南通倡义科技有限公司
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兽用多功能外科缝线

——产品手册

南通倡义科技有限公司
Nantong ChangYi Technology Co., Ltd

倡导健康 引领未来
以义为先 服务至上

倡导健康,引领未来

以义为先,服务至上

企 业 简 介

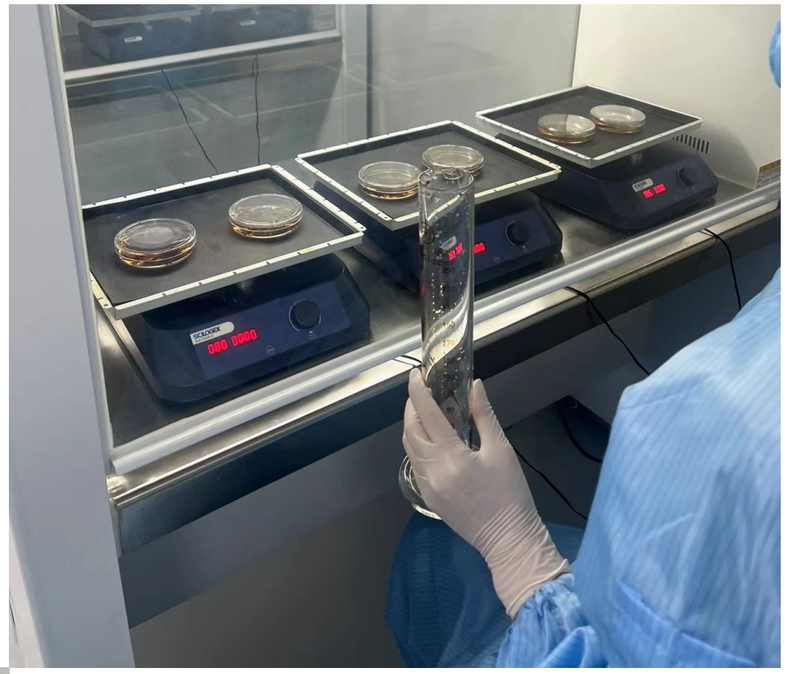
Company Information

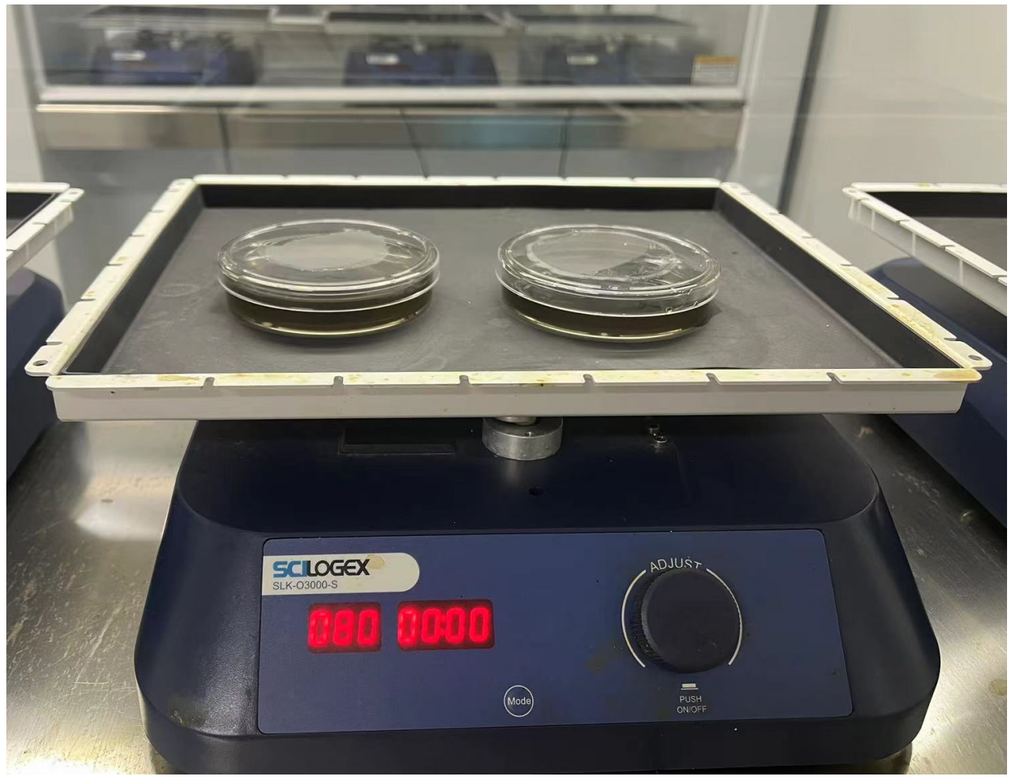
南通倡义科技有限公司专注于功能性缝线的研发与生产。功能性缝线作为医疗领域的重要耗材，其性能直接关系到手术效果和术后的康复过程。公司依托先进的科技力量和专业的研发团队，不断推出创新产品，以满足不同手术场景的需求。这些缝线产品具有减轻术后疼痛、促进快速愈合、降低感染风险等显著优势，为医疗领域的发展做出了积极贡献。

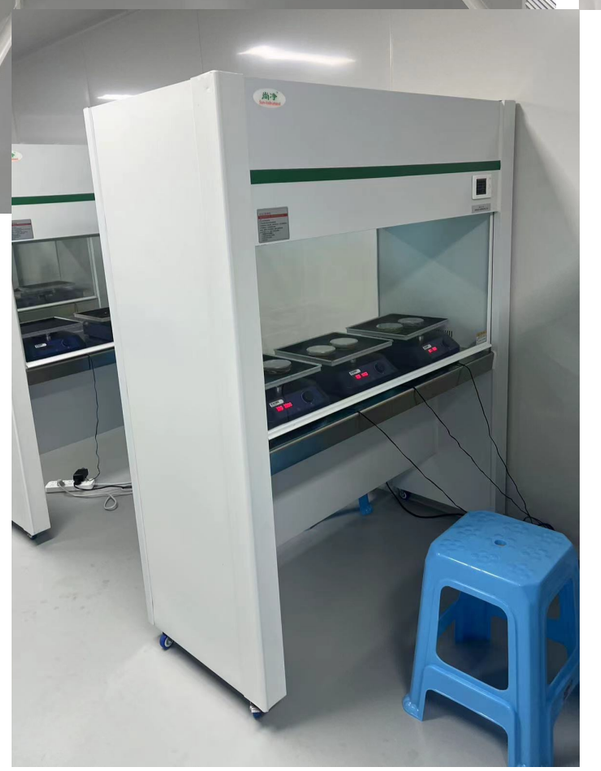
公司始终坚持“倡导健康，引领未来，以义为先，服务至上”的企业经营理念，提倡“诚信、团结、敬业、奋斗”的企业精神文化。在发展过程中，南通倡义科技有限公司注重团队建设和技术创新，不断提升产品质量和服务水平，赢得了广大客户的信赖和支持。

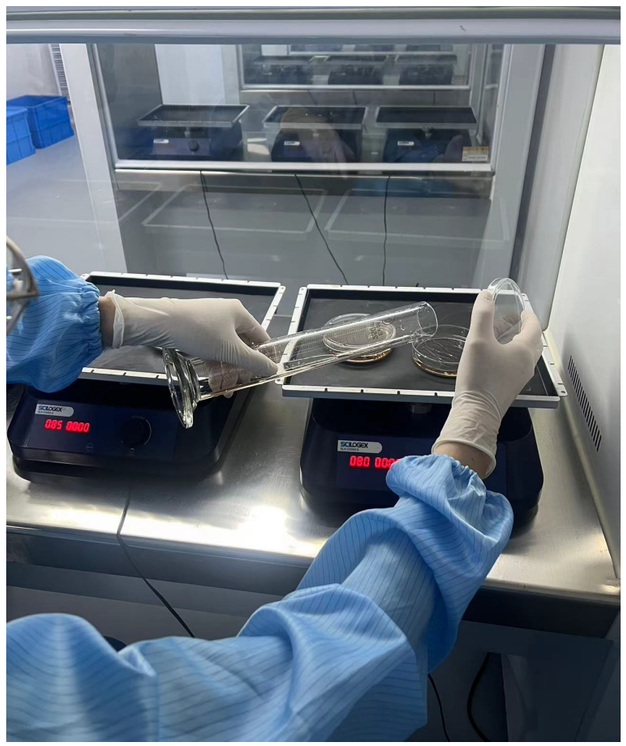
南通倡义科技有限公司

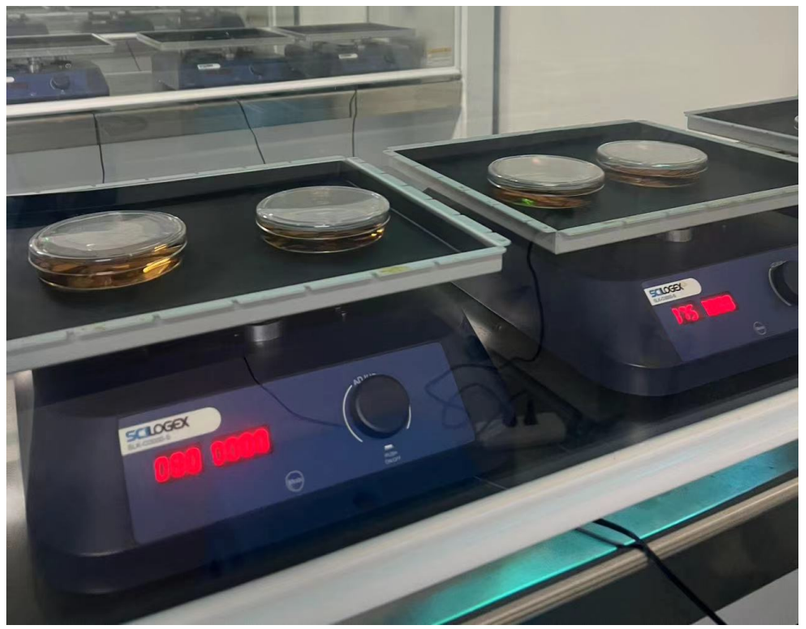
Nantong ChangYi Technology Co ., Ltd











宠物手术专用多功能缝线——让爱宠康复更轻松！

多功能缝线产品说明

Alan Danielski DVM, DECVS 等人研究结果显示: 275只狗在接受了胫骨平台水平截骨术（TPLO）手术后，其中48只狗（17.5%）被诊断为术后切口感染。

另一项Christopher P. Bloch等人的研究结果显示: 75只狗在接受了腹部中线切口手术后，69只狗存活到缝线拆除或术后30天,在这69只狗中，有6只狗（8.7%）被报告出现了术后切口感染。

Received: 22 January 2019 | Revised: 11 July 2019 | Accepted: 23 July 2019
DOI: 10.1111/vsu.13308

ORIGINAL ARTICLE - CLINICAL

WILEY

Risk of infection after double locking plate and screw fixation of tibial plateau leveling osteotomies in dogs weighing greater than 50 kilograms

Jayson Tuan BSc, BVMS, MANZCVS, MRCVS[1] | Miguel A. Solano Ldo Med Vet, DECVS[1] | Alan Danielski DVM, DECVS[2]

Lioce *et al. BMC Res Notes* (2019) 12:459
https://doi.org/10.1186/s13104-019-4494-7

BMC Research Notes

RESEARCH NOTE Open Access

Scalpel blade contamination and risk of postoperative surgical site infection following abdominal incisions in dogs

Christina G. Lioce[1*], Elizabeth C. Davis[1], Julie W. Bennett[1], Forrest I. Townsend[1] and Christopher P. Bloch[2]

多功能缝线产品说明

多功能缝线采用先进的生物科技，具有以下显著特点：

【减轻疼痛】独特的纳米材料处理技术，有效减少缝线对宠物皮肤的刺激，降低术后疼痛感，让宠物更加舒适地度过康复期。

【快速愈合】缝线经过特殊优化，能够促进宠物皮肤细胞的快速生长与修复，显著缩短伤口愈合时间，减少感染风险。

【安全可靠】采用生物相容性极佳的材料制成，确保缝线在宠物体内不会引起排斥反应或过敏症状，保障宠物的健康安全。

【操作便捷】专为宠物手术设计，医生在使用时能够轻松穿线、打结，提高手术效率，同时减少宠物在手术台上的时间。

多功能可吸收外科缝线

结构	多股, 编织	涂层	硬脂酸钙+聚已内酯
颜色	紫色、未染色	吸收类型	水解
成分	聚乙醇酸	适用范围	适用于一般软组织缝合或结扎
吸收期	120 天	灭菌	辐照

型号规格

缝线品名		可吸收性外科缝线
缝合线	规格 (线号)	6-0#、 5-0#、 4-0#、 3-0#、 2-0#、 0#、 1#、 2#
	线长 (CM)	1 0-550
缝合针	针的弧形	1/2弧、 3/8弧、 5/8弧、 直形
	针形	圆针、 正三角 、 反三角 、 铲形
	针径	0．2~1．2Mm
	弦长 (Mm)	4~31

优 点

1.天然仿生材料: 采用全球领先的天然仿生材料，确保缝线在体内具有良好的生物相容性和可吸收性。

2.载药纳米球技术: 独特的载药纳米球设计，能够强力黏附到缝线表面，不影响缝线强度、表面光滑度等关键性能。

3.纳米球内载有镇痛和消炎药物，能够在缝合伤口的同时，实现药物缓释，减轻术后疼痛，降低感染风险。

4.促进伤口愈合:仿生材料有助于细胞增殖和血管形成加速伤口愈合过程。

注意事项

1. 缝线在皮肤上保留 7 天以上可能会引起局部刺激，应该根据指示予以剪短或拆除。

2. 用可吸收性外科缝线缝合含血液供应不良的组织时， 应该谨慎使用，因为组织可能突出缝线或缝线吸收延迟。为避免损坏针尖和针线连接处， 夹持缝针时须握在针尾到针尖之间的 三分之一到 二分之一处，改变缝针形状可能会使其失去原有强度，容易弯曲和断裂。

3. 使用者在操作时要格外小心，以免伤自己，将用过的缝针弃于标有 "利器" 字样的容器内。

储存、运输条件：本产品应储存在温度低于25℃，湿度低于80%，无腐蚀性气体和通风良好的室内。产品运输过程中应避免重压、日晒和雨淋。

多功能非可吸收外科缝线

结构	单股
颜色	蓝色、未染色
成分	聚丙烯
灭菌	辐照

型号规格

缝线品名		非可吸收性外科缝线
缝合线	规格 (线号)	6-0#、 5-0#、 4-0#、 3-0#、 2-0#、 0#、 1#、 2#
	线长 (CM)	10-550
缝合针	针的弧形	1/2弧、 3/8弧、 5/8弧、 直形
	针形	圆针、 正三角、 反三角、 铲形
	针径	0．2~1．2Mm
	弦长 (Mm)	4~31

优 点

1.聚丙烯材料制成的缝线具有较高的拉伸强度和耐久性，能够长时间保持稳定的缝合效果，适用于各种需要高强度支持的手术部位。

2.载药纳米球技术:独特的载药纳米球设计，能够强力黏附到缝线表面，不影响缝线强度、表面光滑度等关键性能。

3.纳米球内载有镇痛和消炎药物，能够在缝合伤口的同时，实现药物缓释，减轻术后疼痛，降低感染风险

4.促进伤口愈合:仿生材料有助于细胞增殖和血管形成加速伤口愈合过程。

注意事项

1. 缝线在皮肤上保留 7 天以上可能会引起局部刺激，应该根据指示予以剪短或拆除。

2．在使用前，应仔细检查聚丙烯缝线是否有损坏、扭曲或其他异常情况，确保缝线的完整性和质量。

3．使用者在操作时要格外小心，以免伤自己，将用过的缝针弃于标有 "利器" 字样的容器内。

储存、运输条件：本产品应储存在温度低于25℃，湿度低于80%，无腐蚀性气体和通风良好的室内。产品运输过程中应避免重压、日晒和雨淋。

多功能缝线产品说明

倡义**创新定制！**

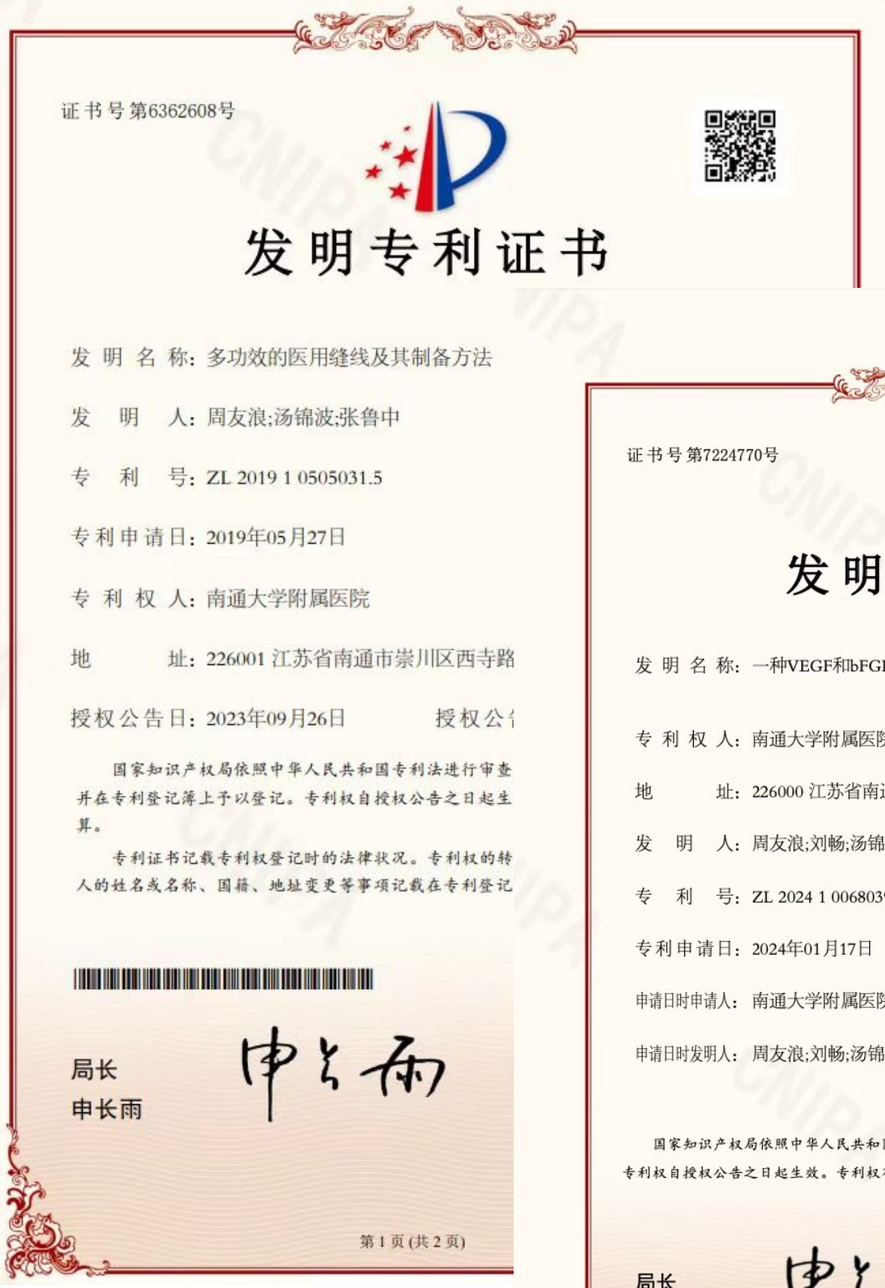
多功能缝线满足**多元需求！**

为宠物打造**专属康复方案！**

止血	促愈合
抗菌	镇痛
抗过敏	减少疤痕
	……

多功能外科缝线产品说明

本产品已获得国家发明专利及多项创新奖项



证书号第6362608号

发明专利证书

发 明 名 称：多功效的医用缝线及其制备方法

发 明 人：周友浪;汤锦波;张鲁中

专 利 号：ZL 2019 1 0505031.5

专利申请日：2019年05月27日

专 利 权 人：南通大学附属医院

地 址：226001 江苏省南通市崇川区西寺路

授权公告日：2023年09月26日 授权公

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申长雨

第 1 页 (共 2 页)

证书号第7224770号

专利公告信息

发明专利证书

发 明 名 称：一种VEGF和bFGF的模拟肽片段组合及其应用

专 利 权 人：南通大学附属医院

地 址：226000 江苏省南通市崇川区西寺路20号

发 明 人：周友浪;刘畅;汤锦波;杨纤纤

专 利 号：ZL 2024 1 0068039.0 授权公告号：CN 117886917 B

专利申请日：2024年01月17日 授权公告日：2024年07月23日

申请日时申请人：南通大学附属医院

申请日时发明人：周友浪;刘畅;汤锦波;杨纤纤

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2024年07月23日

第 1 页 (共 1 页)

证书编号：KCJS2023D1015

获奖证书

Award Certificate

2023年“科创江苏”创新创业大赛生命科学领域决赛

创新组 三等奖

项目名称：多功能生物活性缝线的制备及应用

团队成员：周友浪 汤锦波 陈情忠 杨纤纤 张鲁中 徐鹏军

完成单位：南通大学附属医院 南通大学

江苏省科学技术协会

江苏省人民政府台湾事务办公室

江苏省工业和信息化厅

江苏省农业农村厅

江苏省总工会

中国共产主义青年团江苏省委员会

江苏省委员会

二零二三年十二月

多功能外科缝线产品说明

本产品已在Molecular Therapy、Acta Biomaterialia等国际顶级期刊发表

Please cite this article in press as: Zhou et al., Gene-Loaded Nanoparticle-Coated Sutures Provide Effective Gene Delivery to Enhance Tendon Healing, Molecular Therapy (2019), https://doi.org/10.1016/j.ymthe.2019.05.024

Molecular Therapy
Original Article

AMERICAN SOCIETY of GENE & CELL THERAPY

Gene-Loaded Nanoparticle-Coated Sutures Provide Effective Gene Delivery to Enhance Tendon Healing

You Lang Zhou,[1] Qian Qian Yang,[1] Ying Ying Yan,[1] Luzhong Zhang,[1] Qiu Hong Wang,[1] Fei Ju,[1] and Jin Bo Tang[1]

[1]The Nanomedicine Research Laboratory, Research for Frontier Medicine and Hand Surgery Research Center, Department of Hand Surgery, Affiliated Hospital of Nantong University, Nantong 226001, Jiangsu, China

How to accelerate tendon healing remains a clinical challenge. In this study, a suture carrying nanoparticle/pEGFP-basic fibroblast growth factor (bFGF) and pEGFP-vascular endothelial growth factor A (VEGFA) complexes was developed to transfer the growth factor genes into injured tendon tissues to promote healing. Polydopamine-modified sutures can uniformly and tightly absorb nanoparticle/plasmid complexes. After tendon tissues were sutured, the nanoparticle/plasmid complexes still existed on the suture surface. Further, we found that the nanoparticle/plasmid complexes delivered into tendon tissues could diffuse from sutures to tendon tissues and effectively transfect genes into tendon cells, significantly increasing the expression of growth factors in tendon tissues. Finally, biomechanical tests showed that nanoparticle/pEGFP-bFGF and pEGFP-VEGFA complex-coated sutures could significantly increase the ultimate strengths of repaired tendons, especially at 4 weeks after operation. Two kinds of nanoparticle/plasmid complex-coated sutures significantly increased flexor tendon healing strength by 3.7 times for Ethilon and 5.8 times for PDS II, respectively, compared with the corresponding unmodified sutures. In the flexor tendon injury model, at 6 weeks after surgery, compared with the control suture, the nanoparticle/plasmid complex-coated sutures can significantly increase the gliding excursions of the tendon and inhibit the formation of adhesion. These results indicate that this nanoparticle/plasmid complex-coated suture is a promising tool for the treatment of injured tendons.

INTRODUCTION

A tendon is a link between muscle and bone, and it plays an important role in normal movement.[1–3] Injuries to the tendon caused by trauma or excessive exercise are common in the clinic.[4,5] The overall incidence of tendon or ligament injury was about 1/1,000 persons per year. However, due to the particularity of tendon tissue and lack of adequate cells and growth factors, the healing speed is slow and the healing quality is poor after injury.[6,7] Therefore, how to promote tendon healing, especially early healing, is still a difficult clinical problem.

In previous studies, several methods have been used to increase the concentration or expression of growth factors to promote tendon healing.[8,9] Some studies have directly injected growth factor into injured tendon tissue to promote healing, or injected a plasmid or virus carrying the growth factor gene to increase the expression of growth factor.[10,11] However, due to the compactness of tendon tissue, the volume of injected reagent is limited, and the injected liquid may easily leak, which affects the therapeutic effect. Therefore, finding a better delivery method is still a challenge. At present, clinical tendon repair is mainly done by surgical sutures. Can the suture itself be used as a vehicle for drug delivery? Some studies have loaded growth factors on the suture to promote the healing of the tendon.[12,13] However, because growth factor is directly loaded on the suture, growth factor is easily exposed to the tissue environment and degraded by protease. At the same time, there is no sustained release characteristic and no effect of continuous treatment, which limits the therapeutic effect.

Gene therapy is considered to be a promising method for translating target genes into proteins, which can effectively prolong the effectiveness of therapeutic proteins.[14,15] Our previous studies have found that *basic fibroblast growth factor* (*bFGF*) and *vascular endothelial growth factor A* (*VEGFA*) gene-loaded nanoparticles can continuously increase the expression of these growth factors in tendon tissue and then promote tendon healing.[16] However, due to the limitation of the volume of injection and the possibility of leakage, the therapeutic effect may be limited. Therefore, we intend to load the nanoparticle/gene complexes onto the surgical sutures, so as to avoid some of the above disadvantages, but how to load nanoparticle/gene complexes onto sutures is also a difficulty.

Polydopamine is a recently discovered bio-inspired polymer; it is the main component of sticky protein secreted by mussels.[17,18] It has

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ELSEVIER

Full length article

Nanoparticle-coated sutures providing sustained growth factor delivery to improve the healing strength of injured tendons

You Lang Zhou*, Qian Qian Yang, Luzhong Zhang, Jin Bo Tang*

The Nanomedicine Research Laboratory, Research for Frontier Medicine and Hand Surgery Research Center, Department of Hand Surgery, Affiliated Hospital of Nantong University, Nantong 226001, Jiangsu, China

ARTICLE INFO

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Nanoparticle-coated sutures
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ABSTRACT

Tendon injuries are common diseases. The healing capacity of tendon is limited due to its special composition of extra-cellular matrix and hypocellularity and hypovascularity. The purpose of this study was to evaluate the effectiveness of nanoparticle-coated sutures carrying growth factors for accelerating tendon repair. A variety of experimental methods had been used to investigate the characteristics and therapeutic effects of the modified sutures. Nanoparticles could adhere uniformly to the surface of the suture through polydopamine. Even sutured in the tendon, most of nanoparticles were still remained on the surface of suture, and the loaded proteins could spread into the tendon tissues. *In vivo* study, the ultimate strength of repaired tendons treated with bFGF and VEGFA-releasing sutures was significantly greater than the tendons repaired with control sutures at multiple time-points, whether in the chicken model of flexor tendon injury or the rat model of Achilles tendon injury. At week 6, the adhesion score in the bFGF and VEGFA-releasing suture group was significantly lower than those of the control suture group. Tendon gliding excursion was significantly longer in the bFGF and VEGFA-releasing suture group than that in the control bare sutures. Work of digital flexion was significantly decreased in the bFGF and VEGFA-releasing suture group. In a word, we developed a platform for local and continuous delivery of growth factors based on the nanoparticle-coated sutures, which could effectively deliver growth factors to tissues and control the release of growth factors. This growth factors delivery system is an attractive therapeutic tool to repair injured tendons.

Statement of significance

Tendon rupture is a common clinical injury, due to the special character of the tendon with mainly extra cellular matrix and hypocellularity and hypovascularity, the healing capacity of the injured tendon is limited. In this study, nanoparticle-coated surgical sutures carrying growth factors were prepared to accelerate tendon repair. After treatment, bFGF and VEGFA loaded nanoparticle-coated sutures can significantly enhance tendon healing, and significantly improve tendon gliding function and effectively inhibit the formation of adhesion. Moreover, these nanoparticle-coated sutures have good biocompatibility and no obvious tissue reaction, which provides more guarantee for further clinical application. This is an attractive and promising approach that uses surgical suture as a growth factor delivery tool to repair tendon injury, which can simplify the treatment. And this kind of bioactive sutures may be applied to other tissue repair, such as muscle, nerve, intestinal canal, blood vessel, skin, and so on.

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1. Introduction

Tendon tissues are a special form of connective tissues that connect muscles and bones and play the vital function for normal limb movement [1,2]. Because of excessive exercise, trauma from sports activities, work or daily life, injuries to tendons are very common, which is a social problem that causes economic damages and family burden. According to statistics, from January 1996 to December 2000, the annual incidence rate of tendinous or ligamentous injury was 106/100,000 per year [3,4]. However, due to the special character of the tendon with mainly extra cellular matrix and hypocellularity and hypovascularity, the healing process of the injured

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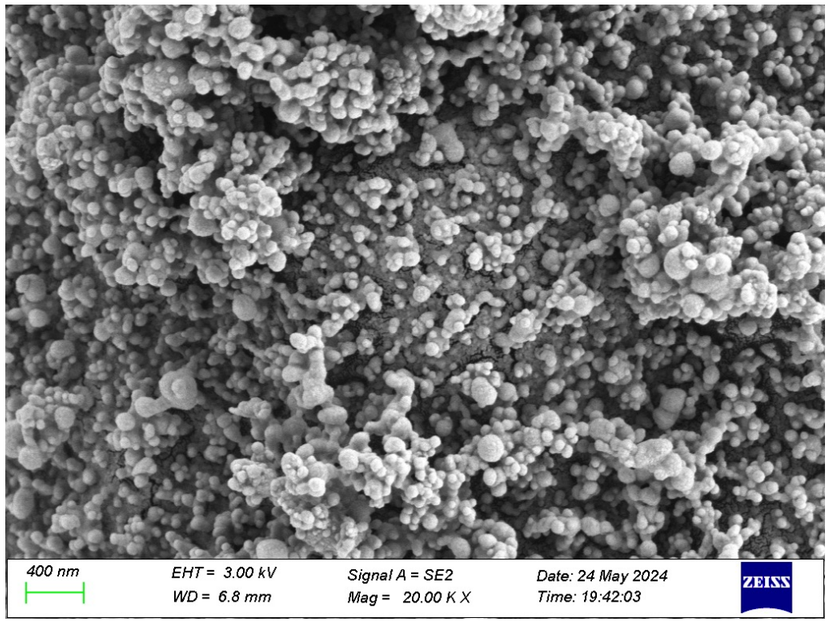
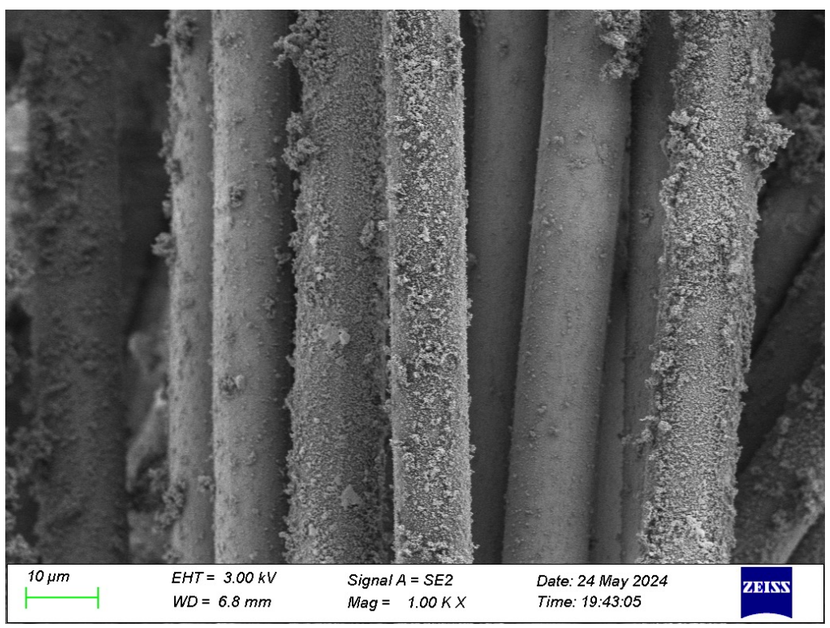
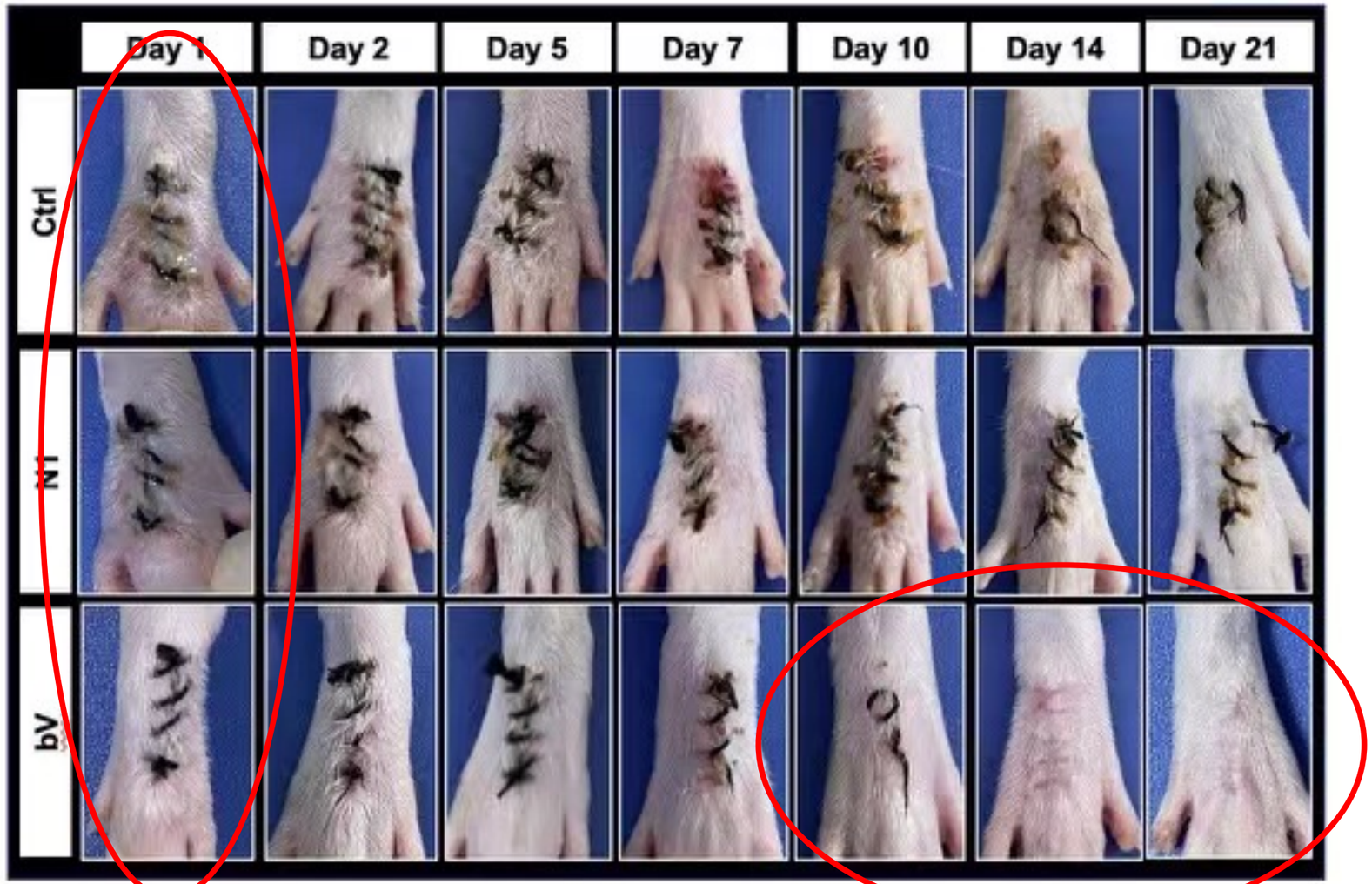
多功能外科缝线产品说明





本产品的微观图像和动物应用



抑制红肿

促愈合

南通倡义科技有限公司
Nantong ChangYi Technology Co., Ltd

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