

## 《整合医学战略研究（2035）》参考

2019年第21期（总第61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11月05日

### [动态信息]

#### 1. **A new breakthrough in bionic legs**

**【news-medical】** For a brief time, Kerry Finn felt like "The Terminator" or "The Six Million Dollar Man." The 60-year-old retired truck driver from Salt Lake County, Utah, lost his left leg to vascular disease from type 2 diabetes. But last year, he was one of 10 human subjects at the University of Utah to test one of the world's first truly bionic legs, a self-powered prosthetic limb with a computer processor and motorized joints in the ankle and knee that enable an amputee to walk with more power, vigor and better balance.

链接: <https://www.news-medical.net/news/20191030/A-new-breakthrough-in-bionic-legs.aspx>

#### 2. **NYU Langone Health launches new molecular assay to identify patients with brain tumors**

**【news-medical】** NYU Langone Health and its Perlmutter Cancer Center have launched clinical whole genome DNA methylation profiling for patients with brain tumors. This leading-edge molecular assay utilizes DNA epigenetic signatures and artificial intelligence with machine learning to correctly identify and subtype brain tumors. NYU Langone Health is the first Clinical Laboratory Improvement Amendments (CLIA)-certified laboratory in the United States to receive state approval (New York State Department of Health) for whole genome DNA methylation for diagnosis and classification of brain tumors.

链接:

<https://www.news-medical.net/news/20191024/NYU-Langone-Health-launches-new-molecular->

[assay-to-identify-patients-with-brain-tumors.aspx](https://www.news-medical.net/news/20191024/Researchers-use-3D-electron-microscopy-to-unravel-dense-networks-in-the-cerebral-cortex.aspx)

### 3. **Researchers use 3D electron microscopy to unravel dense networks in the cerebral cortex**

**【news-medical】** Unlike any other organ, our brains contain extremely densely packed networks of membranous cables that are used by our about 86 billion nerve cells for communication amongst each other. Since each nerve cell in the main part of mammalian brains, the so-called cerebral cortex, communicates with about 1,000 other nerve cells via synapses placed along these cables over long distances, one expects a total of about 5 million kilometers of wires packed into our skulls - more than 10 times longer than all highways on our planet, in each of our brains.

链接: <https://www.news-medical.net/news/20191024/Researchers-use-3D-electron-microscopy-to-unravel-dense-networks-in-the-cerebral-cortex.aspx>

### 4. **Blockchain Technology to Evolve in 4 Phases, Predicts Gartner**

**【HITINFRASTRUCTURE】** Blockchain technology, which is already making an impact in healthcare, will evolve in four phases over the next decade, predicted Gartner.

链接: <https://hitinfrastructure.com/news/blockchain-technology-to-evolve-in-4-phases-predicts-gartner>

### 5. **How Tech, Workforce Can Reduce Cybersecurity Risk to Patient Safety**

**【healthitsecurity】** To reduce the risk cybersecurity poses to patient safety and critical healthcare infrastructure, providers, regulators, and Congress don't need to reinvent the wheel. Instead, industry stakeholders should focus on key program elements around technology, workforce, and culture.

链接:

<https://healthitsecurity.com/news/how-tech-workforce-can-reduce-cybersecurity-risk-to-patient-safety>

### 6. **合肥将创建智能可穿戴设备产业高地**

**【凤凰网】** 据悉，合肥市智能穿戴产业行动纲要及实施方案即将展开编制。未来，全市致力于打造一批智能可穿戴设备在交通、医疗、文娱等场景中的

应用示范，力争积极创建引领世界的产业新高地。

链接：[http://ah.ifeng.com/a/20191022/7804086\\_0.shtml](http://ah.ifeng.com/a/20191022/7804086_0.shtml)

#### 7. 苹果申请新专利：研发可穿戴设备“智能戒指”

【中关村在线】北京时间10月16日下午消息，苹果向美国专利商标局提交一份文件，与穿戴电子环形计算设备有关。按照描述，电子环节设备可以戴在手指上，它既可以作为其它设备的输入外设，又是微缩版 Apple Watch。

链接：<http://baijiahao.baidu.com/s?id=1647680798026781356&wfr=spider&for=pc>

#### 8. 澳洲开发新型可穿戴传感器监测孕妇状态

【RFID 世界网】近日，全球首款被放置在准妈妈肚子上的可穿戴传感器，开始在澳大利亚试用。该传感器可以用来测量宝宝的心率、宫缩、准妈妈的血压和血糖水平，并且所有数据都实时反馈给医生。

链接：[http://news.rfidworld.com.cn/2019\\_10/897404625469efd3.html](http://news.rfidworld.com.cn/2019_10/897404625469efd3.html)

#### 9. 防水、抗紫外线、自修复 南工教授研发出可穿戴防晒剂

【东方卫报】流汗或游泳导致防晒剂失效怎么办？防晒剂成分会不会渗入皮肤造成毒副作用？这些爱美人士担心的问题，已被南京工业大学材料化学工程国家重点实验室的科研人员解决。他们研发出一种既可以高效广谱抵抗紫外线辐射，又可实现穿戴、防水和自修复多重功能的水凝胶防晒剂。该研究成果已刊发于国际材料领域知名刊物、美国化学学会《应用材料与界面》。

链接：[http://dfwb.njnews.cn/html/2019-10/23/content\\_72126.htm](http://dfwb.njnews.cn/html/2019-10/23/content_72126.htm)

#### 10. 研究人员创建了基于酵母的可穿戴辐射传感器

【携手健康网】普渡大学研究人员开发的一种新型辐射传感器是一种可穿戴的，一次性的，薄膜型设备，制造于纸质基材上，其中酵母细胞 (*Saccharomyces cerevisiae*) 构图在两个电极之间，并用作智能材料。该设备在《先进生物系统》杂志上进行了介绍，该设备在干燥时对辐射敏感，可以通过用水激活来读取。

链接：<http://news.xsjk.net/yixueqianyan/201910/3713.html>

## [文献速递]

### 1. **Wearable Technologies for Developing Sleep and Circadian Biomarkers: A Summary of Workshop Discussions**

作者: Depner, C. M.

文献来源: *SLEEP*

摘要: The 'International Biomarkers Workshop on Wearables in Sleep and Circadian Science' was held at the 2018 SLEEP Meeting of the Associated Professional Sleep Societies. The workshop brought together experts in consumer sleep technologies and medical devices, sleep and circadian physiology, clinical translational research, and clinical practice. The goals of the workshop were: 1) characterize the term "wearable" for use in sleep and circadian science, and identify relevant sleep and circadian metrics for wearables to measure; 2) assess the current use of wearables in sleep and circadian science; 3) identify current barriers for applying wearables to sleep and circadian science; and 4) identify goals and opportunities for wearables to advance sleep and circadian science. For the purposes of biomarker development in the sleep and circadian fields, the workshop included the terms "wearables", "nearables", and "ingestibles". Given the state of the current science and technology, the limited validation of wearable devices against gold standard measurements is the primary factor limiting large-scale use of wearable technologies for sleep and circadian research. As such, the workshop committee proposed a set of best practices for validation studies and guidelines regarding how to choose a wearable device for research and clinical use. To complement validation studies, the workshop committee recommends the development of a public data repository for wearable data. Finally, sleep and circadian scientists must actively engage in the development and use of wearable devices to maintain the rigor of scientific findings and public health messages based on wearable technology.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47937](http://pan.ckcest.cn/rcservice//doc?doc_id=47937)

### 2. **Validation and Acceptability of a Cuffless Wrist-Worn Wearable Blood Pressure Monitoring Device Among Users and Health Care Professionals:**

## **Mixed Methods Study**

作者：Islam, Sms

文献来源：JMIR MHEALTH UHEALTH

摘要：BACKGROUND: Blood pressure (BP) is an important modifiable cardiovascular risk factor, yet its long-term monitoring remains problematic. Wearable cuffless devices enable the capture of multiple BP measures during everyday activities and could improve BP monitoring, but little is known about their validity or acceptability. OBJECTIVE: This study aimed to validate a wrist-worn cuffless wearable BP device (Model T2; TMART Technologies Limited) and assess its acceptability among users and health care professionals. METHODS: A mixed methods study was conducted to examine the validity and comparability of a wearable cuffless BP device against ambulatory and home devices. BP was measured simultaneously over 24 hours using wearable and ambulatory devices and over 7 days using wearable and home devices. Pearson correlation coefficients compared the degree of association between the measures, and limits of agreement (LOA; Bland-Altman plots) were generated to assess measurement bias. Semistructured interviews were conducted with users and 10 health care professionals to assess acceptability, facilitators, and barriers to using the wearable device. Interviews were audio recorded, transcribed, and analyzed. RESULTS: A total of 9090 BP measurements were collected from 20 healthy volunteers (mean 20.3 years, SD 5.4; N=10 females). Mean (SD) systolic BP (SBP)/diastolic BP (DBP) measured using the ambulatory (24 hours), home (7 days), and wearable (7 days) devices were 126 (SD 10)/75 (SD 6) mm Hg, 112 (SD 10)/71 (SD 9) mm Hg and 125 (SD 4)/77 (SD 3) mm Hg, respectively. Mean (LOA) biases and precision between the wearable and ambulatory devices over 24 hours were 0.5 (-10.1 to 11.1) mm Hg for SBP and 2.24 (-17.6 to 13.1) mm Hg for DBP. The mean biases (LOA) and precision between the wearable and home device over 7 days were -12.7 (-28.7 to 3.4) mm Hg for SBP and -5.6 (-20.5 to 9.2) mm Hg for DBP. The wearable BP device was well accepted by participants who found the device easy to wear and use. Both participants and health care providers agreed that the wearable cuffless devices were easy to use and that they could be used to improve BP monitoring. CONCLUSIONS: Wearable BP measures compared well against a gold-standard ambulatory device, indicating

potential for this user-friendly method to augment BP management, particularly by enabling long-term monitoring that could improve treatment titration and increase understanding of users' BP response during daily activity and stressors.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47936](http://pan.ckcest.cn/rcservice//doc?doc_id=47936)

### 3. **Wearable Chemical Sensors: Emerging Systems for On-body Analytical Chemistry**

作者: Sempionatto, J. R.

文献来源: *ANAL CHEM*

摘要: With the emergence of mobile devices and digital medicine, wearable sensors have received tremendous recent attention across many applications related to monitoring the wearer's conditions and surroundings. Existing wearable sensors commonly track the user's mobility and vital signs (steps, heart rate, etc.). The recent introduction of non-invasive chemical sensors, providing continuous monitoring of chemical markers in a non-invasive manner, fills major gaps in wearable sensor technology, as desired for a plethora of applications. This emerging and exciting area of on-body wearable chemical sensing represents a major transition away from common centralized laboratory-based analytical systems involving in-vitro test-tube assays of blood or urine. Such a major revolution has led to a variety of wearable chemical sensors that allow non-invasive continuous monitoring of many important analytes in biofluids, such as sweat, saliva, tears and interstitial fluid (ISF), instead of blood.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47939](http://pan.ckcest.cn/rcservice//doc?doc_id=47939)

### 4. **From a Lived Event to Its Autobiographical Memory: An Ecological Study Using Wearable Camera in Schizophrenia**

作者: Alle, M. C.

文献来源: *FRONT PSYCHIATRY*

摘要: Cognitive disorders are considered as a core symptom of schizophrenia. Importantly, episodic autobiographical memory deficits are strongly related to patients' social dysfunction. Although the cognitive mechanisms underlying autobiographical memory deficit are highly important to open the door for specific cognitive remediation, they are yet to be understood. The present study

focused on event segmentation to check to which extent possible impairments in temporal ordering and segmenting in patients hinder memories construction. Twenty-seven patients with schizophrenia and 27 matched controls took part in an outdoor circuit while wearing a wearable camera. A week later, their memory and the temporal organization of this event have been assessed. Results showed that patients, compared with control participants, reported a reduced amount of details, especially less actions with interaction related to the event. Contrary to our initial hypotheses, event segmentation abilities in patients were not affected. The relationship between event segmentation and memory is discussed.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47940](http://pan.ckcest.cn/rcservice//doc?doc_id=47940)

## 5. **Wearable Technology in Spine Surgery**

作者: Lee, T. J.

文献来源: *CLIN SPINE SURG*

摘要: Although patient-reported outcome measures (PROMs) provide valuable insight into the effectiveness of spine surgery, there still remain limitations on measuring outcomes in this manner. Among other deficiencies, PROMs do not always correlate with more objective measures of surgery success. Wearable technology, such as pedometers, tri-axis accelerometer, or wearable cameras, may allow physicians to track patient progress following spine surgery more objectively. Recently, there has been an emphasis on using wearable devices to measure physical activity and limb and spine function. Wearable devices could play an important role as a supplement to PROMs, although they might have to be substantiated through adequate controlled studies to identify normative data for patients presenting with common spine disorders. This review will detail the current state of wearable technology applications in spine surgery and its direction as its utilization expands.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47938](http://pan.ckcest.cn/rcservice//doc?doc_id=47938)

## 6. **便携式可穿戴设备结合运动管理平台在 2 型糖尿病患者中的应用**

作者: 贾竹敏

文献来源: *中华糖尿病杂志*

摘要：目的 探讨便携式可穿戴设备肌氧监测仪、心率臂带结合手机 APP 及运动管理平台在 2 型糖尿病(T2DM)患者管理中的应用效果.方法 采用便利抽样法,选取 2017 年 5 月至 2018 年 6 月于河南科技大学第一附属医院内分泌科出院的无运动禁忌的 T2DM 患者 66 例,按计算机随机法分为试验组 34 例和对照组 32 例.试验组接受便携式可穿戴设备肌氧监测仪及心率臂带结合手机应用程序(APP)及运动管理平台管理,对照组接受常规运动宣教.比较两组干预前后糖代谢、脂代谢、肌氧、心率等指标的差异.计量资料组间比较采用 t 检验分析,计数资料以率(%)表示,采用  $\chi^2$  分析.结果 干预后,试验组患者糖化血红蛋白 [(7.34±1.61) % 比 (6.17±0.53) %]、空腹血糖 [(8.17±2.48) 比 (6.30±1.19)mmol/L]均低于对照组(t=-3.248、-3.644,均 P<0.05);全程最高心率 [(139.00±16.28) 比 (129.84±13.00) 次/min] 和最大运动强度 (0.80±0.08 比 0.75±0.05)均优于对照组(t=-2.400、-2.639,均 P<0.05);在跑步机 4 min×4 阶段递增速度下,试验组平均肌氧含量[(54.79±14.12) % 比 (58.00±14.14) %]和肌氧降幅情况 [(24.56±19.58) % 比 (19.03±15.68) %]均优于对照组(t=-4.541、-2.563,P<0.05).结论 应用便携式可穿戴设备结合运动平台,可优化 T2DM 患者的运动管理,更好地控制血糖并改善肌氧量.

链接：[http://pan.ckcest.cn/rcservice//doc?doc\\_id=47941](http://pan.ckcest.cn/rcservice//doc?doc_id=47941)

## 7. 基于可穿戴设备的儿童青少年身体活动干预效果综述

作者：张丹青

文献来源：上海体育学院学报

摘要：目的 分析可穿戴设备用于儿童青少年身体活动干预的效果,探讨设备类型、佩戴位置、干预时长等因素对结果的影响.方法 运用布尔逻辑运算组合检索 Web of Science (WOS)、PubMed、SPORTDiscus、MEDLINE、Google Scholar、中国知网(CNKI)、万方数据及维普网等数据库收录的 2010-01-01—2018-09-30 发表的文献,经过删重和筛选最终纳入 17 篇文献.结果 47.06%的研究表明可穿戴设备对儿童青少年的身体活动干预有效,23.53%的研究表明干预无效,29.41%的研究表明干预效果不确定.结论 可穿戴设备对身体活动的干预效果仍有待提高,影响干预效果的原因还需深入探讨.



链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47942](http://pan.ckcest.cn/rcservice//doc?doc_id=47942)

#### 8. 基于可穿戴设备的跌倒检测方法综述

作者: 朱连杰

文献来源: *计算机工程与应用*

摘要: 基于可穿戴设备的跌倒检测系统能检测人的跌倒行为,并在老人监护等场景下得到广泛应用,相关系统的设计也引起众多研究人员的关注.对于基于可穿戴设备的跌倒检测系统的研究情况做了详细综述,介绍了跌倒的过程,按照可穿戴设备跌倒检测系统的工作流程,分别从数据采集、数据预处理、特征提取和判别算法等几个方面介绍目前研究工作的开展情况,并对已有研究成果进行分类、对比和统计分析,为后续研究工作提供有意义的借鉴与参考.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47943](http://pan.ckcest.cn/rcservice//doc?doc_id=47943)

#### 9. 服务于大学生科学体育锻炼的可穿戴系统设计

作者: 张晓萍

文献来源: *青少年体育*

摘要: 当前大学生的体质与健康状况很不理想.运动强度过高或过低都对大学生体质和健康不利,为了合理地监测大学生体育运动中的运动强度,设计了一套服务于大学生科学体育锻炼的可穿戴系统.该系统由运动手环、手机App和云服务器组成,文中详细介绍该系统的软硬件,并就长跑运动的姿态和心率测试.实验结果表明,系统运行稳定、安全,能够满足大学生日常体育运动监测的需求.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47944](http://pan.ckcest.cn/rcservice//doc?doc_id=47944)

#### 10. 动态足底压力测量系统研究

作者: 闻刚

文献来源: *河南科技大学学报(自然科学版)*

摘要: 为了克服传统足底矫形辅具以静态足底压力数据为参考的局限,研发了一套可穿戴式动态足底压力测量系统.柔性压阻式压力传感器用于鞋垫设

计,采用 STM32F103RCT6 微处理器作为主控芯片,结合压力信号调理电路模块、模数转换模块及数据处理模块完成下位机设计.通过 HC-05 蓝牙模块将数据传输到电脑端上位机,完成数据的显示、保存及处理,并对步态周期内足底压力分布特点进行动态分析.试验结果表明:系统的测量标准差不超过 0.190 N,不同体质量的志愿者静态足底压力分布基本相同,动态足底压力分布随运动速度的增加而增大.

链接: [http://pan.ckcest.cn/rcservice//doc?doc\\_id=47946](http://pan.ckcest.cn/rcservice//doc?doc_id=47946)

## [研究报告]

### 1. 2019 中国医疗大数据研究报告

发布源: 亿欧智库

发布时间:2019 年

摘要: 医疗产业已经沉淀海量数据,且数据类型及数据量还将持续增加,但医疗数据在过去并未得到有效处理;另一方面,我国面临着慢病发病率提升、临床决策失准及医疗资源配置不均衡、重复诊疗等问题。如何在“海量数据”与“医疗问题”之间架起一条通路?大数据与机器学习、深度学习等技术和循证医学、影像组学等学科的结合,可以为健康管理、辅助诊疗等场景提供解决方案;打通底层数据,构建互联互通的数据平台,可以优化诊疗流程、提升医疗行为的效率。数据互通可以优化各应用场景的体验,各应用场景产生的数据又可以进一步丰富数据——由此形成一个价值闭环。从政策角度出发,医疗是关系国计民生的高监管行业,政策对于大数据赋能这一行业的态度尤为谨慎。从企业角度出发,与以往一呼百应的“大数据+产业”不同,企业对于这一领域的动作显得有些保守,此时谈论“应用场景”似乎操之过急。本报告深入分析中国医疗大数据顶层设计思路,走访中国健康医疗大数据产业发展集团公司、中国健康医疗大数据股份有限公司、中国健康医疗大数据科技发展集团公司,充分听取政策参与制定者、行业专家对医疗大数据的理解和认知;对医疗大数据治理的技术环节及未来可能的主要应用场景进行了梳理,最后对医疗大数据未来的发展趋势及挑战做出预判。

链接: <https://www.iyiou.com/intelligence/insight97783.html>

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