指南与共识

化疗药物导致的周围神经病变中西医结合防治专家共识

世界中医药学会联合会肿瘤精准医学专业委员会

通信作者：霍介格，Email：huojiege@jsatcm.com

【摘要】 化疗药物导致的周围神经病变（CIPN）是常见的化疗不良反应之一。CIPN 增加了肿瘤患者的痛苦，降低了生活质量，部分患者不得不因此而减少化疗药物剂量甚至停止化疗，影响肿瘤的治疗。该专家共识是在文献综述的基础上结合专家投票针对 CIPN 的定义、临床特征、发病机制、危险因素、诊断与临床评估、中医认识与辨证、预防、治疗、宣教与管理展开论述和分级推荐。希望借此提高临床医生对 CIPN 的了解和重视，规范地干预 CIPN，改善患者预后。

【关键词】 化疗药物； 周围神经病变； 中西医结合； 专家共识

doi：10.3969/j.issn.1674-4136.2023.06.001

文章编号：1674-4136（2023）06-0521-10

Expert consensus on the prevention and treatment of chemotherapy-induced peripheral neuropathy by integrated Chinese and Western medicine

Corresponding author: *HUO Jiege*, *Email*: *huojiege@jsatcm.com*

【**Abstract**】 Chemotherapy-induced peripheral neuropathy (CIPN) is one of the common adverse reactions of chemotherapy. CIPN increases the suffering of tumor patients and reduces the quality of life. Therefore, some patients have to reduce the dose of chemotherapy drugs or even stop chemotherapy, which affects the treatment of tumors. This expert consensus discusses and recommends the definition, clinical features, pathogenesis, risk factors, diagnosis and clinical evaluation, TCM understanding and syndrome differentiation, prevention, treatment, education, and management of CIPN based on the literature review and expert voting. It is hoped that this consensus will improve clinicians' understanding and attention to CIPN, standardize the management of CIPN, and improve patient prognosis.

【**Key words**】 Chemotherapy drugs; Peripheral neuropathy; Integrated Chinese and Western medicine; Expert consensus

随着筛查、诊断和治疗的进展，肿瘤患者的生存期越来越长，肿瘤幸存者越来越多。在临床中关注和管理癌症治疗带来的长期毒性非常重要，因为它们可能影响着患者的治疗依从性及生活质量[1]。化疗药物导致的周围神经病变（chemotherapy-induced peripheral neuropathy，CIPN）是临床中常见的化疗不良反应之一，发生率高，持续时间久[2]。2014 年 ASCO 发布了成年人 CIPN 预防与管理指南，2020 年进行了更新，但指南中并无预防方案推荐，在治疗方面也仅仅中度推荐度洛西汀[3]。近年来在 CIPN 领域取得了一定的进展，2020 年紫杉类药物相关 CIPN 规范化管理专家共识专家委员会发布了紫杉类药物相关 CIPN 规范化管理专家共识，提高了大家对紫杉类药物周围神经毒性的认识[4]。根据临床症状特点，CIPN 与中医痹证、血痹症状相似，临床中患者广泛地接受中医药干预，取得了一定的疗效。

为了更好地帮助临床医生认识和管理 CIPN，推进中医药干预 CIPN，世界中医药学会联合会肿瘤精准医学专业委员会经过广泛征求意见，在文献综述的基础上基于临床证据结合专家的投票最终形成了本共识，作为临床医师的参考。

1　CIPN 定义、临床特征及影响

CIPN 是指应用化疗药物后出现的以四肢末梢感觉异常为代表的周围神经病变，临床症状多样，是一种常见的药物治疗相关的不良反应[5]。CIPN 发生率、临床特征和化疗药物种类、药物累积剂量密切相关，目前已报道的可以导致 CIPN 的化疗药物有铂类药物（奥沙利铂、顺铂、卡铂）、紫杉类药物（紫杉醇、多西他赛）、长春碱类药物（长春新碱、长春碱）、艾瑞布林、沙利度胺及靶向药物硼替佐米、伊匹单抗、纳武单抗、派姆单抗等[6]。

根据 CIPN 出现的时间和临床特征，CIPN 可分为急性和慢性两种。急性 CIPN 在用药后数小时到数天即可出现，峰值在用药后第 3 天，一般 1 周内恢复，它具有可逆性，和化疗药物累积剂量无关的特点。上述药物中奥沙利铂和紫杉醇会导致急性 CIPN。奥沙利铂的急性 CIPN 发生率为 85%～98%，主要是和冷刺激相关的感觉异常，通常发生在四肢末梢，部分患者会出现口腔、舌体、咽喉、下颌区域不适及肌肉痉挛[7-8]。紫杉醇的急性 CIPN 发生率为 25%～58%，症状包括关节痛和肌痛[9-10]，急性 CIPN 的发生和严重程度与慢性 CIPN 密切相关[7,10]。

慢性 CIPN 与药物累积剂量相关，其发生率随着化疗周期数的增加而升高。临床症状多样，特征性表现为双侧对称性感觉异常、感觉障碍和疼痛，主要发生在双足和（或）双手末端（呈“手套-袜子”分布），最常见的症状是麻木和刺痛，少部分患者可伴有精细运动（扣纽扣、戴耳环、夹筷子、书写等）协调困难、感觉性共济失调（走路踩棉花感觉）和自主神经功能障碍（勃起功能障碍、出汗、手抖、焦虑、抑郁、睡眠障碍、疲乏等）[5,7,11]。一项纳入 31 项临床研究 4 179 例患者的 Meta 分析显示：化疗结束后第 1 个月慢性 CIPN 发生率为 68.1%，第 3 个月发生率为 60%，6 个月以上发生率仍有 30%，部分患者的症状会持续数年甚至终生[12]。在停止化疗后 2-6 个月内，部分患者的 CIPN 症状会持续加重，被称为“滑行”现象[13]。CIPN 增加了肿瘤患者的痛苦和经济支出，降低了生活质量，部分患者不得不因此而减少化疗药物剂量甚至停止化疗，影响肿瘤的治疗[14-15]。

专家共识 1：CIPN 是临床中常见的化疗药物不良反应，发生率高，影响生活质量和肿瘤治疗，临床中应该给予足够的重视，尤其是可能长时间生存的术后辅助化疗人群。

2　CIPN 的发病机制

不同的化疗药物影响周围神经系统的不同部位，包括从背根神经节（dorsal root ganglion，DRG）的感觉细胞体到远端轴突。目前认为 CIPN 可能的病理机制如下。

2.1　DRG 损伤

感觉信号（如感觉异常、感觉障碍和疼痛）通过 DRG 传导到中枢神经系统，因为缺乏血脑屏障和淋巴系统，化疗药物容易进入 DRG 中产生毒性[16]。铂类药物可以与细胞内 DNA 形成络合物并蓄积在 DRG，导致 DRG 细胞损伤及凋亡[17]。紫杉烷、长春花生物碱、沙利度胺和硼替佐米也与 DRG 损伤有密切关系[18-20]。

2.2　微管损伤

微管是神经元轴突能量和物质运输的关键结构。紫杉类药物是微管抑制剂，在周围神经系统中，其可能通过抑制微管蛋白解聚，干扰神经元轴突正常的微管动力学，阻断轴突的运输功能[21]。长春新碱和硼替佐米也可以影响微管蛋白的功能，导致周围神经功能损伤[22]。

2.3　线粒体功能障碍与氧化应激

线粒体功能障碍与氧化应激是 CIPN 产生的重要机制，线粒体功能异常可导致细胞内钙信号、活性氧（ROS）和细胞凋亡等通路的失调[23]。化疗药物可以通过诱导线粒体通透性转换孔打开，改变线粒体钙稳态和干扰线粒体电子传递链等导致线粒体膜电位异常、ROS 生成增加、ATP 水平降低、钙释放，最终引起神经元异常兴奋性[24-26]。线粒体损伤后会产生大量的 ROS，干扰抗氧化物功能比如 Nrf2、SOD、MDA、GSH，继发氧化应激损伤，最终影响神经元细胞功能[27-28]。

2.4　细胞膜通道功能异常

化疗药物进入周围神经系统后可以导致多种细胞膜通道功能和表达异常，影响周围神经功能。参与 CIPN 的细胞膜通道主要分为两大类：一类是神经兴奋产生及传递的相关通道，比如电压门控钠通道（Nav1.6、Nav1.7）、电压门控钾通道（TREK-1、SK3 和 TRAAK）、电压门控钙通道（L 型、T 型和 N 型 Cav）、瞬时感受器电位通道（TRPV1、TRPA1、TRPM8）[29-33]。另一类是参与化疗药物神经元细胞内外转运蓄积的转运通道蛋白，如 OCT2、OCTN1/2、Ctr1、Atp7a、Mate1 等[34-36]。

专家共识 2: CIPN 发病机制尚未完全清楚，目前认为多种机制共同参与导致了 CIPN 的产生，且不同的化疗药物导致 CIPN 的机制也不全相同，这也解释了不同化疗药物导致的 CIPN 临床症状的差异及为何单靶点药物干预 CIPN 疗效不佳的原因。

3 CIPN 危险因素

3.1 药物累积剂量

药物累积剂量是最主要和最确切的影响因素，奥沙利铂的中位累积剂量 676～1 449 mg/m^2 [37]，在术后辅助化疗患者中也观察到 6 个周期的含奥沙利铂方案周围神经毒性明显高于 3 个周期的人群 [38]。临床研究也发现白蛋白紫杉醇 150 mg 每周方案较 100 mg 方案的周围神经毒性发生率更高，停止化疗后恢复时间更长 [39]。

3.2 药物输注时间

药物的输注时间过短可能是奥沙利铂和紫杉醇急性周围神经毒性的危险因素，相比 3 h 紫杉醇输注，延长紫杉醇可明显降低周围神经毒性的发生率 [40-41]。在奥沙利铂用药过程中，研究也显示 6 h 的奥沙利铂输注急性周围神经毒性发生率低于 2 h 的输注 [42]。

3.3 年龄

儿童肿瘤患者 CIPN 的发生率更高 [43]，这可能和儿童时期周围神经系统发育不全、药物的使用剂量、药代动力学不同、缺乏早期发现及更好的肿瘤预后等因素有关 [6]。>65 岁患者应用卡铂后周围神经毒性发生率更高 [44]。紫杉类药物 CIPN 与年龄有显著相关性，每增加 10 岁，神经病变风险增加 12.9% [45]。

3.4 其它因素

其它可能的因素包括：化疗前已合并有 CIPN（糖尿病 CIPN、病毒感染等导致的 CIPN）[6]、遗传因素 [46-48]、肾功能异常（低肌酐清除率）、吸烟史等 [49]。糖尿病是否增加 CIPN 的发生率目前尚存在争议，需要进一步的研究有研究显示 [50-51]。

专家共识 3: 目前认为药物累积剂量和药物输注时间是 CIPN 明确的高危因素，年龄、遗传等其他危险因素证据不足或存在争议，需要进一步研究，尚无公认的可以预测 CIPN 高危人群的分子标志物。

4 CIPN 的诊断与临床评估

4.1 CIPN 诊断与鉴别诊断

结合化疗药物应用背景和典型临床表现，就可明确诊断 CIPN，通常不需要进行复杂的检查。但在 CIPN 诊断过程中，需要注意与其他病因导致的 CIPN 进行鉴别，特别是当患者存在运动神经障碍、明显的肢体无力时，应注意鉴别诊断 [52]。临床常需要与其鉴别的疾病包括：肿瘤相关的副癌综合征、肿瘤压迫引起的神经病理性疼痛、慢性炎性脱髓鞘性多发性神经根周围神经病（格林巴利综合征、多发性硬化等）、糖尿病 CIPN 等。

4.2 CIPN 临床评估

目前 CIPN 最常用的量表为 EORTC-QLQ-CIPN20 评分量表和 NCI-CTCAE 分级量表 [53]。EORTC-QLQ-CIPN20 评分量表是基于患者的评估量表，包含 20 个问题，评估全面，涉及感觉及运动神经症状、自主神经症状，应用广泛。NCI-CTCAE 分级量表是基于医护人员的评估量表，操作简单，它包含了感觉和运动两个方面，分为 1-5 级，与 EORTC-QLQ-CIPN20 评分量表吻合度高。其它量表包括患者神经毒性问卷（PNQ）、总神经病变评分（TNS）、妇科肿瘤患者神经毒性评估量表（FACT/GOG-Ntx）、Levi 专用感觉神经毒性分级（奥沙利铂急性 CIPN 专用量表）等 [54]。合并有疼痛的患者可以采用 VAS、PINRS 评分量表评估疼痛情况 [55]。对于合并自主神经症状如焦虑、抑郁的患者可采用焦虑及抑郁相关评估量表评估。

对 CIPN 患者进行神经电生理检查存在争议，因为它不指导治疗也无法提供早期损伤预测。目前主要用于临床研究中，除非用于怀疑合并其他类型 CIPN 时的鉴别诊断 [56]。

专家共识 4: 根据化疗药物用药史及特征性的临床症状一般都可以明确 CIPN 的诊断，但对于合并运动神经障碍、明显的肢体无力患者应注意鉴别诊断。建议临床中对 CIPN 进行多维度的评估，不推荐 CIPN 患者常规进行肌电图检查。

5 CIPN 的中医认识与辨证

根据临床症状特点，CIPN 与中医痹证、血痹症状相似 [57-58]。肿瘤患者本身存在正气不足，化疗药物属于有毒伤正之品，化疗药物进入机体后会进一步损伤机体正气，导致气血不足，营卫虚弱，气虚则推动无力血行涩滞，血虚则荣养不足，最终经络闭阻不通，筋脉失养，出现四肢末梢疼痛、麻木等症状。

5.1 营血虚弱，寒凝经脉

本证型多见于化疗早期，出现急性 CIPN 者，尤

其是应用奥沙利铂、紫杉类药物化疗早期。症状表现为四肢末梢麻木，肌肉、关节疼痛或口腔、舌体、咽喉、下颌区域不适及肌肉痉挛，遇寒（冷水、冰冷物体）症状加重，症状在化疗用药结束后很快可以恢复，舌质淡苔薄白，脉沉细或弦细。治以温经散寒，养血通脉。

5.2　气虚血弱、营卫失和

本证型多见于化疗中后期，急慢性周围神经病变症状交叉，慢性周围神经症状逐渐出现加重者。症状表现为四肢末梢麻木、疼痛，可与冷刺激无关，部分患者症状持续存在，舌质淡苔薄白，脉微涩或脉紧。治以益气温经，和营通痹。

5.3　气虚血瘀、络脉痹阻

本证型多见于化疗后期或化疗结束后较长时间内，患者仍持续伴有周围神经病变症状者。症状表现为四肢末梢麻木和刺痛，持续不缓解，可与冷刺激无关，部分患者可伴有精细运动（如扣纽扣、戴耳环、夹筷子、书写等）协调困难、感觉性共济失调（走路踩棉花感觉）和出汗、手抖、乏力等自主神经症状，舌质黯或紫黯或舌边有瘀斑，苔薄白，脉涩。治以补气养血，活血通络。

专家共识 5：CIPN 中医病名、病机、证型目前无统一认识，本共识建议从痹证、血痹论治 CIPN。临床上分为营血虚弱，寒凝经脉；气虚血弱，营卫失和；气虚血瘀，络脉痹阻 3 个证型。

6　CIPN 预防

截至目前，已开展了很多 CIPN 预防的临床研究，包括一般护理、物理防护、药物治疗。

6.1　非药物预防

6.1.1　延长药物输注时间、减少药物累积剂量　较短的药物输注时间和较高的药物累积剂量是 CIPN 的危险因素，延长药物输注时间可以降低急性周围神经毒性的发生率和严重程度，建议紫杉醇输注时间>3 h，奥沙利铂输注时间>6 h。对于Ⅱ期结直肠癌（T3N0M0，pMMR）无高危因素者，不推荐联合使用奥沙利铂，伴高危因素的Ⅱ期肠癌和低危Ⅲ期患者 T1～3N1 结直肠癌推荐 3 个月的 CapeOX 方案化疗[29-30,59-60]。

6.1.2　其它非药物方法

加压手套及冰冻手套和袜子可降低紫杉烷类药物导致的 CIPN 发生率[63]。最近开展的一项多中心的临床研究评估佩戴冰冻手套预防接受奥沙利铂、多西他赛、紫杉醇所导致的 CIPN 的疗效，结果显示在 EORTC QLQ CIPN20 量表评估中两组差异无统计学意义。但佩戴冰冻手套可以减轻患者的手指/手部刺痛感、双手精细协调运动及手部力量[63]。因考虑到奥沙利铂导致的周围神经病变与接触冷物明确相关，因而不推荐冰手套预防奥沙利铂周围神经病变。

专家共识 6：在非药物预防 CIPN 中推荐延长药物输注时间（紫杉醇>3 h，奥沙利铂>6 h）和根据患者肿瘤分期、不良反应等降低药物的累积剂量。推荐患者使用加压手套预防接受紫杉类药物引起的 CIPN。

6.2　药物预防

6.2.1　单唾液酸四己糖神经节苷脂（GM1）　GM1 对奥沙利铂周围神经毒性有一定的预防效果[64]，可显著降低参与者报告的急性神经毒性（对冷物品的敏感性、吞咽冷液体的不适、喉咙不适、肌肉抽筋）发生率[65]。对紫杉醇导致的周围神经毒性，GM1 组有更低的 CTCAE 4.0 1 级或以上的 CIPN，更低的 ENS 感觉神经病变和运动神经病变亚量表评分[66]，被认为是紫杉类药物周围神经毒性干预的重大进步[67]。

6.2.2　维生素 E　早期的小样本临床研究均提示补充维生素 E 可以降低顺铂化疗患者周围神经毒性的发生率和严重程度[68]，对顺铂化疗患者的神经有一定的保护作用[69]。

6.2.3　钙锰福地吡（Calmangafodipir）　钙锰福地吡是在锰福地吡（通常作为核磁共振检查的造影剂）的基础上改进而成，具有减少氧自由基的形成、抗氧化应激作用。Ⅱ期临床研究结果提示其可以减少 2 级及以上神经病变发生[70]，目前国内药物不可及。

专家共识 7：本共识推荐使用 GM1 预防紫杉类药物慢性周围神经毒性和奥沙利铂急性周围神经毒性；推荐维生素 E 用于预防顺铂慢性周围神经毒性。

6.2.4　中医药　中医药预防 CIPN 的文献报道很多，包括中药口服、中药外洗[61,71-72]等。Schloss 等[73]从 5 614 项评估研究中选择了 34 项研究，通过文献的综述和数据的再分析，推荐草药作为 CIPN 的辅助治疗，但仍需进一步设计严格的临床研究验证。Meta 分析提示黄芪桂枝五物汤临床可以有效预防 CIPN，2019 年霍介格团队报道了一项多中心、双盲、随机、安慰剂对照试验，结果显示 4 个周期含奥沙利铂方案辅助化疗后，EORTC QLQ-CIPN20 周

围神经毒性评分、疼痛评分，黄芪桂枝五物颗粒组均低于安慰剂组[74]。其它可用的中药复方有当归四逆汤、补阳还五汤。

专家共识 8：基于以上临床研究、文献综述及专家投票，本共识推荐应用黄芪桂枝五物汤及加减方预防奥沙利铂慢性周围神经毒性；推荐益气温经、活血通络类药物内服、外洗预防 CIPN。鼓励在临床中开展高质量的临床研究优化中医药预防 CIPN 方案。

6.3 不推荐或反对用于 CIPN 预防的药物

对于已经过Ⅲ期的 RCT 研究证实无效的药物，本共识对于Ⅲ期 RCT 研究证实无效且不良反应大的药物，反对在临床实践中用于预防 CIPN，不推荐在临床实践中用于预防 CIPN[75-83]。

专家共识 9：基于当前的临床研究结果，本专家共识反对临床中使用钙镁合剂、乙酰左旋肉碱、阿米替林、普瑞巴林、文拉法辛、Goshajinkigan（济生肾气丸）预防 CIPN；不推荐使用谷胱甘肽、B 族维生素预防 CIPN[84-86]；不推荐使用氨磷汀[87-88]、维生素 E[89] 用于顺铂以外的 CIPN。

7 CIPN 治疗

CIPN 的治疗包括药物治疗、非药物治疗及综合干预等。

7.1 药物治疗

7.1.1 度洛西汀 度洛西汀是一种选择性的 5-羟色胺和去甲肾上腺素再摄取抑制药，可以有效改善 CIPN 引起的疼痛[90-91]，但考虑到度洛西汀的不良反应大如嗜睡、恶心、呕吐、眩晕等，临床医生要充分评估患者的受益和药物的不良反应[3,92]。

7.1.2 普瑞巴林 在 CIPN 预防的临床研究中未显示普瑞巴林的获益，但在 CIPN 的治疗方面具有一定的疗效[93-94]，并可改善 CIPN 患者的整体生活质量[95-96]。和度洛西汀类似，在临床使用中普瑞巴林的不良反应多，如头晕、嗜睡、共济失调等。所以临床使用时应该平衡患者的受益和不良反应。

7.1.3 文拉法辛 文拉法辛对奥沙利铂所致的急性神经感觉毒性及紫杉醇导致的 CIPN 均有治疗效果[97-98]，与度洛西汀相比，文拉法辛同样可降低运动、感觉和神经性疼痛分级，但在降低疼痛程度方面不如度洛西汀[99]。

7.1.4 中医药 中医药治疗 CIPN 方法包括中药口服、中药外洗、中药涂擦、贴敷等[58,100-101]。在临床中应用广泛，但大部分循证证据低，在本共识制定过程中，我们采用了专家投票的方式作为补充，结果显示 100%专家推荐使用中医药治疗 CIPN，推荐的包括黄芪桂枝五物汤，当归四逆汤及补阳还五汤等具有闪气温经通络功效的中药复方。近期徐兵河团队开展的一项临床研究证实黄芪桂枝五物汤预防使用可降低白蛋白结合型紫杉醇周围神经病变发生率，提高患者的耐变性和生活质量[102]。

专家共识 10：基于以上临床研究结果，推荐度洛西汀、普瑞巴林治疗 CIPN；推荐文拉法辛治疗奥沙利铂急性周围神经毒性；推荐使用具有益气温经、活血通络功效的中药复方口服或外洗治疗 CIPN；鼓励在临床中开展高质量的临床研究优化中医药治疗 CIPN 方案。

7.2 非药物疗法

7.2.1 运动锻炼 近年来运动锻炼对 CIPN 的改善作用越来越受到关注，通过特定的运动锻炼可以改善 CIPN 患者的感觉及运动症状，这些运动锻炼方式包括感觉运动训练（SMT）、全身振动（WBV）、基于可穿戴传感器的互动运动适应平衡训练方案、渐进式步行和阻力锻炼、耐力和平衡训练、基于游戏的互动平衡训练、多模式运动等[103-108]。专家投票认为太极拳、八段锦等养生运动方法有助于改善 CIPN 的症状，但需要进一步的临床研究。

专家共识 11：基于以上临床研究结果及专家投票，推荐运动锻炼治疗 CIPN，强烈建议临床医生指导或告知患者康复科就诊开展适当的运动锻炼；推荐有条件的患者练习太极拳、八段锦等中医养生运动。

7.2.2 针灸 针灸治疗 CIPN 是一种有效的干预措施，可改善 CIPN 患者手脚麻木、疼痛及生活质量[109-113]，常用的穴位有足阳明胃经的足三里、丰隆，手阳明大肠经的合谷、曲池，足太阴脾经的血海、三阴交[114]。近两项系统评价也证实针灸治疗可以改善 CIPN 症状，但需要更高级别、大样本的证据[115]。一项对美国肿瘤从业人员推荐或使用针灸治疗 CIPN 的调查显示，有三分之一人接受针灸治疗 CIPN[116]。

专家共识 12：基于以上临床研究结果及专家投票，推荐使用针灸治疗 CIPN。鼓励开展高质量的针灸治疗 CIPN 临床研究。

7.3 不推荐用于 CIPN 治疗的药物

对于已经过Ⅲ期的 RCT 研究证实无效的药物[117-121]，本共识不推荐在临床实践中用于治疗 CIPN。

专家共识 13：本共识不推荐使用加巴喷丁、拉莫三嗪、阿米替林、去甲替林、阿米替林相关外用制剂治疗 CIPN。

8　CIPN 宣教和管理

CIPN 影响患者的生活质量，尤其是对于接受辅助化疗、新辅助化疗的早期肿瘤预后好的患者，影响更为显著。尽管目前有一些被证明可以预防或治疗 CIPN 的药物及非药物疗法，但疗效仍不理想，仍有部分患者出现长时间或永久性的 CIPN 症状。因此，对即将或正在使用可能导致 CIPN 化疗药物的患者进行充分的宣教和精细化管理十分重要。内容包括：①在用药前充分评估患者有无基础 CIPN、肾功能异常等 CIPN 高危因素；②参照最新指南、共识，结合患者的年龄、肿瘤分期为患者制定个体化化疗方案，减少可能会导致 CIPN 药物的累积剂量；③在使用可导致 CIPN 的化疗药物前，医护人员应充分对患者宣教：如在输注奥沙利铂前后避免冷刺激，包括进食冰冷食物、冷水漱口、呼吸冷空气、接触金属冷物、注意四肢末梢的保暖；④在用药过程中，及时地评估 CIPN。急性神经病变往往是慢性神经病变的预测因素，所以要关注急性神经病变，告知患者早发现、早报告；⑤出现 CIPN 后，应注意五防：防跌倒、防磕碰、防烫伤、防冻伤、防锐器伤。同时给予精细化管理，应根据 CIPN 的严重程度及时调整用药方案、同时给予患者药物、非药物综合干预，避免出现更严重 CIPN 的风险；⑥CIPN是增加跌倒风险的重要因素，尤其是伴有运动神经受损和自主神经症状的人群。推荐使用 Morse 跌倒评估量表对患者进行跌倒评估，在院期间加强巡视，及时发现并满足患者需求，提供足够的灯光，将物品放置于患者易取处，保持房间地面清洁干燥，清除病房、床旁和通道障碍，穿着舒适的鞋和衣裤，患者活动时有人陪伴等[4]；⑦对于慢性 CIPN 患者，应及时给予药物、非药物干预。建议多学科的诊治，包括神经内科、康复科、中医科、心理科等，为患者制定综合干预方案，促进恢复，避免发展为不可逆的 CIPN 或者致残。

专家共识 14：计划使用可能导致 CIPN 化疗药物的患者应做好充分的宣教和精细化管理，以做到早发现、早干预。对于已经出现 CIPN 的患者，建议采用多学科的干预，以做到早康复，避免严重并发症。

利益冲突：

本共识编写过程无利益冲突。

参考文献：

[1] Park SB, Goldstein D, Krishnan AV, et al. Chemotherapy-induced peripheral neurotoxicity: a critical analysis [J]. CA Cancer J Clin, 2013, 63(6): 419-437.

[2] Yoshino T, Kotaka M, Shinozaki K, et al. JOIN trial: treatment outcome and recovery status of peripheral sensory neuropathy during a 3-year follow-up in patients receiving modified FOLFOX6 as adjuvant treatment for stage II/III colon cancer [J]. Cancer Chemother Pharmacol, 2019, 84(6): 1269-1277.

[3] Hershman DL, Lacchetti C, Dworkin RH, et al. Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline [J]. J Clin Oncol, 2014, 32(18): 1941-1967.

[4] 马飞，刘明生，王佳妮，等. 紫杉类药物相关周围神经病变规范化管理专家共识 [J]. 中国医学前沿杂志(电子版)，2020, 12(3): 41-51.

[5] Flatters SJL, Dougherty PM, Colvin LA. Clinical and preclinical perspectives on Chemotherapy-Induced Peripheral Neuropathy (CIPN): a narrative review [J]. Br J Anaesth, 2017, 119(4): 737-749.

[6] Cavaletti G, Alberti P, Argyriou AA, et al. Chemotherapy-induced peripheral neurotoxicity: A multifaceted, still unsolved issue [J]. J Peripher Nerv Syst: 24 Suppl 2: S6-S12.

[7] Pachman DR, Qin R, Seisler DK, et al. Clinical course of oxaliplatin-induced neuropathy: Results From the Randomized Phase III trial N08CB (Alliance) [J]. J Clin Oncol, 2015, 33(30): 3416-3422.

[8] Gebremedhn EG, Shortland PJ, Mahns DA. The incidence of acute oxaliplatin-induced neuropathy and its impact on treatment in the first cycle: a systematic review [J]. BMC Cancer, 2018, 18(1): 410.

[9] Loprinzi CL, Reeves BN, Dakhil SR, et al. Natural history of paclitaxel-associated acute pain syndrome: prospective cohort study NCCTG N08C1 [J]. J Clin Oncol, 2011, 29(11): 1472-1478.

[10] Reeves BN, Dakhil SR, Sloan JA, et al. Further data supporting that paclitaxel-associated acute pain syndrome is associated with development of peripheral neuropathy: North Central Cancer Treatment Group trial N08C1 [J]. Cancer, 2012, 118(20): 5171-5178.

[11] Bonhof CS, van de Poll-Franse LV, Vissers PAJ, et al. Anxiety and depression mediate the association between chemotherapy-induced peripheral neuropathy and fatigue: Results from the population-based PROFILES registry [J]. Psychooncology, 2019, 28(9): 1926-1933.

[12] Seretny M, Currie GL, Sena ES, et al. Incidence, prevalence, and predictors of chemotherapy-induced peripheral neuropathy: A systematic review and meta-analysis [J]. Pain, 2014, 155(12): 2461-2470.

[13] Pachman DR, Qin R, Seisler D, et al. Comparison of oxaliplatin and paclitaxel-induced neuropathy (Alliance A151505) [J]. Support Care Cancer, 2016, 24(12): 5059-5068.

[14] Pike CT, Birnbaum HG, Muehlenbein CE, et al. Healthcare costs and workloss burden of patients with chemotherapy-associated peripheral neuropathy in breast, ovarian, head and neck, and nonsmall cell lung cancer [J]. Chemother Res Pract, 2012, 2012: 913848.

[15] Soveri LM, Lamminmäki A, Hänninen UA, et al. Long-term neuropathy and quality of life in colorectal cancer patients treated with oxaliplatin containing adjuvant chemotherapy [J]. Acta onco-

logica (Stockholm, Sweden), 2019, 58(4): 398-406.
[16] Jimenez-Andrade JM, Herrera MB, Ghilardi JR, et al. Vascularization of the dorsal root ganglia and peripheral nerve of the mouse: implications for chemical-induced peripheral sensory neuropathies [J]. Mol Pain, 2008, 4: 10.
[17] Yan F, Liu JJ, Ip V, et al. Role of platinum DNA damage-induced transcriptional inhibition in chemotherapy-induced neuronal atrophy and peripheral neurotoxicity [J]. J Neurochem, 2015, 135(6): 1099-1112.
[18] Peters CM, Jimenez-Andrade JM, Kuskowski MA, et al. An evolving cellular pathology occurs in dorsal root ganglia, peripheral nerve and spinal cord following intravenous administration of paclitaxel in the rat [J]. Brain Res, 2007, 1168: 46-59.
[19] Topp KS, Tanner KD, Levine JD. Damage to the cytoskeleton of large diameter sensory neurons and myelinated axons in vincristine-induced painful peripheral neuropathy in the rat [J]. J Comp Neurol, 2000, 424(4): 563-576.
[20] Casafont I, Berciano MT, Lafarga M. Bortezomib induces the formation of nuclear poly(A) RNA granules enriched in Sam68 and PABPN1 in sensory ganglia neurons [J]. Neurotox Res, 2010, 17(2): 167-178.
[21] Gornstein EL, Schwarz TL. Neurotoxic mechanisms of paclitaxel are local to the distal axon and independent of transport defects [J]. Exp Neurol, 2017, 288: 153-166.
[22] LaPointe NE, Morfini G, Brady ST, et al. Effects of eribulin, vincristine, paclitaxel and ixabepilone on fast axonal transport and kinesin-1 driven microtubule gliding: implications for chemotherapy-induced peripheral neuropathy [J]. Neurotoxicology, 2013, 37: 231-239.
[23] Trecarichi A, Flatters SJL. Mitochondrial dysfunction in the pathogenesis of chemotherapy-induced peripheral neuropathy [J]. Int Rev Neurobiol, 2019, 145: 83-126.
[24] Staff NP, Fehrenbacher JC, Caillaud M, et al. Pathogenesis of paclitaxel-induced peripheral neuropathy: A current review of in vitro and in vivo findings using rodent and human model systems [J]. Exp Neurol, 2020, 324: 113121.
[25] Xiao WH, Bennett GJ. Effects of mitochondrial poisons on the neuropathic pain produced by the chemotherapeutic agents, paclitaxel and oxaliplatin [J]. Pain, 2012, 153(3): 704-709.
[26] Chine VB, Au NPB, Ma CHE. Therapeutic benefits of maintaining mitochondrial integrity and calcium homeostasis by forced expression of Hsp27 in chemotherapy-induced peripheral neuropathy [J]. Neurobiol Dis, 2019, 130: 104492.
[27] Yang Y, Luo L, Cai X, et al. Nrf2 inhibits oxaliplatin-induced peripheral neuropathy via protection of mitochondrial function [J]. Free Radic Biol Med, 2018, 120: 13-24.
[28] Di Cesare Mannelli L, Zanardelli M, Failli P, et al. Oxaliplatin-induced oxidative stress in nervous system-derived cellular models: could it correlate with in vivo neuropathy? [J]. Free Radic Biol Med, 2013, 61: 143-150.
[29] Starobova H, Vetter I. Pathophysiology of chemotherapy-induced peripheral neuropathy [J]. Front Mol Neurosci, 2017, 10: 174.
[30] Sittl R, Lampert A, Huth T, et al. Anticancer drug oxaliplatin induces acute cooling-aggravated neuropathy via sodium channel subtype Na(V) 1. 6-resurgent and persistent current [J]. Proc Natl Acad Sci U S A, 2012, 109(17): 6704-6709.
[31] Li Y, North RY, Rhines LD, et al. DRG voltage-gated sodium channel 1. 7 Is upregulated in paclitaxel-induced neuropathy in rats and in humans with neuropathic pain [J]. J Neurosci, 2018, 38(5): 1124-1136.
[32] Chukyo A, Chiba T, Kambe T, et al. Oxaliplatin-induced changes in expression of transient receptor potential channels in the dorsal root ganglion as a neuropathic mechanism for cold hypersensitivity [J]. Neuropeptides, 2018, 67: 95-101.
[33] Boehmerle W, Huehnchen P, Lee SLL, et al. TRPV4 inhibition prevents paclitaxel-induced neurotoxicity in preclinical models [J]. Exp Neurol, 2018, 306: 64-75.
[34] Koepsell H. Organic cation transporters in health and disease [J]. Pharmacol Rev, 2020, 72(1): 253-319.
[35] Sprowl JA, Ong SS, Gibson AA, et al. A phosphotyrosine switch regulates organic cation transporters [J]. Nat Commun, 2016, 7: 10880.
[36] Wei G, Gu Z, Gu J, et al. Platinum accumulation in oxaliplatin-induced peripheral neuropathy [J]. J Peripher Nerv Syst, 2021, 26(1): 35-42.
[37] Beijers AJ, Mols F, Vreugdenhil G. A systematic review on chronic oxaliplatin-induced peripheral neuropathy and the relation with oxaliplatin administration [J]. Support Care Cancer, 2014, 22(7): 1999-2007.
[38] André T, Vernerey D, Mineur L, et al. Three Versus 6 Months of Oxaliplatin-Based Adjuvant Chemotherapy for Patients With Stage III colon cancer: Disease-free survival results from a randomized, open-label, international duration evaluation of adjuvant (IDEA) france, phase III trial [J]. J Clin Oncol, 2018, 36(15): 1469-1477.
[39] Ciruelos E, Apellániz-Ruiz M, Cantos B, et al. A pilot, phase II, randomized, open-label clinical trial comparing the neurotoxicity of three dose regimens of nab-paclitaxel to that of solvent-based paclitaxel as the first-line treatment for patients with human epidermal growth factor receptor type 2-negative metastatic breast cancer [J]. Oncologist, 2019, 24(11): e1024-e1033.
[40] Smith RE, Brown AM, Mamounas EP, et al. Randomized trial of 3-hour versus 24-hour infusion of high-dose paclitaxel in patients with metastatic or locally advanced breast cancer: National Surgical Adjuvant Breast and Bowel Project Protocol B-26 [J]. J Clin Oncol, 1999, 17(11): 3403-3411.
[41] Moulder SL, Holmes FA, Tolcher AW, et al. A randomized phase 2 trial comparing 3-hour versus 96-hour infusion schedules of paclitaxel for the treatment of metastatic breast cancer [J]. Cancer, 2010, 116(4): 814-821.
[42] Petrioli R, Pascucci A, Francini E, et al. Neurotoxicity of FOLFOX-4 as adjuvant treatment for patients with colon and gastric cancer: a randomized study of two different schedules of oxaliplatin [J]. Cancer Chemother Pharmacol, 2008, 61(1): 105-111.
[43] Kandula T, Park SB, Cohn RJ, et al. Pediatric chemotherapy induced peripheral neuropathy: A systematic review of current knowledge [J]. Cancer Treat Rev, 2016, 50: 118-128.
[44] Ewertz M, Qvortrup C, Eckhoff L. Chemotherapy-induced peripheral neuropathy in patients treated with taxanes and platinum derivatives [J]. Acta oncologica (Stockholm, Sweden), 2015, 54(5): 587-591.
[45] Schneider BP, Li L, Miller K, et al. Sldege GW(2011) Genetic associations with taxane-induced neuropathy by a genome-wide association study(GWAS) in E5103 [J]. J Clin Oncol, 2011, 29(Suppl): Abstract no. 1000
[46] McWhinney-Glass S, Winham SJ, Hertz DL, et al. Cumulative genetic risk predicts platinum/taxane-induced neurotoxicity [J]. Clin Cancer Res, 2013, 19(20): 5769-5776.
[47] Cliff J, Jorgensen AL, Lord R, et al. The molecular genetics of chemotherapy-induced peripheral neuropathy: A systematic review and meta-analysis [J]. Crit Rev Oncol Hematol, 2017, 120: 127-140.
[48] Branca JJV, Carrino D, Gulisano M, et al. Oxaliplatin-induced

neuropathy: Genetic and epigenetic profile to better understand how to ameliorate this side effect [J]. Frontiers in molecular biosciences, 2021, 8: 643824.
[49] Kawakami K, Tunoda T, Takiguchi T, et al. Factors exacerbating peripheral neuropathy induced by paclitaxel plus carboplatin in non-small cell lung cancer [J]. Oncol Res, 2012, 20(4): 179-185.
[50] Abdel-Rahman O. Impact of diabetes comorbidity on the efficacy and safety of FOLFOX first-line chemotherapy among patients with metastatic colorectal cancer: a pooled analysis of two phase-III studies [J]. Clinical & translational oncology: official publication of the Federation of Spanish Oncology Societies and of the National Cancer Institute of Mexico, 2019, 21(4): 512-518.
[51] Gu J, Lu H, Chen C, et al. Diabetes mellitus as a risk factor for chemotherapy-induced peripheral neuropathy: a meta-analysis [J]. Support Care Cancer, 2021, 29(12): 7461-7469.
[52] Hausheer FH, Schilsky RL, Bain S, et al. Diagnosis, management, and evaluation of chemotherapy-induced peripheral neuropathy [J]. Semin Oncol, 2006, 33(1): 15-49.
[53] Le-Rademacher J, Kanwar R, Seisler D, et al. Patient-reported (EORTC QLQ-CIPN20) versus physician-reported (CTCAE) quantification of oxaliplatin- and paclitaxel/carboplatin-induced peripheral neuropathy in NCCTG/Alliance clinical trials [J]. Support Care Cancer, 2017, 25(11): 3537-3544.
[54] Cavaletti G, Cornblath DR, Merkies ISJ, et al. The chemotherapy-induced peripheral neuropathy outcome measures standardization study: from consensus to the first validity and reliability findings [J]. Annals of oncology: official journal of the European Society for Medical Oncology, 2013, 24(2): 454-462.
[55] Yoshida Y, Satoh A, Yamada T, et al. The relationship between evaluation methods for chemotherapy-induced peripheral neuropathy [J]. Sci Rep, 2019, 9(1): 20361.
[56] England JD, Gronseth GS, Franklin G, et al. Distal symmetric polyneuropathy: a definition for clinical research: report of the American Academy of Neurology, the American Association of Electrodiagnostic Medicine, and the American Academy of Physical Medicine and Rehabilitation [J]. Neurology, 2005, 64(2): 199-207.
[57] 曹鹏，李松林，霍介格. 奥沙利铂相关性周围神经病变以血瘀论治析 [J]. 中国中医基础医学杂志，2013，19(4)：430-431.
[58] 曹雯，魏国利，李灵常，等. 化疗相关周围神经毒性的治疗进展及中医药防治策略 [J]. 世界科学技术-中医药现代化，2019，21(7)：1458-1466.
[59] 中国临床肿瘤学会指南工作委员会. CSCO 结直肠癌诊疗指南 [M]. 北京: 人民卫生出版社，2021.
[60] Grothey A, Sobrero AF, Shields AF, et al. Duration of adjuvant chemotherapy for stage III colon cancer [J]. N Engl J Med, 2018, 378(13): 1177-1188.
[61] Tsuyuki S, Senda N, Kanng Y, et al. Evaluation of the effect of compression therapy using surgical gloves on nanoparticle albumin-bound paclitaxel-induced peripheral neuropathy: a phase II multicenter study by the Kamigata Breast Cancer Study Group [J]. Breast Cancer Res Treat, 2016, 160(1): 61-67.
[62] Eckhoff L, Knoop AS, Jensen MB, et al. Risk of docetaxel-induced peripheral neuropathy among 1, 725 Danish patients with early stage breast cancer [J]. Breast Cancer Res Treat, 2013, 142(1): 109-118.
[63] Beijers AJM, Bonhof CS, Mols F, et al. Multicenter randomized controlled trial to evaluate the efficacy and tolerability of frozen gloves for the prevention of chemotherapy-induced peripheral neuropathy [J]. Annals of oncology: official journal of the European Society for Medical Oncology, 2020, 31(1): 131-136.
[64] Chen XF, Wang R, Yin YM, et al. The effect of monosialotetrahexosylganglioside (GM1) in prevention of oxaliplatin induced neurotoxicity: a retrospective study [J]. Biomedicine & pharmacotherapy, 2012, 66(4): 279-284.
[65] Su Y, Huang J, Wang S, et al. The effects of ganglioside-monosialic acid in taxane-induced peripheral neurotoxicity in patients with breast cancer: A randomized trial [J]. J Natl Cancer Inst, 2020, 112(1): 55-62.
[66] Wang DS, Wang ZQ, Chen G, et al. Phase III randomized, placebo-controlled, double-blind study of monosialotetrahexosylganglioside for the prevention of oxaliplatin-induced peripheral neurotoxicity in stage II/III colorectal cancer [J]. Cancer Med, 2020, 9(1): 151-159.
[67] Das M. GM1 for taxane-induced neuropathy in breast cancer [J]. Lancet Oncol, 2019, 20(7): e348.
[68] Pace A, Savarese A, Picardo M, et al. Neuroprotective effect of vitamin E supplementation in patients treated with cisplatin chemotherapy [J]. J Clin Oncol, 2003, 21(5): 927-931.
[69] Pace A, Giannarelli D, Galiè E, et al. Vitamin E neuroprotection for cisplatin neuropathy: a randomized, placebo-controlled trial [J]. Neurology, 2010, 74(9): 762-766.
[70] Glimelius B, Manojlovic N, Pfeiffer P, et al. Persistent prevention of oxaliplatin-induced peripheral neuropathy using calmangafodipir (PledOx ©): a placebo-controlled randomised phase II study (PLIANT) [J]. Acta oncologica (Stockholm, Sweden), 2018, 57(3): 393-402.
[71] 丁蓉，余佳霖，魏国利，等. 3 种温经通络方防治慢性奥沙利铂周围神经毒性疗效的网状 Meta 分析 [J]. 世界科学技术—中医药现代化，2019，21(7)，1480-1485.
[72] Cheng XL, Liu HQ, Wang Q, et al. Chemotherapy-induced peripheral neurotoxicity and complementary and alternative medicines: progress and perspective [J]. Front Pharmacol, 2015, 6: 234.
[73] Schloss J, Colosimo M, Vitetta L. Herbal medicines and chemotherapy induced peripheral neuropathy (CIPN): A critical literature review [J]. Crit Rev Food Sci Nutr, 2017, 57(6): 1107-1118.
[74] 马骏，魏国利，朱梁军，等. 加味黄芪桂枝五物配方颗粒防治奥沙利铂神经毒性多中心、随机、双盲、对照临床研究 [J]. 世界科学技术-中医药现代化，2019，21(7)：1495-1504.
[75] Loprinzi CL, Qin R, Dakhil SR, et al. Phase III randomized, placebo-controlled, double-blind study of intravenous calcium and magnesium to prevent oxaliplatin-induced sensory neurotoxicity (N08CB/Alliance) [J]. J Clin Oncol, 2014, 32(10): 997-1005.
[76] Jordan B, Jahn F, Beckmann J, et al. Calcium and magnesium infusions for the prevention of oxaliplatin-induced peripheral neurotoxicity: A systematic review [J]. Oncology (Williston Park), 2016, 90(6): 299-306.
[77] Hershman DL, Unger JM, Crew KD, et al. Randomized double-blind placebo-controlled trial of acetyl-L-carnitine for the prevention of taxane-induced neuropathy in women undergoing adjuvant breast cancer therapy [J]. J Clin Oncol, 2013, 31(20): 2627-2633.
[78] Hershman DL, Unger JM, Crew KD, et al. Two-year trends of taxane-induced neuropathy in women enrolled in a randomized trial of acetyl-l-carnitine (SWOG S0715) [J]. J Natl Cancer Inst, 2018, 110(6): 669-676.
[79] Kautio AL, Haanpää M, Leminen A, et al. Amitriptyline in the prevention of chemotherapy-induced neuropathic symptoms [J]. Anticancer Res, 2009, 29(7): 2601-2606.

[80] Shinde SS, Seisler D, Soori G, et al. Can pregabalin prevent paclitaxel-associated neuropathy? —An ACCRU pilot trial [J]. Support Care Cancer, 2016, 24(2): 547-553.

[81] de Andrade DC, Jacobsen Teixeira M, Galhardoni R, et al. Pregabalin for the Prevention of Oxaliplatin-Induced Painful Neuropathy: A Randomized, Double-Blind Trial [J]. Oncologist, 2017, 22(10): 1154-e1105.

[82] Zimmerman C, Atherton PJ, Pachman D, et al. MC11C4: a pilot randomized, placebo-controlled, double-blind study of venlafaxine to prevent oxaliplatin-induced neuropathy [J]. Support Care Cancer, 2016, 24(3): 1071-1078.

[83] Oki E, Emi Y, Kojima H, et al. Preventive effect of Goshajinkigan on peripheral neurotoxicity of FOLFOX therapy (GENIUS trial): a placebo-controlled, double-blind, randomized phase III study [J]. Int J Clin Oncol, 2015, 20(4): 767-775.

[84] Cascinu S, Catalano V, Cordella L, et al. Neuroprotective effect of reduced glutathione on oxaliplatin-based chemotherapy in advanced colorectal cancer: a randomized, double-blind, placebo-controlled trial [J]. J Clin Oncol, 2002, 20(16): 3478-3483.

[85] Leal AD, Qin R, Atherton PJ, et al. North Central Cancer Treatment Group/Alliance trial N08CA-the use of glutathione for prevention of paclitaxel/carboplatin-induced peripheral neuropathy: a phase 3 randomized, double-blind, placebo-controlled study [J]. Cancer, 2014, 120(12): 1890-1897.

[86] Schloss JM, Colosimo M, Airey C, et al. A randomised, placebo-controlled trial assessing the efficacy of an oral B group vitamin in preventing the development of chemotherapy-induced peripheral neuropathy (CIPN) [J]. Support Care Cancer, 2017, 25(1): 195-204.

[87] Hilpert F, Stähle A, Tomé O, et al. Neuroprotection with amifostine in the first-line treatment of advanced ovarian cancer with carboplatin/paclitaxel-based chemotherapy—a double-blind, placebo-controlled, randomized phase II study from the Arbeitsgemeinschaft Gynäkologische Onkologoie (AGO) Ovarian Cancer Study Group [J]. Support Care Cancer, 2005, 13(10): 797-805.

[88] Leong SS, Tan EH, Fong KW, et al. Randomized double-blind trial of combined modality treatment with or without amifostine in unresectable stage III non-small-cell lung cancer [J]. J Clin Oncol, 2003, 21(9): 1767-1774.

[89] Kottschade LA, Sloan JA, Mazurczak MA, et al. The use of vitamin E for the prevention of chemotherapy-induced peripheral neuropathy: results of a randomized phase III clinical trial [J]. Support Care Cancer, 2011, 19(11): 1769-1777.

[90] Smith EM, Pang H, Cirrincione C, et al. Effect of duloxetine on pain, function, and quality of life among patients with chemotherapy-induced painful peripheral neuropathy: a randomized clinical trial [J]. JAMA, 2013, 309(13): 1359-1367.

[91] Song SY, Ko YB, Kim H, et al. Effect of serotonin-norepinephrine reuptake inhibitors for patients with chemotherapy-induced painful peripheral neuropathy: A meta-analysis [J]. BMC Med, 2020, 99(1): e18653.

[92] Loprinzi CL, Lacchetti C, Bleeker J, et al. Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: ASCO guideline update [J]. J Clin Oncol, 2020, 38(28): 3325-3348.

[93] Nihei S, Sato J, Kashiwaba M, et al. [Efficacy and safety of pregabalin for oxaliplatin- and paclitaxel-induced peripheral neuropathy] [J]. Gan To Kagaku Ryoho, 2013, 40(9): 1189-1193.

[94] Hincker A, Frey K, Rao L, et al. Somatosensory predictors of response to pregabalin in painful chemotherapy-induced peripheral neuropathy: a randomized, placebo-controlled, crossover study [J]. Pain, 2019, 160(8): 1835-1846.

[95] Salehifar E, Janbabaei G, Hendouei N, et al. Comparison of the efficacy and safety of pregabalin and duloxetine in taxane-induced sensory neuropathy: A randomized controlled trial [J]. Clin Drug Investig, 2020, 40(3): 249-257.

[96] Avan R, Janbabaei G, Hendouei N, et al. The effect of pregabalin and duloxetine treatment on quality of life of breast cancer patients with taxane-induced sensory neuropathy: A randomized clinical trial [J]. J Res Med Sci, 2018, 23: 52.

[97] Durand JP, Deplanque G, Montheil V, et al. Efficacy of venlafaxine for the prevention and relief of oxaliplatin-induced acute neurotoxicity: results of EFFOX, a randomized, double-blind, placebo-controlled phase III trial [J]. Annals of oncology: official journal of the European Society for Medical Oncology, 2012, 23(1): 200-205.

[98] Aziz MT, Good BL, Lowe DK. Serotonin-norepinephrine reuptake inhibitors for the management of chemotherapy-induced peripheral neuropathy [J]. Ann Pharmacother, 2014, 48(5): 626-632.

[99] Farshchian N, Alavi A, Heydarheydari S, et al. Comparative study of the effects of venlafaxine and duloxetine on chemotherapy-induced peripheral neuropathy [J]. Cancer Chemother Pharmacol, 2018, 82(5): 787-793.

[100] 孙焱, 李丹, 曹雯, 等. 奥沙利铂相关周围神经病变的中医药外治进展 [J]. 世界科学技术-中医药现代化, 2019, 21(7): 1488-1494.

[101] 季漪, 李国春, 李黎, 等. 中药外洗预防奥沙利铂所致周围神经毒性的系统评价及 Meta 分析 [J]. 中华中医药学刊, 2017, 35(2): 335-340.

[102] Chai Y, Zhao F, Ye P, et al. A prospective, randomized, placebo-controlled study assessing the efficacy of Chinese herbal medicine C Huangqí Guizhi Wuwu Decoction) in the treatment of albumin-bound paclitǎxel-induced peripheral neuropathy [J]. J Clin Med. 2023, 12(2): 505.

[103] Schwenk M, Grewal GS, Holloway D, et al. Interactive sensor-based balance training in older cancer patients with chemotherapy-induced peripheral neuropathy: A randomized controlled trial [J]. Gerontology, 2016, 62(5): 553-563.

[104] Kleckner IR, Kamen C, Gewandter JS, et al. Effects of exercise during chemotherapy on chemotherapy-induced peripheral neuropathy: a multicenter, randomized controlled trial [J]. Support Care Cancer, 2018, 26(4): 1019-1028.

[105] Streckmann F, Lehmann HC, Balke M, et al. Sensorimotor training and whole-body vibration training have the potential to reduce motor and sensory symptoms of chemotherapy-induced peripheral neuropathy-a randomized controlled pilot trial [J]. Support Care Cancer, 2019, 27(7): 2471-2478.

[106] Kneis S, Wehrle A, Müller J, et al. It's never too late - balance and endurance training improves functional performance, quality of life, and alleviates neuropathic symptoms in cancer survivors suffering from chemotherapy-induced peripheral neuropathy: results of a randomized controlled trial [J]. BMC Cancer, 2019, 19(1): 414.

[107] McCrary JM, Goldstein D, Sandler CX, et al. Exercise-based rehabilitation for cancer survivors with chemotherapy-induced peripheral neuropathy [J]. Support Care Cancer, 2019, 27(10): 3849-3857.

[108] McCrary JM, Goldstein D, Sandler CX, et al. Exercise-based rehabilitation for cancer survivors with chemotherapy-induced peripheral neuropathy [J]. Support Care Cancer, 2019, 27(10): 3849-3857.

[109] Molassiotis A, Suen LKP, Cheng HL, et al. A randomized as-

sessor-blinded wait-list-controlled trial to assess the effectiveness of acupuncture in the management of chemotherapy-induced peripheral neuropathy [J]. Integr Cancer Ther, 2019, 18: 1534735419836501.

[10] Bao T, Seidman AD, Piulson L, et al. A phase IIA trial of acupuncture to reduce chemotherapy-induced peripheral neuropathy severity during neoadjuvant or adjuvant weekly paclitaxel chemotherapy in breast cancer patients [J]. European journal of cancer (Oxford, England: 1990), 2018, 101: 12-19.

[11] Bao T, Goloubeva O, Pelser C, et al. A pilot study of acupuncture in treating bortezomib-induced peripheral neuropathy in patients with multiple myeloma [J]. Integr Cancer Ther, 2014, 13(5): 396-404.

[12] Bao T, Patil S, Chen C, et al. Effect of acupuncture vs sham procedure on chemotherapy-induced peripheral neuropathy symptoms: A randomized clinical trial [J]. JAMA network open, 2020, 3(3): e200681.

[13] Lu W, Giobbie-Hurder A, Freedman RA, et al. Acupuncture for chemotherapy-induced peripheral neuropathy in breast cancer survivors: A Randomized Controlled Pilot Trial [J]. Oncologist, 2020, 25(4): 310-318.

[14] Gu J, Hu M, Wang X, et al. Data mining analysis reveals key acupoints and meridians for the treatment of chemotherapy-induced peripheral neuropathy [J]. Explore (New York, N. Y.), 2023, 19(1): 71-77.

[15] Chien TJ, Liu CY, Fang CJ, et al. The efficacy of acupuncture in chemotherapy-induced peripheral neuropathy: Systematic review and meta-analysis [J]. Integr Cancer Ther, 2019, 18: 1534735419886662.

[16] Lu Z, Moody J, Marx BL, et al. Treatment of chemotherapy-induced peripheral neuropathy in integrative oncology: A survey of acupuncture and oriental medicine practitioners [J]. J Altern Complement Med, 2017, 23(12): 964-970.

[17] Rao RD, Michalak JC, Sloan JA, et al. Efficacy of gabapentin in the management of chemotherapy-induced peripheral neuropathy: a phase 3 randomized, double-blind, placebo-controlled, crossover trial (N00C3) [J]. Cancer, 2007, 110(9): 2110-2118.

[18] Rao RD, Flynn PJ, Sloan JA, et al. Efficacy of lamotrigine in the management of chemotherapy-induced peripheral neuropathy: a phase 3 randomized, double-blind, placebo-controlled trial, N01C3 [J]. Cancer, 2008, 112(12): 2802-2808.

[19] Kautio AL, Haanpää M, Saarto T, et al. Amitriptyline in the treatment of chemotherapy-induced neuropathic symptoms [J]. J Pain Symptom Manage, 2008, 35(1): 31-39.

[20] Hammack JE, Michalak JC, Loprinzi CL, et al. Phase III evaluation of nortriptyline for alleviation of symptoms of cis-platinum-induced peripheral neuropathy [J]. Pain, 2002, 98(1-2): 195-203.

[21] Gewandter JS, Mohile SG, Heckler CE, et al. A phase III randomized, placebo-controlled study of topical amitriptyline and ketamine for chemotherapy-induced peripheral neuropathy (CIPN): a University of Rochester CCOP study of 462 cancer survivors [J]. Support Care Cancer, 2014, 22(7): 1807-1814.

[修回日期: 2023-11-10]　[本文编辑: 钦嫣]

化疗药物导致的周围神经病变中西医结合防治专家共识编写委员会专家组成员(按姓氏笔画排序)

组　长:

霍介格　南京中医药大学附属中西医结合医院

秘　书:

刘　煊　上海市光华中西医结合医院

共识执笔人:

魏国利　南京中医药大学附属中西医结合医院

编　委:

王兰英　甘肃省中医院

方志军　南京中医药大学附属中西医结合医院

冯　利　中国医学科学院肿瘤医院

田雪飞　湖南中医药大学

刘怀民　河南省肿瘤医院

李　艺　云南省中医院

李仁廷　陕西中医药大学附属医院

李庆霞　河北省人民医院

刘　煊　上海市光华中西医结合医院

杨忠明　西南医科大学附属中医医院

张海波　广东省中医院

张莹雯　武汉大学中南医院

岳小强　上海长征医院

房　栋　江苏省镇江市中西医结合医院

林胜友　浙江省中医院

侯　丽　北京中医药大学东直门医院

荣　震　广西中医药大学第一附属医院

唐东昕　贵州省中医院

曾普华　湖南省中医药研究院附属医院

舒琦瑾　浙江省中医院

霍介格　南京中医药大学附属中西医结合医院

魏国利　南京中医药大学附属中西医结合医院