《整合医学战略研究（2035）》参考

2019 年第 24 期（总第 64 期）

中国工程科技知识中心医药卫生专业分中心
中国医学科学院医学信息研究所 2019 年 12 月 20 日

[动态信息]

1. **Why do scientists want to visualize neural networks plane-by-plane?**

【**news-medical**】Máté: To start with, let's look at why scientists want to visualize neurons. Electrophysiological techniques allow us to study neural signaling both at the single cell (limited cell numbers at the same time) and network level. However, at the network level, we cannot distinguish the spatial distribution of the signals (at the cellular level).

链接：

https://www.news-medical.net/news/20191217/The-Acoustics-of-the-Brain-Random-access-3D-Microscopy-in-Neuroscience.aspx

2. **Moffitt researchers develop efficient method for creating mouse models to study melanoma**

【**news-medical**】Genetically engineered mouse models are often used by scientists to study how the addition, deletion or mutation of genes affects the development of disease and effects of drugs. The process of creating these genetically modified mice is extremely time consuming and expensive, which limits the ability of scientists to use their models to perform important research. Moffitt Cancer Center researchers have developed a new platform for creating genetically engineered mice

to study melanoma that is significantly faster than a normal mouse model approach. Their work was published in Cancer Research.

链接：

https://www.news-medical.net/news/20191217/Moffitt-researchers-develop-efficient-method-for-creating-mouse-models-to-study-melanoma.aspx

3. **Nature's own gene therapy**

【**news-medical**】A brand-new technique of gene therapy was reported on December 16, 2019, in the journal Nature Biomedical Engineering. The scientists made use of the potential of human cells to produce biological nanoparticles chockful of edited genes, so that they could insert beneficial genes into people suffering from various disease processes.

链接：

https://www.news-medical.net/news/20191217/Naturee28099s-own-gene-therapy.aspx

4. **Machine Learning Microscope Adapts Lighting to Improve Diagnosis**

【**Thinkstock**】Engineers at Duke University have developed a prototype microscope that adapts its lighting patterns while teaching itself the optimal settings needed to complete a given diagnostic task.

链接：

https://healthitanalytics.com/news/machine-learning-microscope-adapts-lighting-to-improve-diagnosis

5. **Remote Patient Monitoring, Reimbursement Topped Headlines in 2019**

【**Thinkstock**】As 2019 comes to an end, healthcare organizations are reflecting on the trends and stories that most influenced their behaviors in the past year. Based on our most clicked stories in 2019, those trends included remote patient monitoring, telehealth reimbursement and coding, behavioral health/substance use disorder care, chronic disease management strategies, and direct-to-consumer mHealth technologies.

链接：

https://mhealthintelligence.com/news/remote-patient-monitoring-reimbursement-topped-headlines-in-2019

6. 第四届世界整合医学大会暨硅谷中医药健康创新创业论坛在硅谷举行

【大众网潍坊】以"整合东西方科学共创未来医学"为主题的第四届世界整合医学大会于 12 月 7 日和 8 日,在硅谷的美国国际医药大学(University of East-West Medicine)和创新创业的圣地斯坦福大学(Stanford)成功举办,有来自美国、中国、加拿大、德国、日本等地的近 500 多位整合医学、中医药专家参与大会学术交流及创新创业合作,大会还同时宣布成立"世界整合医学学会联合会"筹备委员会、宣读了世界整合医学大会宣言(征求意见稿),并且共同庆祝国医大师程莘农院士北美传承基地八周年及新书发布。经过大会评委会初选、中选,从 69 位提名人中,最终评选出杰出贡献奖、学术创新奖、心身医学创新奖、终身成就奖等 24 位获奖人。大会收到中国驻旧金山总领事王东华先生、美國联邦众议员赵美心女士及海外华人中医论坛主席董志林博士的贺信。

链接： http://baijiahao.baidu.com/s?id=1652617226830657329&wfr=spider&for=pc

7. 江西省整合医学学会赣州分会落户赣州市人民医院

【中国江西网】近日,江西省整合医学学会赣州分会成立大会在赣州市人民医院召开，该分会的成立将有力促进赣州市整合医学的发展。

链接：http://jxgz.jxnews.com.cn/system/2019/12/07/018682554.shtml

8. 美国研发新型光子 pH 传感器，可追踪细胞组织的生长

【传感器专家网】未来，医生们可能会为在战斗中失去手臂的士兵、需要新心脏或肝脏的儿童以及其他有紧急需要的人培育四肢和其他身体组织。如今，医学专业人员可以从病人身上移植细胞，将其沉积在组织支架上，并将支架插入体内，以促进骨骼、软骨和其他特殊组织的生长。但研究人员仍在致力于构建可植入患者体内的复杂器官。

链接：http://news.rfidworld.com.cn/2019_12/ab7f9751b8df26b7.html

9. 《细胞》重磅：太震撼了！科学家首次看清全身所有癌症转移灶

【上海热线】在 Ali Ertürk 教授的带领下，中国青年科学家潘晨琛博士在一个叫 vDISCO 的成像黑科技的基础上，开发了一个能处理 3D 影像的 DeepMACT 的人工智能算法。有了这两套技术，科学家就可以在小鼠体内找到转移到全身各处的转移位点。与之前的技术相比，这个技术平台首次让科学家得以看到单个癌细胞形成的转移位点。

链接：http://baijiahao.baidu.com/s?id=1651502570372956075&wfr=spider&for=pc

10. 日本一企业开售可穿戴肌肉辅助外骨骼设备 可帮助老年人延长工作年限

【快科技】近日，据外媒报道，因社会老龄化问题日益严峻，日本企业 INNOPHYS 发售可穿戴肌肉辅助外骨骼设备，帮助老年人延长工作年限，或缓解老年人间的看护对身体的损伤。报道中指出，该产品名为"Muscle Suit"，利用人造肌肉原理，可为身体减轻 25.5 公斤力的负重。使用方法简便，只需为设备打气 30 次后穿上即可。

链接：http://m.elecfans.com/article/1138042.html

[文献速递]

1. **Untangling the co-effects of oriented nanotopography and sustained anticoagulation in a biomimetic intima on neovessel remodeling**

作者：Wang, Z.

文献来源：*BIOMATERIALS*

摘要：Constructing a small-diameter artificial blood vessel with biological functions and mechanical compliance comparable to native tissues is still a major challenge in vascular tissue engineering. To address the issues of severe thrombosis and unsatisfactory long-term patency in small-diameter vascular grafts, herein we designed a specifically biomimetic intima with an oriented nanotopographical structure and covalently immobilized anticoagulant molecules. The mixture of heparinized silk fibroin (SF-Hep) and polycaprolactone (PCL) was used to produce oriented inner layer and pure PCL was used to fabricate vertically porous outer layer by a two-step cross-electrospinning. Our findings

showed that the immobilized heparin significantly influenced adherence and activation of platelets while the oriented nanotopography mainly manipulated the elongation and aligned growth of endothelial cells as well as hemodynamics of blood flow. More importantly, two factors of the oriented structure and anticoagulation presented the obviously synergistic effects on rapid endothelialization, long-term patency and remodeling of neovessel. Consequently, the current study successfully combined biochemical induction of heparin molecule and biophysical stimulation of oriented nanotopography to create an off-the-shelf small-diameter vascular graft with excellent antithrombosis in the early stage and long-term patency in the late stage.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49974

2. Poly(3-hydroxybutyrate-co-3-hydroxyexanoate) Scaffolds with Tunable Macro- and Microstructural Features by Additive Manufacturing

作者：He, Z.

文献来源：*J CONTROL RELEASE*

摘要：Liraglutide is a GLP-1 receptor agonist recently approved for Type-II diabetes (T2D) treatment with superior hypoglycemic effect while also improving cardiovascular function for the patients. However, its application has been limited by its short half-life (~13h), which requires daily injections to maintain effective drug concentrations in blood, thus increasing the risk of poor patient compliance and complications. In this study, we developed a ternary liraglutide/tannic acid (TA)/Al(3+) nanoparticle system based on hydrogen bond formation between liraglutide and TA and stabilized by complex coordination interaction between TA and Al(3+). This ternary nanoparticle formulation offers sustained release of liraglutide for >8days by optimizing the concentration of TA during nanoparticle assembly. A flash nanocomplexation (FNC) process was adopted to confer homogeneous mixing of the three components and control the assembly kinetics, thus enabling efficient encapsulation, a tunable drug release profile, improved

nanoparticle size uniformity, and a high degree of colloidal stability. Upon a single intraperitoneal (i.p.) administration, the optimized formulation effectively lowered the high blood glucose level in a T2D db/db mice model to the normal range (8-10mmol/L) within 6h, maintained it for 60 more hours, and kept it lower than the original level for >6days. In a 30-day treatment study, the nanoparticle formulation with a dosage frequency of once every 5days exhibited similar or better control of blood sugar level (20% reduction in HbA1c) and weight control than daily injection of free liraglutide at the same treatment dose. The extended glycemic control led to distinctive improvements on reducing cardiomyopathy, including inhibition in lipo-toxicity by decreasing 40% of triglyceride, 30% of diacylglycerol and 50% of PKC level in the heart, as well as ameliorating oxidative stress and cell apoptosis activities through positive regulation on superoxidase, malondialdehyde, caspase-3 and Bax. This nanoparticle system demonstrates improved therapeutic potential owing to its long-acting glycemic control with improved cardiovascular function and reduced tissue toxicity in multiple organs.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49975

3. **A polyphenol-metal nanoparticle platform for tunable release of liraglutide to improve blood glycemic control and reduce cardiovascular complications in a mouse model of type II diabetes**

作者：He, Z.

文献来源：*J CONTROL RELEASE*

摘要：Liraglutide is a GLP-1 receptor agonist recently approved for Type-II diabetes (T2D) treatment with superior hypoglycemic effect while also improving cardiovascular function for the patients. However, its application has been limited by its short half-life (~13h), which requires daily injections to maintain effective drug concentrations in blood, thus increasing the risk of poor patient compliance and complications. In this study, we developed a ternary liraglutide/tannic acid

(TA)/Al(3+) nanoparticle system based on hydrogen bond formation between liraglutide and TA and stabilized by complex coordination interaction between TA and Al(3+). This ternary nanoparticle formulation offers sustained release of liraglutide for >8days by optimizing the concentration of TA during nanoparticle assembly. A flash nanocomplexation (FNC) process was adopted to confer homogeneous mixing of the three components and control the assembly kinetics, thus enabling efficient encapsulation, a tunable drug release profile, improved nanoparticle size uniformity, and a high degree of colloidal stability. Upon a single intraperitoneal (i.p.) administration, the optimized formulation effectively lowered the high blood glucose level in a T2D db/db mice model to the normal range (8-10mmol/L) within 6h, maintained it for 60 more hours, and kept it lower than the original level for >6days. In a 30-day treatment study, the nanoparticle formulation with a dosage frequency of once every 5days exhibited similar or better control of blood sugar level (20% reduction in HbA1c) and weight control than daily injection of free liraglutide at the same treatment dose. The extended glycemic control led to distinctive improvements on reducing cardiomyopathy, including inhibition in lipo-toxicity by decreasing 40% of triglyceride, 30% of diacylglycerol and 50% of PKC level in the heart, as well as ameliorating oxidative stress and cell apoptosis activities through positive regulation on superoxidase, malondialdehyde, caspase-3 and Bax. This nanoparticle system demonstrates improved therapeutic potential owing to its long-acting glycemic control with improved cardiovascular function and reduced tissue toxicity in multiple organs.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49972

4. **ECHO, the executable CHOndrocyte: A computational model to study articular chondrocytes in healthy and disease**

作者： Schivo, S.

文献来源：*CELL SIGNAL*

摘要：Computational modeling can be used to investigate complex signaling networks in biology. However, most modeling tools are not suitable for molecular cell biologists with little background in mathematics. We have built a visual-based modeling tool for the investigation of dynamic networks. Here, we describe the development of computational models of cartilage development and osteoarthritis, in which a panel of relevant signaling pathways are integrated. In silico experiments give insight in the role of each of the pathway components and reveal which perturbations may deregulate the basal healthy state of cells and tissues. We used a previously developed computational modeling tool Analysis of Networks with Interactive Modeling (ANIMO) to generate an activity network integrating 7 signal transduction pathways resulting in a network containing over 50 nodes and 200 interactions. We performed in silico experiments to characterize molecular mechanisms of cell fate decisions. The model was used to mimic biological scenarios during cell differentiation using RNA-sequencing data of a variety of stem cell sources as input. In a case-study, we wet-lab-tested the model-derived hypothesis that expression of DKK1 (Dickkopf-1) and FRZB (Frizzled related protein, WNT antagonists) and GREM1 (gremlin 1, BMP antagonist) prevents IL1beta (Interleukin 1 beta)-induced MMP (matrix metalloproteinase) expression, thereby preventing cartilage degeneration, at least in the short term. We found that a combination of DKK1, FRZB and GREM1 may play a role in modulating the effects of IL1beta induced inflammation in human primary chondrocytes.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49973

5. Associations Between Apparent Diffusion Coefficient Values and the Prognostic Factors of Breast Cancer

作者：Choi, B. B.

文献来源：*J Comput Assist Tomogr*

摘要：OBJECTIVES: Breast imaging can offer great information about breast cancer heterogeneity. The purpose of this study was to analyze the relationship between apparent diffusion coefficient (ADC) values and various prognostic factors and investigate whether ADC values are useful for breast cancer diagnosis, evaluation of treatment response, and determination of prognosis. METHODS: A total of 111 cases of breast cancer were included in this study. Magnetic resonance findings were recorded according to the Breast Imaging Reporting and Data System magnetic resonance imaging lexicon. Diffusion-weighted imaging rim sign and minimum, maximum, and difference ADC values (ADCdiff) were also evaluated. RESULTS: ADCdiff was related to all prognostic factors such as histological grade, Ki-67, tumor size, molecular subtype, axillary node metastasis, lymphvascular invasion, internal enhancement pattern, intratumoral high T2 signal, peritumoral edema, and diffusion-weighted imaging rim sign, whereas minimum and maximum ADC values showed variable associations. CONCLUSIONS: Apparent diffusion coefficient values were shown to be correlated with many proven or possible prognostic factors of breast cancer. In particular, ADCdiff can reflect tumor heterogeneity and showed higher correlation.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49965

6. 基于磁共振成像的女性盆腔脏器数字化三维模型的构建

作者：陈兰

文献来源：*妇产与遗传（电子版）*

摘要：目的 探讨利用磁共振二维影像数据构建女性盆腔脏器数字化三维模型的方法及意义. 方法 从 2018 年 1 月至 2018 年 10 月在南方医科大学南方医院因疾病需要行盆腔磁共振成像检查的患者中随机挑选 10 例,获取其原始 Dicom 3.0 数据集并导入 Mimics 19.0 软件,通过手动勾画盆腔各脏器轮廓线,再经三维计算和光滑处理即可完成三维模型重构.结果 成功构建女性盆腔脏

器精细三维解剖模型,包括子宫、子宫内膜、阴道、双侧附件、膀胱、尿道、直肠等脏器组织,具有表面光滑、层次分明、形态逼真、多角度观察等特点.利用软件自带测量工具可快速测量各脏器的几何形态参数. 结论 女性盆腔脏器数字化三维模型可作为手术模拟、规划、培训教学的载体,具有广阔的临床应用前景.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49967

7. 多种特殊状态下关节软骨缺损修复的组织工程技术

作者：陈劲松

文献来源：*中国组织工程研究*

摘要：背景:应用组织工程学技术可获得良好的关节软骨再生,但多为生理状态下小面积缺损的单纯修复.然而临床上的软骨缺损常伴随骨性关节炎、类风湿性关节炎等基础疾病,且缺损的位置、范围、深度均不确定,给软骨组织修复带来了很大挑战.目的:总结不同位置和炎症状态下软骨缺损的修复方式.方法:检索 PubMed 数据库和 CNKI 数据库,英文检索词为"cartilage defect regeneration,osteochondral,growth plate,weight-bearing area,inflammatory",中文检索词为"关节软骨缺损,骨软骨,生长板,负重区,炎症",检索建库至 2019 年 3 月发表的相关文献.共检索到相关文献 209 篇,按照纳入与排除标准,最终纳入 86 篇文献进行总结.结果与结论:针对各种特殊状态下的关节软骨缺损,其修复目标和策略是不同的:全层软骨和骨软骨结构缺损多采用具有多层结构的支架,旨在修复软骨特有的分层结构及软骨下骨结构,同时避免新生软骨内异位骨化的问题;生长板缺损的修复关键在于避免长骨成熟后发生畸形,因此在修复支架内应添加胰岛素样生长因子、骨发生形态蛋白 7 等生长因子,以持续刺激生长板的修复并发挥骨生长的生理功能;负重区软骨修复则需要修复支架具有良好的力学性能,负重时不会发生严重形变及结构破坏,同时新生的软骨组织具有足够的力学强度以支撑持续的纵向压力和磨损;炎症状态下的软骨缺损则要同时治疗炎症与软骨缺损,间充质干细胞的引入可同时发挥免疫调节及组织再生功能,以使疾病达到彻底治疗的目标.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49966

8. 非编码 RNA 在骨组织工程细胞与支架构建中的研究与应用

作者：黄慧

文献来源：*中国组织工程研究*

摘要：背景:越来越多的研究工作证实在维持骨稳态的精细复杂机制中有许多非编码 RNA 发挥作用,将非编码 RNA 作为生物活性因子用于骨组织工程修复骨缺损是一个研究热点.目的:介绍非编码 RNA 作为生物活性因子在骨组织工程中的应用.方法:由第一作者在 2018 年 12 月至 2019 年 3 月间以"bone tissue engineering,ncRNA(miRNA、siRNA 或 lncRNA),scaffold,drug delivery system"为关键词,检索 2004 至 2019 年期间 Web of Science、PubMed、SpringerLink 数据库收录的相关文献.初检得到相关文献 1754 篇,筛选后对 95 篇文章进行分析.结果与结论:因为非编码 RNA 在成骨分化中发挥关键作用,所以可以作为骨组织工程的重要生物活性因子得以应用.目前基于非编码 RNA 生物活性因子的骨组织工程修复方式,成为骨缺损修复的一个研究热点,主要有 2 种应用策略: ①种子细胞内非编码 RNA 转录有目的地改变后与骨组织工程支架结合,以促进骨缺损修复; ②特殊设计的骨组织工程支架可控地、有目的地改变种子细胞内非编码 RNA 表达,以促进骨缺损修复.此外,愈来愈多的非编码 RNA 在骨再生过程中的功能被明确,表现出良好的应用前景.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49968

9. 3D 打印与组织工程技术在气管替代治疗中的应用与热点

作者：梁娅男

文献来源：*中国组织工程研究*

摘要：背景:由于缺乏满意的气管替代物,功能性气管重建仍然是一个外科挑战.目的:综述组织工程气管支架的研究热点、临床应用及主要存在的问题.方法：以 "3D Printing,tissue-engineered trachea,trachea reconstruction,tracheal

replacement;3D 打印气管,组织工程气管,气管重建,气管替代"为关键词,检索 PubMed、Medline、万方数据库 2004 至 2019 年发表的相关文献,共纳入 47 篇文献进行分析总结.结果与结论:目前气管重建的方式主要有人工气管移植、同种异体移植、自体组织移植和组织工程气管移植.人工气管移植通常引起气管破裂、感染和狭窄而导致移植失败;同种异体移植需要长期的免疫抑制治疗,移植后由于血管再生不足引起的坏死和感染往往导致死亡;自体组织复制气管结构和功能的能力有限且存在手术创伤;组织工程气管通过选择合适的支架材料,在支架中均匀地植入种子细胞,可以模拟与天然气管相似的生物结构和功能,似乎是气管替代物的理想选择.将 3D 打印技术与组织工程技术相结合,利用生物降解材料打印完整的气管支架,再植入间充质干细胞培育的组织工程气管,为解决长段气管缺损问题提供了新思路.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49969

10. 可穿戴运动监测设备在关节炎病人中的应用研究进展

作者：李秀梅

文献来源：*护理研究*

摘要：综述可穿戴运动监测设备在关节炎病人中的应用进展,从可穿戴运动监测设备应用面临的机遇和挑战,反思现状,提出未来研究应注意改进的方面,以期为改善我国关节炎病人的身体活动水平提出相关建议.

链接：http://pan.ckcest.cn/rcservice//doc?doc_id=49970

[研究报告]

1. 2019 上半年医疗健康产业投融资报告

发布源：脉动网

发布时间：2019 年

摘要：2019 上半年，全球医疗健康产业共发生 730 起融资事件,融资总额达到 206.3 亿美元,如果以此为基础,预计 2019 全年融资额将超过 400 亿美元,融资事件数将接近 1500 起，双双创下历史新高，医疗健康产业将继续保持

良好的增长态势。

链接：http://www.199it.com/archives/909934.html