential for segregation of the IPNs into inhomogeneous domains can cause mechanical properties...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.01047/event_abstract?sname=10th_World_Biomaterials_Congress

Engineering degradable "smart" biomedical hydrogels on multiple length scales*Hoare T*Oral #339.2 on Friday, May 20 from 16:30 to 18:30 in room 520B during World Biomaterials Congress, Montreal, May 2016

While multiple types of smart, environmentally-responsive materials have been explored for a variety of biomedical applications (e.g. drug delivery, tissue engineering, bioimaging, etc.), their ultimate clinical use has been hampered by their lack of...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.00250/event_abstract?sname=10th_World_Biomaterials_Congress

Articulation-Induced Responses of Superficial Zone Chondrocytes in Human Knee Articular Cartilage - Effects of Shear and Sliding*Hsu FH, Hui AY, Chen AC, Lotz MK and Sah R*Orthopeadic Research Society Annual Meeting in Las Vegas, Abstract 0256

Introduction: During daily physical activities, joint articulation results in 3-10% compression in its overall thickness. There is also consensus that articulation is a combined process of shearing and sliding, with relative rotational and...

https://prgmobileapps.com/AppUpdates/ors2015/Abstracts/abs256.html

Poro-viscoelastic models applied to porous gelatin scaffolds*Lain éA, Drouin B and Mantovani D*Poster #P.0901 on Wed May 18 from 15:00 to 16:30 in room 220BCD (P5) during World Biomaterials Congress, Montreal, May 2016.

Introduction: Scaffolds are among the key components of a tissue-engineered construct. Although many different proteins have been used in scaffold preparation, gelatin, which is obtained by degradation of collagen, is a completely...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.02699/event_abstract?sname=10th_World_Biomaterials_Congress

The effects of frequency on matrix remodeling induced in dynamically strained collagen-based cellularised scaffolds*Levesque L, Loy C, Lain éA, Bono N, Drouin B and Mantovani D*Oral.238.51 on Wed May 19 from 16:30 to 18:30 in room 519 during World Biomaterials Congress, Montreal, May 2016

Introduction: In vascular tissue engineering, the understanding of cells behavior inside matrices and under pseudo-physiological treatment is of upmost importance in order to develop arteries and arterial wall models. Indeed, extracted...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.00309/event_abstract?sname=10th_World_Biomaterials_Congress

Cellularized collagen gels for tissue engineered vascular wall: in vitro models alternative to in vivo testing*Loy C, Meghezi S, Seifu DG, Pezzoli D , Bono N , Levesque L, Drouin B and Mantovani D*Poster #P.0616 on Thursday May 19 from 15:00 to 16:30 in room 220BCD (P3) during World Biomaterials Congress, Montreal, May 2016.

Introduction: Type I collagen-gels, as scaffolds for vascular tissue engineering, have a high potential for supporting and guiding vascular cells in the regeneration process. With this in mind, our project was to develop a set of...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.00135/event_abstract?sname=10th_World_Biomaterials_Congress

Changes in Collagen and Sulphated Proteoglycan Synthesis by Multilamellated AF Tissues Cultured in vitro on Aligned Nanofibrous Polyurethane Constructs Under Dynamic Compressive Loading*Iu J, Santerre JP and Kandel RA*Presentation #331.2 on Fri May 20 from 16:30 to 18:30 in room 511E during the World Congress on Biomechanics, Montreal, May 2016.

Introduction: Current treatments for chronic neck or low back pain are not optimal. The replacement of a degenerated intervertebral disc (IVD) with a bioengineered IVD has been investigated as a potential alternative approach. The IVD is...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.03015/event_abstract?sname=10th_World_Biomaterials_Congress

Dynamic Axial Loading Disrupts Lateral Integration of Arthritic Human Articular Cartilage and Synthetic Tissue Engineered Scaffolds in an Ex Vivo Ring Model*Mintz BR, Papaliodis D, Jordan S, Leonard G, Mulligan M and Cooper JA*Orthopeadic Research Society Annual Meeting in Las Vegas, 2015, Abstract 0390

Introduction: Common surgical procedures including mosaicplasty, microfracture, and autologous chondrocyte implantation to promote articular cartilage regeneration account for ~40% of knee arthroscopy.[1] These procedures are reliant on...

https://prgmobileapps.com/AppUpdates/ors2015/Abstracts/abs390.html

Contrast-Enhanced Computed Tomography Reflects Stiffness of Intact Articular Cartilage

Nickmanesh R, Stewart R, Snyder B, Grinstaff M and Wilson D ISMRM Workshop on Imaging Based Measures of Osteoarthritis. Sept 11-14, 2015. Pacific Grove, CA, USA. Presentation on Sept 13 at 14:39.

Purpose: Articular cartilage distributes load in joints and provides a low-friction surface for joint movement. Glycosaminoglycan (GAG) in cartilage plays a critical role in its compressive stiffness. Loss of GAG is an early sign of...

Nickmanesh-IWOAI2015-abstract.pdf

The Effect Of Superimposed Vibrations On Chondrocytes Subjected To Dynamic Compressive Loading

Weber J and Waldman S Orthopeadic Research Society Annual Meeting in Las Vegas, Abstract 1244

Introduction: Mechanical stimulation is often used as a means to accelerate and improve the growth and properties of tissue engineered cartilage constructs. However, as cartilage cells (chondrocytes) rapidly desensitize to the imposed stimulus...

https://prgmobileapps.com/AppUpdates/ors2015/Abstracts/abs1244.html

Direct reactive electrospinning of degradable hydrogel nanofibers for tissue engineering

Xu F, Gough I and Hoare T Oral #520.5 on Sunday, May 22 from 14:00 to 16:00 in room 516C during World Biomaterials Congress, Montreal, May 2016.

Hydrogels have received considerable attention in the context of soft tissue engineering due to their as high water contents, (general) cell compatibility, and physicochemical and mechanical similarities to native soft tissues[1]. Most hydrogels used...

https://www.frontiersin.org/10.3389/conf.FBIOE.2016.01.01238/event_abstract?sname=10th_World_Biomaterials_Congress

Electroarthrography, a non-invasive streaming potential-based method, measures cartilage quality in live horses

Changoor A, Brett W, Hoba MA, Garon M, Quenneville E, Gordon K, Savard P, Buschmann MD, Hurtig MB and Trout DR Osteoarthritis and Cartilage, Vol. 22, Supplement 1, 138, World Congress on Osteoarthritis, April 2014, Paris, France.

Introduction: Degenerative joint diseases, including osteoarthritis, are characterized by progressive cartilage degeneration, which can lead to pain and loss of joint function. Therapeutics administered early, when only low grade cartilage...

Changoor-OARSI2014-Poster.pdf

Non-invasive Electroarthrography Correlates to Direct Measurements of Cartilage Streaming Potentials in Weight Bearing Regions of Equine Metacarpophalangeal (Fetlock) Joints

Changoor A, Hoba MA, Garon M, Quenneville E, Gordon K, Savard P, Buschmann MD and Hurtig MB Transactions of the 60th Annual Meeting of the Orthopaedic Research Society, New Orleans, LA, USA, 1123 (2014)

Introduction/Purpose: Electroarthrography (EAG) is a new technology that non-invasively measures cartilage streaming potentials through electrodes contacting the skin surrounding an articular joint. Streaming potentials are produced during...

Changoor-ORS2014.pdf

Freeze-dried chitosan-PRP implants improve meniscus repair in an ovine model

Ghazi Zadeh L, Chevrier A, Hurtig M, Farr J, Rodeo S, Hoemann C and Buschmann M International Cartilage Repair Society (ICRS), Sorrento, 2016, Poster P112

Purpose: Menisci are structurally complex and play an essential weight-?bearing role in the knee joint. Although there has been a recent increase in the number of meniscus repairs performed yearly in the US [1], only a small number of all...

Zadeh-2016A ICRS2016 Poster

https://cslide.ctimeetingtech.com/icrs2016/confcal/ghazi

Streaming Potential-Based Arthroscopic Device Discerns Topographical Differences In Cartilage Covered And Uncovered By Meniscus In Ovine Stifle Joints*Changoor A, Quenneville E, Garon M, Cloutier L, Hurtig MB and Buschmann MD*Transactions of the 53th Annual Meeting of the Orthopaedic Research Society, San Diego, CA, USA, 32:631. (2007)

Animal models of osteoarthritis have been used for understanding diseaseprogression and are essential for assessing potential new therapies. Ovine models, such as the lateral meniscectomy model, are of interest because meniscectomy models often...

Changoor-ORS2007-poster.pdf

Electroarthrography Provides a Non-invasive Streaming Potential-Based Method for Detecting Cartilage Degeneration in an Equine Model Transactions*Changoor A, Hoba MA, Quenneville E, Garon M, Gordon K, Buschmann MD, Savard P and Hurtig MB*The 59th Annual Meeting of the Orthopaedic Research Society, San Antonio, TX, USA, 1974. (2013)

Degenerative joint diseases, like osteoarthritis, are characterized by progressive cartilage degeneration, which can lead to pain and loss of mobility. Low-grade cartilage deterioration occurs early in disease progression and may be treatable....

Changoor-2013-Poster.pdf

Assessment of allograft performance in vivo using electromechanical properties of articular cartilage*Usas A, Mickevicius T, Pockevicius A, Kucinskas A, Maciulaitis J and Gudas R*International Cartilage Repair Society (ICRS), Sorrento, 2016, Poster P211

Purpose: Clinical outcome of osteochondral allograft transplantation (OAT) depends on allograft quality. There is a lack of rapid and reliable non-destructive methods for intraoperative evaluation of repaired cartilage. Measurement of...

https://cslide.ctimeetingtech.com/icrs2016/confcal/usas

Biomechanical characterisation of the human nasal cartilages - implications for tissue engineering*Griffin MF, Premakumar Y, Seifalian AM, Szarko M and Butler PEM*Journal of Materials Science: Materials in Medicine, 27(1), 1-6. (2016)

Nasal reconstruction is currently performed using autologous grafts provides but is limited by donor site morbidity, tissue availability and potentially graft failure. Additionally, current alternative alloplastic materials are limited by their high...

Mechanical characterization of matrix-induced autologous chondrocyte implantation (MACI®) grafts in an equine model at 53 weeks*Griffin DJ, Bonnevie ED, Lachowsky DJ, Hart JC, Sparks HD, Moran N and Bonassar LJ*Journal of biomechanics, 48(10), 1944-1949. (2015)

There has been much interest in using autologous chondrocytes in combination with scaffold materials to aid in cartilage repair. In the present study, a total of 27 animals were used to compare the performance of matrix-assisted chondrocyte...

https://www.ncbi.nlm.nih.gov/pubmed/25920896

Decrease of the electrical potentials measured on the surface of the knee and produced by cartilage compression during successive loading cycles*Zhu L, Garon M, Quenneville E, Buschmann MD and Savard P*Journal of Biomechanics, 49(14), 3587-3591. (2016)

Electroarthrography (EAG) is a new technique formeasuring electrical potentials appearing on the knee surface during loadingthat reflects cartilage quality and joint contact force. Our objective was toinvestigate the evolution of EAG signals during...

https://www.ncbi.nlm.nih.gov/pubmed/27653377

https://www.researchgate.net/publication/308352591_Decrease_of_the_electrical_potentials_measured_on_the_surface_of_the_knee_and_produced_by_cartilage_compression_during_successive_loading_cycles

Mechanical loading of knee articular cartilage induced by muscle contraction can be assessed by measuring electrical potentials at the surface of the knee*Zhu L, Buschmann MD and Savard P*Journal of biomechanics, 49(3), 338-343. (2016)
Electroarthrography (EAG) consists of recording electrical potentials on the knee surface that originate from streaming potentials within articular cartilage while the joint is undergoing compressive loading. The aim was to investigate how the...

https://www.researchgate.net/publication/288919310_Mechanical_loading_of_knee_articular_cartilage_induced_by_muscle_contraction_can_be_assessed_by_measuring_electrical_potentials_at_the_surface_of_the_knee

Change in viability of C2C12 myoblasts under compression, shear and oxidative challenges*Hong Y, Yao Y, Wong S, Bian L and Mak AF*Journal of biomechanics, 49(8), 1305-1310. (2016)
Skeletal and epidermal loadings can damage muscle cells and contribute to the development of deep tissue injury (DTI) – a severe kind of pressure ulcers affecting many people with disability. Important predisposing factors include the multiaxial...

https://www.ncbi.nlm.nih.gov/pubmed/27017299
https://www.researchgate.net/publication/270596382_The_Effects_of_Oxidative_Stress_on_the_Compressive_Damage_Thresholds_of_C2C12_Mouse_Myoblasts_Implications_for_Deep_Tissue_Injury
https://www.researchgate.net/publication/270596382_The_Effects_of_Oxidative_Stress_on_the_Compressive_Damage_Thresholds_of_C2C12_Mouse_Myoblasts_Implications_for_Deep_Tissue_Injury/figures

Biomechanics and MechanoBiology of Human Cartilage Articulation*Hsu FH, Alonso E, Raleigh AR, Saleh AA, Masuda K, Lotz MK, Chen AC and Sah R*Orthopeadic Research Society Annual Meeting, 2016, Orlando, USA, Poster abstract 1428
Introduction: During joint articulation, cartilage, particularly that near the articular surface, undergoes a complex combination of compression, shear, and sliding.1,2 In vitro analyses have focused on cartilage biomechanics in response...

https://www.ors.org/Transactions/62/1428.pdf

Effects of Biowastes Released by Mechanically Damaged Muscle Cells on the Propagation of Deep Tissue Injury: A Multiphysics Study*Yao Y, Da Ong LX, Li X, Wan K and Mak AF*Annals of Biomedical Engineering March 2017, Volume 45, Issue 3, pp 761–774
Deep tissue injuries occur in muscle tissues around bony prominences under mechanical loading leading to severe pressure ulcers. Tissue compression can potentially compromise...

Changes in growth plate extracellular matrix composition and biomechanics following in vitro static versus dynamic mechanical modulation*Kaviani R, Londono I, Parent S, Moldovan F and Villemure I*J Musculoskelet Neuronal Interact, 1-11 (2017)
The objective of this study was to investigate the effects of mechanical modulation parameters on structural proteins biocomposition and mechanical properties of the growth plate. Establishing these parameters is a crucial step in the...

https://www.ismni.org/jmni/accepted/jmni_aa_KAVIANI.pdf

Autonomously Self-Adhesive Hydrogels as Building Blocks for Additive Manufacturing*Deng X, Attalla R, Sadowski LP, Chen M, Majcher MJ, Urosev I, Yin D-C, Selvaganapathy PR, Filipe CDM and Hoare T*Biomacromolecules 2017, Published Online, doi: 10.1021/acs.biomac.7b01243
We report a simple method of preparing autonomous and rapid self-adhesive hydrogels and their use as building blocks for additive manufacturing of functional tissue scaffolds. Dynamic crosslinking between 2-aminophenylboronic acid-functionalized...

https://www.ncbi.nlm.nih.gov/pubmed/29168379

Mechanically resilient injectable scaffolds for intramuscular stem cell delivery and cytokine release*Young SA, Sherman SE, Cooper TT, Brown C, Anjum F, Hess DA. Flynn LE and Amsden BG*Biomaterials. doi: https://doi.org/10.1016/j.biomaterials.2018.01.008 (2018)

A promising strategy for treating peripheral ischemia involves the delivery of stem cells to promote angiogenesis through paracrine signaling. Treatment success depends on cell localization, retention, and survival within the mechanically dynamic...

https://www.sciencedirect.com/science/article/pii/S0142961218300085

Ermittlung mechanischer Kennwerte mittels Indentation*Seidenstucker M*BioNanoMat. 2015; 16 (2-3): 152–156 DOI 10.1515/bnm-2015-9014

(In Germany only) In der Materialprüfung sind Indentationsverfahren bereits seit Jahren gängige Praxis. Jedoch war es bisher nicht so ohne weiteres möglich Gewebeproben, insbesondere Weichgewebe wie Knorpel zu untersuchen. Mit dem Mikroindenter...

Seidenstucker-2015-presentation.pdf

Seidenstucker-2015.pdf

Guidelines for an optimized indentation protocol for measurement of cartilage stiffness - The effects of spatial variation and indentation parameters*Moshtagh PR, Pouran B, Korthagen NM, Zadpoor AA and Weinans H*Journal of Biomechanics 49(14) ·September 2016 DOI: 10.1016/j.jbiomech.2016.09.020

Mechanical properties of articular cartilage that are vital to its function are often determined by indentation tests, which can be performed at different scales. Cartilage tissue exhibits various types of structural, geometrical, and spatial...

https://www.ncbi.nlm.nih.gov/pubmed/27660171

https://www.researchgate.net/publication/308351970_Guidelines_for_an_optimized_indentation_protocol_for_measurement_of_cartilage_stiffness_The_effects_of_spatial_variation_and_indentation_parameters

Quantitative Analysis of Tissue Damage Evolution in Porcine Liver With Interrupted Mechanical Testing Under Tension, Compression, and Shear.*Chen J, Brazile B, Prabhu R, Patnaik SS, Bertucci R, Rhee H, Horstemeyer MF, Hong Y, Williams LN, Liao J*J Biomech Eng. 2018 Jul 1;140(7). doi: 10.1115/1.4039825.

https://www.ncbi.nlm.nih.gov/pubmed/29715364

Contrast-Enhanced Computed Tomography (CECT) attenuation is associated with stiffness of intact knee cartilage*Nickmanesh, Reza; Stewart, Rachel C.; Snyder, Brian D.; Grinstaff, Mark W.; Masri, Bassam A.; Wilson, David R.*J. Orthop. Res. First published: 17 April 2018 doi:10.1002/jor.24022

Contrast?enhanced computed tomography (CECT) using charged contrast?agents enables quantification of cartilage glycosaminoglycan content. Since glycosaminoglycan content is a key determinant of cartilage compressive stiffness, CECT measurements have...

https://onlinelibrary.wiley.com/doi/abs/10.1002/jor.24022

Development of a Breast Cancer Cell Microenvironment in Three-Dimensional Hyaluronic Acid Based Hydrogels*Fisher, Stephanie Anne.*Thesis, University of Toronto. (2018)

Breast cancer cell invasion is influenced by the tumor microenvironment including the extracellular matrix, mechanical properties, stromal cells, and bioactive factors. To elucidate the role of the microenvironment on cell invasion, defined...

https://tspace.library.utoronto.ca/handle/1807/89784

Effects of bone damage on creep behaviours of human vertebral trabeculae*O'Callaghan, Paul; Szarko, Matthew; Wang, Yue; Luo, Jin*Bone Volume 106, January 2018, Pages 204-210 https://doi.org/10.1016/j.bone.2017.10.022

A subgroup of patients suffering with vertebral fractures can develop progressive spinal deformities over time. The mechanism underlying such clinical observation, however, remains unknown. Previous studies suggested that creep deformation of the...

https://www.sciencedirect.com/science/article/pii/S8756328217303885

Fibronectin promotes elastin deposition, elasticity and mechanical strength in cellularised collagen-based scaffolds*Pezzoli, Daniele; Di Paolo, Joseph; Kumra, Heena; Fois, Giulia; Candiani, Gabriele; Reinhardt, Dieter P.; Mantovani, Diego*Biomaterials Volume 180, October 2018, Pages 130-142 https://doi.org/10.1016/j.biomaterials.2018.07.013

One of the tightest bottlenecks in vascular tissue engineering (vTE) is the lack of strength and elasticity of engineered vascular wall models caused by limited elastic fiber deposition. In this study, flat and tubular collagen gel-based scaffolds...

https://www.sciencedirect.com/science/article/pii/S0142961218304903

Glycation marker glucosepane increases with the progression of osteoarthritis and correlates with morphological and functional changes of cartilage in vivo*Legrand, Catherine; Ahmed, Usman; Anwar, Attia; Rajpoot, Kashif; Pasha, Sabah; Lambert, Cecile; Davidson, Rose K.; Clark, Ian M.; Thornalley, Paul J.; Henrotin, Yves*Arthritis Research & Therapy 2018 20:131 https://doi.org/10.1186/s13075-018-1636-6

Background

Changes of serum concentrations of glycated, oxidized, and nitrated amino acids and hydroxyproline and anticyclic citrullinated peptide antibody status combined by machine learning techniques in algorithms have recently been found to...

https://www.ncbi.nlm.nih.gov/pubmed/29929535

In Situ Cross-Linking of Poly (vinyl alcohol)/Graphene Oxide–Polyethylene Glycol Nanocomposite Hydrogels as Artificial Cartilage Replacement: Intercalation Structure, Unconfined Compressive Behavior, and Biotribological Behaviors*Meng, Yeqiao; Ye, Lin; Coates, Phil; Twigg, Peter*J. Phys. Chem. C, 2018, 122 (5), pp 3157–3167 DOI: 10.1021/acs.jpcc.7b12465

Poly(vinyl alcohol) (PVA)/graphene oxide (GO) nanocomposite hydrogel as artificial cartilage replacement was prepared via freezing/thawing method by introducing polyethylene glycol (PEG). Efficient grafting of PVA molecules onto GO surface was...

https://pubs.acs.org/doi/abs/10.1021/acs.jpcc.7b12465

Investigating the role of in vivo cell cycle activation within mesenchymal stem cells in the regenerative potential of articular cartilage after injury*Masson, A. O.; Underhill, T. M.; Edwards, W. B.; Krawetz, R. J.*Osteoarthritis and Cartilage 26 (2018) S38 https://doi.org/10.1016/j.joca.2018.02.092

Purpose: Cartilage has intrinsic poor healing capacity after injury, which can lead to the development of degenerative diseases such as osteoarthritis (OA). Current treatments for OA are unable to effectively stop or delay disease progression. Hence,...

https://www.sciencedirect.com/science/article/pii/S1063458418301924

https://www.oarsijournal.com/article/S1063-4584(18)30192-4/abstract

Mechanically enhanced nested-network hydrogels as a coating material for biomedical devices*Wang, Zhengmu; Zhang, Hongbin; Chu, Axel J.; Jackson, John; Lin, Karen; Lim, Chinten James; Lange, Dirk; Chiao, Mu*Acta Biomaterialia Volume 70, 1 April 2018, Pages 98-109 https://doi.org/10.1016/j.actbio.2018.02.003

Well-organized composite formations such as hierarchical nested-network (NN) structure in bone tissue and reticular connective tissue present remarkable mechanical strength and play a crucial role in achieving physical and biological functions for...

https://www.sciencedirect.com/science/article/pii/S1742706118300734

Models and tissue mimics for brain shift simulations*Forte, Antonio E.; Galvan, Stefano; Dini, Daniele*Biomech Model Mechanobiol (2018) 17: 249. https://doi.org/10.1007/s10237-017-0958-7

Capturing the deformation of human brain during neurosurgical operations is an extremely important task to improve the accuracy or surgical procedure and minimize permanent damage in patients. This study focuses on the development of an accurate...

https://link.springer.com/article/10.1007/s10237-017-0958-7

Morphology of cross-linked cellulose nanocrystal aerogels: cryo-templating versus pressurized gas expansion processing*Osorio, Daniel A.; Seifried, Bernhard; Moquin, Paul; Grandfield, Kathryn; Cranston, Emily D.*Journal of Materials Science July 2018, Volume 53, Issue 13, pp 9842–9860

Cellulose nanocrystal (CNC)-based aerogels are often produced through cryo-templating, followed by either critical point drying or freeze drying. While cryo-templating gives aerogels with a bimodal pore size distribution, better morphological control...

https://link.springer.com/article/10.1007/s10853-018-2235-2

Nanocolloidal Hydrogel for Heavy Metal Scavenging*Alizadehgiashi, Moien; Khuu, Nancy; Khabibullin, Amir; Henry, Andria; Tebbe, Moritz; Suzuki, Toyoko; Kumacheva, Eugenia*ACS Nano, Article ASAP DOI: 10.1021/acsnano.8b03202 Publication Date (Web): July 6, 2018

We report a nanocolloidal hydrogel that combines the advantages of molecular hydrogels and nanoparticle-based scavengers of heavy metal ions. The hydrogel was formed by the chemical cross-linking of cellulose nanocrystals and graphene quantum dots....

https://pubs.acs.org/doi/abs/10.1021/acsnano.8b03202

Optimising the decellularization of human elastic cartilage with trypsin for future use in ear reconstruction*Rahman, Shafiq; Griffin, Michelle; Naik, Anish; Szarko, Matthew; Butler, Peter EM*Scientific Reports (2018) 8:3097 DOI:10.1038/s41598-018-20592-x

Decellularized scaffolds can induce chondrogenic differentiation of stem cells. This study compares different methods to optimise the decellularization of auricular cartilage. The process consisted of an initial 12?hour dry freeze thaw which froze...

https://www.nature.com/articles/s41598-018-20592-x

Patterning of Structurally Anisotropic Composite Hydrogel Sheets*Prince, Elisabeth; Alizadehgiashi, Moien; Campbell, Melissa; Khuu, Nancy; Albulescu, Alexandra; De France, Kevin; Ratkov, Dimitrije; Li, Yunfeng; Hoare, Todd; Kumacheva, Eugenia*Biomacromolecules, 2018, 19 (4), pp 1276–1284 DOI: 10.1021/acs.biomac.8b00100

Compositional and structural patterns play a crucial role in the function of many biological tissues. In the present work, for nanofibrillar hydrogels formed by chemically cross-linked cellulose nanocrystals (CNC) and gelatin, we report a...

https://pubs.acs.org/doi/abs/10.1021/acs.biomac.8b00100

Quantifying the Effects of Different Treadmill Training Speeds and Durations on the Health of Rat Knee Joints*Rios, Jaqueline Lourdes; Boldt, Kevin Rudi; Mather, James William; Seerattan, Ruth Anne; Hart, David Arthur; Herzog, Walter*Sports Medicine - Open 2018 4:15 https://doi.org/10.1186/s40798-018-0127-2

Background Walking and running provide cyclical loading to the knee which is thought essential for joint health within a physiological window. However, exercising outside the physiological window, e.g. excessive cyclical loading, may produce loading...

https://sportsmedicine-open.springeropen.com/articles/10.1186/s40798-018-0127-2

Tribological evaluation of biomedical polycarbonate urethanes against articular cartilage*Kanca, Yusuf; Milner, Piers; Dini, Daniele; Amis, Andrew A.*Journal of the Mechanical Behavior of Biomedical Materials Volume 82, June 2018, Pages 394-402 https://doi.org/10.1016/j.jmbbm.2018.04.001

This research investigated the in-vitro wear and friction performance of polycarbonate urethane (PCU) 80A as they interact with articular cartilage, using a customised multidirectional pin-on-plate tester. Condyles were articulated against PCU 80A...

https://www.sciencedirect.com/science/article/pii/S1751616118304326

Tribological properties of PVA/PVP blend hydrogels against articular cartilage*Kanca, Yusuf; Milner, Piers; Dini, Daniele; Amis, Andrew A.*Journal of the Mechanical Behavior of Biomedical Materials Volume 78, February 2018, Pages 36-45 https://doi.org/10.1016/j.jmbbm.2017.10.027

This research investigated in-vitro tribological performance of the articulation of cartilage-on- polyvinyl alcohol (PVA) and polyvinyl pyrrolidone (PVP) blend hydrogels using a custom-designed multi-directional wear rig. The hydrogels were prepared...

https://www.sciencedirect.com/science/article/pii/S1751616117304629

Visible Light Photoinitiation of Cell Adhesive Gelatin Methacryloyl Hydrogels for Stereolithography 3D Bioprinting*Wang, Zongjie; Kumar, Hitendra; Tian, Zhenlin; Jin, Xian; Holzman, Jonathan F.; Menard, Frederic; Kim, Keekyoung*ACS Appl. Mater. Interfaces, Just Accepted Manuscript DOI: 10.1021/acsami.8b06607 Publication Date (Web): July 19, 2018

We present the first cell attachable and visible light crosslinkable hydrogels based on gelatin methacryloyl (GelMA) with eosin Y (EY) photoinitiation for stereolithography 3D bioprinting. In order to develop visible a light crosslinkable hydrogel,...

https://pubs.acs.org/doi/abs/10.1021/acsami.8b06607

Tough, Semisynthetic Hydrogels for Adipose Derived Stem Cell Delivery for Chondral Defect Repair*Anjum F, Carroll A, Young SA, Flynn LE and Amsden BG*Macromol Biosci. 2017 Jan 13. doi: 10.1002/mabi.201600373.

Cell-based therapies have great potential to regenerate and repair injured articular cartilage, and a range of synthetic and natural polymer-based hydrogels have been used in combination with stem cells and growth factors for this purpose. Although...

https://www.ncbi.nlm.nih.gov/pubmed/28085994

Cryogenic 3D Printing of Super Soft Hydrogels*Forte AE, Parisi C, Dini D, Di Silvio L and Tan Z*Scientific Reports 7, Article number: 16293 (2017) doi:10.1038/s41598-017-16668-9

Conventional 3D bioprinting allows fabrication of 3D scaffolds for biomedical applications. In this contribution we present a cryogenic 3D printing method able to produce stable 3D structures by utilising the liquid to solid phase change of a...

https://www.nature.com/articles/s41598-017-16668-9?WT.feed_name=subjects_scientific-community-and-society

Effect of Multiple Confined Compression/Stress Relaxation Cycles on Cross-linked Alginate Pore Size*Kolar Venkat S, Risa EL, Antell B and Mobed-Miremadi M*Biomedical Engineering Society 2017 (BMES) Phoenix - Arizona

Introduction: Alginate is a biopolymer and hydrogel comprised of (1,4)-linked ?-D-mannuronic (M) and (1,3)-?- L-guluronic (G) acid residues. The average pore size associated with crosslinked high MW 1-2 (w/v%) alginate structures has been...

https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=1061&context=bmes

Addition of excess thyroid hormone induces detrimental changes in human ex vivo full thickness osteochondral explants*Houtman, E.; van Hoolwerff, M.; Ruiz, A. Rodriguez; Lakenberg, N.; Suchiman, E.; Nelissen, R.; Ramos, Y.; Meulenbelt, I.*Osteoarthritis and Cartilage 26 (2018) S400 https://doi.org/10.1016/j.joca.2018.02.777

Purpose: By applying 3D in vitro chondrogenesis in a model using human bone marrow mesenchymal stem cells (hBMSC), it was demonstrated that excess thyroid hormone (T3) and the upregulation of deiodinase iodothyronine type-2 (D2) gene (DIO2), had...

Comparison of Regenerative Tissue Quality following Matrix-Associated Cell Implantation Using Amplified Chondrocytes Compared to Synovium-Derived Stem Cells in a Rabbit Model for Cartilage Lesions*Schmal, Hagen; Kowal, Justyna M.; Kassem, Moustapha; Seidenstuecker, Michael; Bernstein, Anke; Bätiger, Katharina; Xiong, Tanshiyue; Sudkamp, Norbert P.; Kubosch, Eva J.*Stem Cells International Volume 2018, Article ID 4142031, 12 pages https://doi.org/10.1155/2018/4142031

Known problems of the autologous chondrocyte implantation motivate the search for cellular alternatives. The aim of the study was to test the potential of synovium-derived stem cells (SMSC) to regenerate cartilage using a matrix-associated...

https://www.hindawi.com/journals/sci/2018/4142031/

Laser micro-ablation of fibrocartilage tissue: Effects of tissue processing on porosity modification and mechanics*Matuska, A. M.; McFetridge, P. S.*J Biomed Mater Res Part B 2018:106B:1858–1868. https://doi.org/10.1002/jbm.b.33997

The temporomandibular joint disk (TMJd) is an extremely dense and avascular fibrocartilaginous extracellular matrix (ECM) resulting in a limited regenerative capacity. The use of decellularized TMJd as a biocompatible scaffold to guide tissue...

Comparison of crystallization characteristics and mechanical properties of polypropylene processed by ultrasound and conventional micro-injection molding*Masato, D., Babenko, M., Shriky, B., Gough, T., Lucchetta, G., & Whiteside, B.*Int J Adv Manuf Technol (2018). https://doi.org/10.1007/s00170-018-2493-9

Ultrasound injection molding has emerged as an alternative production route for the manufacturing of micro-scale polymeric components, where it offers significant benefits over the conventional micro-injection molding process. In this work, the...

https://link.springer.com/article/10.1007/s00170-018-2493-9

Supramolecular hydrogels cross-linked by preassembled host–guest PEG cross-linkers resist excessive, ultrafast, and non-resting cyclic compression*Chen, X., Dong, C., Wei, K., Yao, Y., Feng, Q., Zhang, K., … Bian, L.*Chen, X. et al. NPG Asia Materials 1 (2018). doi:10.1038/s41427-018-0071-0

This study is to investigate and systemically study the mechanical performance of supramolecular PEG hydrogels in comparison with those of the chemical hydrogels cross-linked by conventional PEG diacrylate (PEGDA). The supramolecular cross-links...

https://www.nature.com/articles/s41427-018-0071-0

Stochastic Resonance with Dynamic Compression Improves the Growth of Adult Chondrocytes in Agarose Gel Constructs*Weber, J. F., Chiu, L. L. Y., Balko, S., & Waldman, S. D.*Weber, J.F., Chiu, L.L., Balko, S. et al. Ann Biomed Eng (2018). https://doi.org/10.1007/s10439-018-02123-x

Dynamic mechanical stimulation has been an effective method to improve the growth of tissue engineering cartilage constructs derived from immature cells. However, when more mature cell populations are used, results are often variable due to the...

https://link.springer.com/article/10.1007/s10439-018-02123-x

Mechanically-enhanced polysaccharide-based scaffolds for tissue engineering of soft tissues*de Souza, R. F. B., de Souza, F. C. B., Rodrigues, C., Drouin, B., Popat, K., Mantovani, D., & Moraes, A. M.*Materials Science and Engineering: C. https://doi.org/10.1016/j.msec.2018.09.045

Collagen-based materials are probably among the most used class of biomaterials in tissue engineering and regenerative medicine. Although collagen is often privileged for providing a suitable substrate on which cells can be cultured or a matrix in...

https://www.sciencedirect.com/science/article/pii/S0928493118302510

Ultra-sensitive microfluidic wearable strain sensor for intraocular pressure monitoring*Agaoglu, S., Diep, P., Martini, M., Kt, S., Baday, M., & Araci, I. E.*Lab Chip, 2018, DOI: 10.1039/C8LC00758F.

Wearable technologies have potential to transform healthcare by providing continuous measurements of physiological parameters. Sensors that passively monitor physiological pressure without using electronic components are ideal for wearable contact...

https://pubs.rsc.org/en/content/articlelanding/2018/lc/c8lc00758f#!divAbstract

Composite hydrogel: A high fidelity soft tissue mimic for surgery*Tan, Z., Dini, D., Rodriguez y Baena, F., & Forte, A. E.*Materials & Design, 160, 886–894. https://doi.org/10.1016/j.matdes.2018.10.018

Accurate tissue phantoms are difficult to design due to the complex non-linear viscoelastic properties of real soft tissues. A composite hydrogel, resulting from a mix of poly(vinyl) alcohol and phytagel, is able to reproduce the viscoelastic...

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