·痴呆及相关认知功能障碍·

老年轻度认知损害患者抑郁情绪与认知功能相关性分析

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【摘要】 目的　探讨轻度认知损害(MCI)患者抑郁情绪与认知功能之间的相关性。**方法**　纳入2020年12月至2021年12月浙江大学医学院附属第一医院收治的106例轻度认知损害患者,根据老年抑郁量表(GDS)评分分为伴抑郁MCI组(53例)和无抑郁MCI组(53例),以及同期就诊的53例认知功能正常的抑郁患者(抑郁组)和53例无认知功能障碍且无抑郁的对照者(对照组)。采用简易智能状态检查量表(MMSE)和蒙特利尔认知评价量表(MoCA)评价整体认知功能,Rey-Osterrieth复杂图形测验(ROCFT)和画钟测验(CDT)评价视空间能力,逻辑记忆测验(LMT)和听觉词汇学习测验(AVLT)评价记忆力,Stroop色词测验(SCWT)和连线测验(TMT)评价注意力和执行功能,词语流畅性测验(VFT)和Boston命名测验(BNT)评价语言功能,日常生活活动能力量表(ADL)评价日常生活活动能力。Pearson相关分析和偏相关分析探讨抑郁情绪与认知功能之间的相关性。**结果**　4组受试者各项神经心理学测验差异具有统计学意义(均$P<0.05$),其中,伴抑郁MCI组MMSE和MoCA评分低于对照组(均$P=0.000$)、抑郁组(均$P=0.000$)和无抑郁MCI组(均$P=0.000$);伴抑郁MCI组ROCFT-临摹和回忆、CDT评分低于对照组(均$P=0.000$)、抑郁组(均$P=0.000$)和无抑郁MCI组(均$P=0.000$);伴抑郁MCI组和无抑郁MCI组LMT-即刻回忆和延迟回忆评分低于对照组($P=0.000,0.000,0.002,0.001$)和抑郁组($P=0.000,0.000,0.040,0.043$),伴抑郁MCI组LMT-延迟回忆评分低于无抑郁MCI组($P=0.030$);伴抑郁MCI组AVLT-即刻回忆、短延迟回忆、长延迟回忆和再认评分低于对照组(均$P=0.000$)、抑郁组(均$P=0.000$)和无抑郁MCI组($P=0.009,0.003,0.017,0.001$);伴抑郁MCI组SCWT-A、SCWT-B和SCWT-C、TMT-A和TMT-B完成时间长于对照组($P=0.001,0.000,0.000,0.000,0.000$)、抑郁组($P=0.008,0.001,0.001,0.001,0.001$)和无抑郁MCI组($P=0.001,0.000,0.000,0.000,0.004$),SCWT-A、SCWT-B和SCWT-C正确个数少于对照组($P=0.003,0.008,0.001$)和抑郁组($P=0.016,0.031,0.002$),而SCWT-A和SCWT-C正确个数少于无抑郁MCI组($P=0.003,0.008$);伴抑郁MCI组VFT-动物和蔬菜、BNT正确个数少于对照组(均$P=0.000$)、抑郁组($P=0.016,0.003,0.000$)和无抑郁MCI组($P=0.010,0.005,0.000$);伴抑郁MCI组ADL评分高于对照组($P=0.000$)、抑郁组($P=0.001$)和无抑郁MCI组($P=0.000$),抑郁组ADL评分高于对照组($P=0.014$)和无抑郁MCI组($P=0.001$);对照组和无抑郁MCI组的GDS评分低于抑郁组(均$P=0.000$)伴抑郁MCI组(均$P=0.000$)。相关分析显示,GDS评分与MMSE($r=-0.300,P=0.000$),MoCA($r=-0.357,P=0.000$),ROCFT-临摹($r=-0.192,P=0.006$)和回忆($r=-0.142,P=0.044$),CDT($r=-0.171,P=0.015$),LMT-即刻回忆($r=-0.213,P=0.002$)和延迟回忆($r=-0.193,P=0.005$),AVLT-即刻回忆($r=-0.159,P=0.021$)、短延迟回忆($r=-0.161,P=0.020$)和长延迟回忆($r=-0.137,P=0.047$),以及SCWT-A($r=-0.156,P=0.025$)、VFT-动物($r=-0.271,P=0.000$)和蔬菜($r=-0.145,P=0.038$)、BNT($r=-0.194,P=0.005$)正确个数呈负相关;与SCWT-A($r=0.162,P=0.020$)、SCWT-B($r=0.189,P=0.007$)、SCWT-C($r=0.184,P=0.009$)、TMT-A($r=0.189,P=0.006$)完成时间和ADL评分($r=0.367,P=0.000$)呈正相关。**结论**　轻度认知损害伴抑郁情绪患者存在更广泛、更严重的认知域损害,临床照料轻度认知损害患者时应关注其情绪问题。

【关键词】 认知障碍;　抑郁;　神经心理学测验

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The relationship between depression and cognitive function in patients with mild cognitive impairment

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【**Abstract**】 **Objective** To explore the relationship between depression and cognitive function in patients with mild cognitive impairment (MCI). **Methods** Total 106 patients with MCI were selected from December 2020 to December 2021, including 53 patients with depression based on Geriatric Depression Scale (GDS). Total 106 normal cognitive function people who received physical examination at the same time were selected, also including 53 with depression. Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) were used to evaluate overall cognitive function, Rey-Osterrieth Complex Figure Test (ROCFT) and Clock Drawing Test (CDT) were used to evaluate visual spatial ability, Logical Memory Test (LMT) and Auditory Verbal Learning Test (AVLT) were used to evaluate memory, Stroop Colour-Word Test (SCWT) and Trail Making Test (TMT) were used to evaluate attention and executive function, Verbal Fluency Test (VFT) and Boston Naming Test (BNT) were used to evaluate verbal fluency and naming ability, and Activities of Daily Living Scale (ADL) were used to evaluate activities of daily living. **Results** There were statistically significant differences in cognitive function of multiple dimensions among 4 groups ($P < 0.05$, for all). The MMSE and MoCA scores of the MCI group with depression were lower than those of the control group ($P = 0.000$, for all), the depression group ($P = 0.000$, for all) and the MCI group without depression ($P = 0.000$, for all). The ROCFT-imitation, recall, and CDT scores in the MCI group with depression were lower than those in the control group ($P = 0.000$, for all), the depression group ($P = 0.000$, for all), and the MCI group without depression ($P = 0.000$, for all). The LMT-immediate and delayed recall scores of the MCI group were lower than those of the control group ($P = 0.000$, 0.000, 0.002, 0.001) and the depression group ($P = 0.000$, 0.000, 0.040, 0.043). The LMT-delayed recall scores of the MCI group with depression were lower than those of the MCI group without depression ($P = 0.030$). The AVLT-immediate recall, short delayed recall, long delayed recall, and recognition scores in the MCI group with depression were lower than those in the control group ($P = 0.000$, for all), the depression group ($P = 0.000$, for all), and the MCI group without depression ($P = 0.009$, 0.003, 0.017, 0.001). The time of SCWT-A, SCWT-B and SCWT-C, TMT-A, and TMT-B in the MCI group with depression was longer than that in the control group ($P = 0.001$, 0.000, 0.000, 0.000, 0.000), the depression group ($P = 0.008$, 0.001, 0.001, 0.001, 0.001), and the MCI group without depression ($P = 0.001$, 0.000, 0.000, 0.000, 0.004). The correct number of SCWT-A, SCWT-B and SCWT-C was less than that in the control group ($P = 0.003$, 0.008, 0.001), and the depression group ($P = 0.016$, 0.031, 0.002). The correct number of SCWT-A and SCWT-C was lower than that of the MCI group without depressive ($P = 0.003$, 0.008). The correct number of VFT-animals and vegetables, BNT in the MCI group with depression was lower than that in the control group ($P = 0.000$, for all), the depression group ($P = 0.016$, 0.003, 0.000), and the MCI group without depression ($P = 0.010$, 0.005, 0.000). The ADL score of the MCI group with depression was higher than that of the control group ($P = 0.000$), the depression group ($P = 0.001$), and the MCI group without depression ($P = 0.000$), while the ADL score of the depression group was higher than that of the control group ($P = 0.014$) and the MCI group without depression ($P = 0.001$). The GDS scores of the control group and the MCI group without depressive were lower than those of the depressive group ($P = 0.000$, for all) and the MCI group with depression ($P = 0.000$, for all). Correlation analysis showed that GDS scores were correlated with MMSE ($r = -0.300$, $P = 0.000$), MoCA ($r = -0.357$, $P = 0.000$), ROCFT-copy ($r = -0.192$, $P = 0.006$) and recall ($r = -0.142$, $P = 0.044$), CDT ($r = -0.171$, $P = 0.015$), LMT-immediate recall ($r = -0.213$, $P = 0.002$), delayed recall ($r = -0.193$, $P = 0.005$), AVLT-immediate recall ($r = -0.159$, $P = 0.021$), short delay recall ($r = -0.161$, $P = 0.020$) and long delay recall ($r = -0.137$, $P = 0.047$), correct number of SCWT-A ($r = -0.156$, $P = 0.025$), VFT-animals ($r = -0.271$, $P = 0.000$) and vegetables ($r = -0.145$, $P = 0.038$), BNT ($r = -0.194$, $P = 0.005$) were negatively correlated; compared with the completion time of SCWT-A ($r = 0.162$, $P = 0.020$), SCWT-B ($r = 0.189$, $P = 0.007$), SCWT-C ($r = 0.184$, $P = 0.009$) and TMT-A ($r = 0.189$, $P = 0.006$), and ADL score ($r = 0.367$, $P = 0.000$) were positively correlated. **Conclusions** MCI patients with depression have more extensive and severe cognitive deficits, and their psycho-mental states should be paid more attention.

【**Key words**】 Cognition disorders; Depression; Neuropsychological tests

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轻度认知损害(MCI)是正常老龄化与痴呆之间的一种过渡状态,其临床主要表现为记忆力减退,其他认知功能相对保留,通常不影响日常工作或生活[1-2]。轻度认知损害未达到痴呆诊断标准,但其进展为痴呆的风险是正常人的10倍[3],且更易出现抑郁、焦虑等心理症状。抑郁情绪与认知功能障碍密切相关,是痴呆发生发展的重要危险因素[4-5]。轻度认知损害和抑郁情绪均与海马萎缩密切相关[6],二者影像学均呈现大面积皮质及皮质下灰质体积缩小[6-7]。研究显示,老年轻度认知损害患者抑郁发生率高达44.4%,且抑郁情绪可使其认知功能障碍进一步加重,增加其进展为痴呆的风险[8]。本研究采用神经心理学测验对老年轻度认知损害患者认知功能和抑郁情绪进行评估,并初步探讨抑郁情绪与多维度认知功能之间的相关性。

对象与方法

一、研究对象

1.诊断标准 (1)轻度认知损害:符合2004年Petersen[9]提出的诊断标准,①主诉记忆障碍,可被知情者证实。②存在记忆损害的客观证据。③总体认知功能基本保留,临床痴呆评价量表(CDR)评分为0.5分,简易智能状态检查量表(MMSE)评分为小学受教育程度≥20分、初中及以上受教育程度≥24分。④日常生活活动能力正常。⑤不符合国际疾病分类法-10(ICD-10)中痴呆诊断标准以及美国国立神经病学、语言障碍和卒中研究所-阿尔茨海默病及相关疾病协会(NINCDS-ADRDA)很可能的(probable)阿尔茨海默病诊断标准。(2)抑郁情绪:采用老年抑郁量表(GDS)评价抑郁情绪,评分>10分为存在抑郁情绪[10]。

2.纳入与排除标准 (1)年龄≥55岁。(2)日常生活活动能力量表(ADL)评分<22分。(3)临床资料完整。(4)凡存在以下情况者不纳入本研究:既往有脑血管病和中枢神经系统肿瘤病史;合并帕金森病、多发性硬化、癫痫或其他影响认知功能的神经系统疾病;合并引起认知功能障碍的其他系统性疾病,如甲状腺功能减退症、叶酸或维生素B_{12}缺乏等;合并严重心、肺、肝、肾功能障碍;酒精及药物滥用史;存在体内植入金属等MRI检查禁忌证或无法配合检查。(5)本研究经浙江大学医学院附属第一医院道德伦理委员会审核批准(审批号:2016-035),受试者或家属均知情同意并签署知情同意书。

3.一般资料 (1)伴抑郁的轻度认知损害组(伴抑郁MCI组):选择2020年12月至2021年12月在我院神经内科记忆门诊就诊的轻度认知损害伴抑郁情绪患者53例,男性26例,女性27例;年龄55~86岁,平均(68.77±8.31)岁;受教育程度3~18年,平均(10.08±3.31)年;既往合并高血压占32.08%(17/53)、高脂血症占18.87%(10/53),吸烟占20.75%(11/53)、饮酒占22.64%(12/53)。(2)不伴抑郁的轻度认知损害组(无抑郁MCI组):选择同期在我院神经内科记忆门诊就诊的轻度认知损害不伴抑郁情绪患者共53例,男性31例,女性22例;年龄55~85岁,平均(66.81±8.33)岁;受教育程度为6~17年,平均为(11.09±3.46)年;既往合并高血压占35.85%(19/53)、高脂血症占20.75%(11/53),吸烟占18.87%(10/53)、饮酒占30.19%(16/53)。(3)认知功能正常的抑郁组(抑郁组):选择同期在我院神经内科记忆门诊就诊的抑郁情绪患者共53例,认知功能和头部MRI检查均正常,男性14例,女性39例;年龄55~85岁,平均(63.64±8.09)岁,受教育程度4~19年,平均(11.58±3.57)年;既往合并高血压占33.96%(18/53)、高脂血症占15.09%(8/53),吸烟占11.32%(6/53)、饮酒占11.32%(6/53)。(4)无轻度认知损害且无抑郁组(对照组):同期从我院健康体检科招募53例认知功能正常且无抑郁情绪受试者作为对照,无神经系统疾病或精神疾病病史,头部MRI正常,可配合完成神经心理学测验。男性25例,女性28例;年龄55~83岁,平均(64.51±8.66)岁;受教育程度4~22年,平均(12.60±4.03)年;既往合并高血压占43.40%(23/53)、高脂血症占24.53%(13/53),吸烟占15.09%(8/53)、饮酒占22.64%(12/53)。4组受试者性别($P=0.008$)、年龄($P=0.008$)、受教育程度($P=0.004$)差异具有统计学意义(表1),对照组($t=-2.630$, $P=0.009$)和抑郁组($t=-3.165$, $P=0.002$)年龄小于伴抑郁MCI组;对照组受教育程度高于伴抑郁MCI组($t=3.614$, $P=0.000$)和无抑郁MCI组($t=2.104$, $P=0.037$),抑郁组受教育程度高于伴抑郁MCI组($t=2.158$, $P=0.032$);其余各项指标组间差异无统计学意义(均$P>0.05$)。

二、研究方法

1.神经心理学测验 (1)蒙特利尔认知评价量表(MoCA)[11]:评价整体认知功能。该量表包括视空间/执行功能(5分)、命名(3分)、注意力(3分)、计算力(3分)、语言功能(3分)、抽象能力(2分)、记忆

表1 4组受试者一般资料的比较

Table 1. Comparison of general data among 4 groups

观察指标	对照组(n=53)	抑郁组(n=53)	无抑郁MCI组(n=53)	伴抑郁MCI组(n=53)	χ^2或F值	P值
性别[例(%)]					11.727	0.008
男性	25(47.17)	14(26.42)	31(58.49)	26(49.06)		
女性	28(52.83)	39(73.58)	22(41.51)	27(50.94)		
年龄($\bar{x}\pm s$,岁)	64.51±8.66	63.64±8.09	66.81±8.33	68.77±8.31	4.086	0.008
受教育程度($\bar{x}\pm s$,年)	12.60±4.03	11.58±3.57	11.09±3.46	10.08±3.31	4.517	0.004
高血压[例(%)]	23(43.40)	18(33.96)	19(35.85)	17(32.08)	1.693	0.639
高脂血症[例(%)]	13(24.53)	8(15.09)	11(20.75)	10(18.87)	1.544	0.672
吸烟史[例(%)]	8(15.09)	6(11.32)	10(18.87)	11(20.75)	2.019	0.568
饮酒史[例(%)]	12(22.64)	6(11.32)	16(30.19)	12(22.64)	5.664	0.129

One-way ANOVA for comparison of age and education, and χ^2 test for comparison of others,年龄和受教育程度的比较行单因素方差分析,其余指标的比较行χ^2检验。MCI,mild cognitive impairment,轻度认知损害

力(5分)、定向力(6分)共8项内容,总评分为30分,评分越低、认知功能越差,评分<26分为认知功能障碍,受教育程度≤12年者评分加1以校正偏倚。(2)Rey-Osterrieth复杂图形测验(ROCFT)[12]:评价视空间能力。该测试由正方形、三角形、长方形、圆形及其他线条组成,包括临摹和回忆两项内容,受试者有5 min的临摹图形时间,休息30 min后在空白纸上回忆并画出该图形。共包括18项内容,每项评分0~2分,图形正确且位置正确计2分,图形正确但位置错误或位置正确但图形错误均计1分,无法辨认或无法画出图形均计为零,总评分为36分,评分越低、视空间能力越差。(3)画钟测验(CDT)[13]:评价视空间能力,包括数字位置(10分)、数字顺序(10分)、指针位置(10分),总评分为30分,评分越低、视空间能力越差。(4)逻辑记忆测验(LMT)[14]:评价逻辑记忆力,包括即刻回忆和延迟回忆。测试者阅读"公鸡蛋"故事,阅读结束之后即刻嘱受试者回忆关键词,30 min后再次回忆关键词,共20个关键词,回忆1个计1分,评分越低、逻辑记忆越差。(5)听觉词汇学习测验(AVLT)[14]:评价记忆力,包括即刻回忆、延迟回忆和再认。嘱受试者对12个词汇进行3次重复学习并进行3次即刻回忆,每个词汇回忆正确计1分、回忆错误或无法回忆计为零,即刻回忆总评分为36分;即刻回忆结束后分别延迟5和20 min再次回忆词汇,短延迟回忆和长延迟回忆总评分为12分;长延迟回忆结束后即刻进行词汇再认,包括12个学习过的目标词汇和12个未学习的干扰词汇,正确识别目标词汇计1分,将干扰词汇识别为目标词汇减1分,再认总评分12分。各项评分越低、记忆力越差。(6)Stroop色词测验(SCWT)[15]:评价注意力和执行功能。该测试包括3张卡片,A卡片由50个黑色印刷的"红"、"黄"、"蓝"、"绿"汉字组成,要求快速且准确读出汉字;B卡片由50个红色、黄色、蓝色、绿色圆点随机排列组成,要求快速且准确读出圆点颜色;C卡片由50个字体颜色(红色、黄色、蓝色、绿色)与汉字("红"、"黄"、"蓝"、"绿")意义不一致的汉字组成,要求快速且准确说出汉字颜色,记录各卡片完成时间以及正确个数。(7)连线测验(TMT)[16]:评价执行功能,包括A和B两部分。连线测验A(TMT-A)嘱受试者将标有数字1~25的圆圈按照从小到大的顺序连接起来,所画线条需要穿过图形;连线测验B(TMT-B)的数字1~25包含在红色和黄色圆圈中,嘱受试者按照数字从小到大的顺序且红色与黄色交替连接起来,并记录完成时间。(8)词语流畅性测验(VFT)[17]:评价言语流畅性。嘱受试者于1 min内列举尽可能多的蔬菜、水果和动物词汇,并记录符合要求的词汇个数。(9)Boston命名测验(BNT)[18]:评价命名能力。测试者展示30张图片,嘱受试者对其进行自发命名,记录命名正确个数。(10)日常生活活动能力量表(ADL)[19]:评价日常生活活动能力,包括躯体生活自理量表(6项,如厕、进食、穿衣、梳洗、行走、洗澡)和工具性日常生活活动能力量表(8项,打电话、购物、烹饪、做家务、洗衣、使用交通工具、服药、自理经济)两部分,每项评分1~4分,总评分56分,评分越高、日常生活活动能力越差。

表2 4组受试者神经心理学测验的比较($\bar{x} \pm s$, n = 53)

Table 2. Comparison of neuropsychological tests among 4 groups ($\bar{x} \pm s$, n = 53)

观察指标	对照组(1)	抑郁组(2)	无抑郁MCI组(3)	伴抑郁MCI组(4)	*F*值	*P*值
MMSE(评分)	28.55 ± 0.24	28.08 ± 0.23	27.90 ± 0.23	25.74 ± 0.24	26.862	0.000
MoCA(评分)	26.94 ± 0.24	25.77 ± 0.24	23.99 ± 0.24	19.86 ± 0.24	153.214	0.000
ROCFT-临摹(评分)	30.38 ± 0.68	29.90 ± 0.67	31.21 ± 0.66	25.47 ± 0.68	14.313	0.000
ROCFT-回忆(评分)	13.39 ± 0.87	13.25 ± 0.86	12.68 ± 0.84	6.97 ± 0.87	12.158	0.000
CDT(评分)	26.70 ± 0.59	26.67 ± 0.58	26.39 ± 0.57	22.65 ± 0.59	10.788	0.000
LMT-即刻回忆(评分)	7.16 ± 0.44	6.38 ± 0.43	5.03 ± 0.43	3.87 ± 0.44	10.225	0.000
LMT-延迟回忆(评分)	6.37 ± 0.45	5.33 ± 0.44	3.95 ± 0.44	2.59 ± 0.45	12.378	0.000
AVLT-即刻回忆(评分)	19.22 ± 0.71	18.86 ± 0.70	15.94 ± 0.69	13.37 ± 0.71	14.046	0.000
AVLT-短延迟回忆(评分)	6.44 ± 0.38	6.07 ± 0.38	4.36 ± 0.37	2.75 ± 0.38	18.395	0.000
AVLT-长延迟回忆(评分)	5.94 ± 0.39	5.58 ± 0.38	3.81 ± 0.37	2.53 ± 0.39	15.874	0.000
AVLT-再认(评分)	9.35 ± 0.37	9.28 ± 0.36	8.05 ± 0.36	6.34 ± 0.37	13.585	0.000
SCWT-A时间(s)	25.52 ± 1.43	26.79 ± 1.41	25.63 ± 1.39	32.25 ± 1.44	4.904	0.003
SCWT-B时间(s)	38.71 ± 2.46	42.75 ± 2.42	41.24 ± 2.38	54.36 ± 2.47	7.740	0.000
SCWT-C时间(s)	79.50 ± 4.48	82.47 ± 4.41	79.24 ± 4.37	104.23 ± 4.50	7.065	0.000
SCWT-A正确数(个)	49.96 ± 0.12	49.85 ± 0.12	49.93 ± 0.11	49.44 ± 0.12	4.111	0.007
SCWT-B正确数(个)	49.38 ± 0.45	49.03 ± 0.44	48.82 ± 0.44	47.63 ± 0.45	2.687	0.048
SCWT-C正确数(个)	47.38 ± 0.77	47.16 ± 0.75	46.55 ± 0.74	43.73 ± 0.77	4.649	0.004
TMT-A时间(s)	60.41 ± 5.23	61.99 ± 5.15	61.86 ± 5.08	88.11 ± 5.26	6.354	0.000
TMT-B时间(s)	124.80 ± 9.74	130.61 ± 9.58	137.14 ± 9.44	176.39 ± 9.78	5.469	0.001
VFT-动物(个)	18.96 ± 0.67	16.43 ± 0.66	16.50 ± 0.65	14.09 ± 0.68	8.289	0.000
VFT-水果(个)	13.60 ± 3.32	12.56 ± 3.58	11.19 ± 3.19	10.36 ± 3.80	1.276	0.284
VFT-蔬菜(个)	14.01 ± 0.59	13.47 ± 0.58	13.24 ± 0.57	10.92 ± 0.59	5.131	0.002
BNT正确数(个)	24.90 ± 0.52	24.07 ± 0.52	23.71 ± 0.51	21.01 ± 0.53	9.833	0.000
ADL(评分)	14.34 ± 0.28	15.02 ± 0.27	14.28 ± 0.27	16.29 ± 0.27	11.519	0.000
GDS(评分)	5.36 ± 2.89	15.47 ± 4.23	5.25 ± 2.77	16.57 ± 4.48	151.298	0.000

MCI, mild cognitive impairment, 轻度认知损害; MMSE, Mini-Mental State Examination, 简易智能状态检查量表; MoCA, Montreal Cognitive Assessment, 蒙特利尔认知评价量表; ROCFT, Rey-Osterrieth Complex Figure Test, Rey-Osterrieth复杂图形测验; CDT, Clock Drawing Test, 画钟测验; LMT, Logical Memory Test, 逻辑记忆测验; AVLT, Auditory Verbal Learning Test, 听觉词汇学习测验; SCWT, Stroop Colour-Word Test, Stroop色词测验; TMT, Trail Making Test, 连线测验; VFT, Verbal Fluency Test, 词语流畅性测验; BNT, Boston Naming Test, Boston命名测验; ADL, Activities of Daily Living Scale, 日常生活活动能力量表; GDS, Geriatric Depression Scale, 老年抑郁量表

2. 统计分析方法 采用SPSS 22.0统计软件进行数据处理与分析。计数资料以相对数构成比(%)或率(%)表示,采用χ^2检验。呈正态分布的计量资料以均数 ± 标准差($\bar{x} \pm s$)表示,采用单因素方差分析,各组认知功能差异性采用协方差分析以消除性别、年龄和受教育程度对认知功能的影响,两两比较行LSD-*t*检验。抑郁情绪与神经心理学测验之间的相关性采用Pearson相关分析和偏相关分析。以$P \leqslant 0.05$为差异具有统计学意义。

结 果

神经心理学测验比较,4组受试者除VFT-水果个数外($P = 0.284$),其余各项测验差异具有统计学意义(均$P < 0.05$,表2)。整体认知功能方面,伴抑郁MCI组MMSE评分和MoCA评分低于对照组(均$P = 0.000$)、抑郁组(均$P = 0.000$)和无抑郁MCI组(均$P = 0.000$),无抑郁MCI组MMSE评分低于对照组($P = 0.037$),无抑郁MCI组MoCA评分低于对照组($P = 0.000$)和抑郁组($P = 0.000$,表3)。视空间能力方面,伴抑郁MCI组ROCFT-临摹和回忆、CDT评分低于对照组(均$P = 0.000$)、抑郁组(均$P = 0.000$)和无抑郁MCI组(均$P = 0.000$,表4)。记忆力方面,伴抑郁MCI组和无抑郁MCI组LMT-即刻回忆和延迟回忆评分均低于对照组(即刻回忆:$P = 0.000$,

表3 4组受试者整体认知功能的两两比较

Table 3. Pairwise comparison of overall cognitive function among 4 groups

组间两两比	MMSE		MoCA	
	*t*值	*P*值	*t*值	*P*值
(1):(2)	1.514	0.134	3.842	0.000
(1):(3)	2.103	0.037	10.938	0.000
(1):(4)	8.205	0.000	20.112	0.000
(2):(3)	0.571	0.569	6.704	0.000
(2):(4)	6.963	0.000	17.072	0.000
(3):(4)	6.655	0.000	12.364	0.000

MMSE, Mini-Mental State Examination, 简易智能状态检查量表; MoCA, Montreal Cognitive Assessment, 蒙特利尔认知评价量表

表4 4组受试者视空间能力的两两比较

Table 4. Pairwise comparison of visual spatial ability among 4 groups

组间两两比	ROCFT-临摹		ROCFT-回忆		CDT	
	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值
(1):(2)	0.926	0.357	-0.025	0.980	0.273	0.813
(1):(3)	-0.907	0.366	0.382	0.703	0.482	0.631
(1):(4)	4.964	0.000	5.082	0.000	4.707	0.000
(2):(3)	-1.649	0.101	0.369	0.713	0.387	0.699
(2):(4)	4.558	0.000	5.064	0.000	4.763	0.000
(3):(4)	6.114	0.000	4.763	0.000	4.587	0.000

ROCFT, Rey-Osterrieth Complex Figure Test, Rey-Osterrieth复杂图形测验; CDT, Clock Drawing Test, 画钟测验

表5 4组受试者记忆力的两两比较

Table 5. Pairwise comparison of memory among 4 groups

组间两两比	LMT-即刻回忆		LMT-延迟回忆		AVLT-即刻回忆		AVLT-短延迟回忆		AVLT-长延迟回忆		AVLT-再认	
	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值
(1):(2)	1.111	0.270	1.421	0.159	-0.018	0.985	0.343	0.733	0.271	0.787	-0.028	0.978
(1):(3)	3.229	0.002	3.526	0.001	3.044	0.003	3.735	0.000	3.691	0.000	3.014	0.003
(1):(4)	5.168	0.000	5.773	0.000	5.700	0.000	6.657	0.000	6.104	0.000	5.600	0.000
(2):(3)	2.074	0.040	2.040	0.043	2.785	0.006	3.133	0.002	3.146	0.002	2.874	0.005
(2):(4)	4.004	0.000	4.263	0.000	5.450	0.000	6.088	0.000	5.548	0.000	5.571	0.000
(3):(4)	1.916	0.057	2.182	0.030	2.640	0.009	3.052	0.003	2.405	0.017	3.355	0.001

LMT, Logical Memory Test, 逻辑记忆测验; AVLT, Auditory Verbal Learning Test, 听觉词汇学习测验

0.000; 延迟回忆: *P* = 0.002, 0.001)和抑郁组(即刻回忆: *P* = 0.000, 0.000; 延迟回忆: *P* = 0.040, 0.043), 伴抑郁MCI组LMT-延迟回忆评分低于无抑郁MCI组(*P* = 0.030); 伴抑郁MCI组AVLT-即刻回忆、短延迟回忆、长延迟回忆和再认评分均低于对照组(均*P* = 0.000)、抑郁组(均*P* = 0.000)和无抑郁MCI组(*P* = 0.009, 0.003, 0.017, 0.001), 无抑郁MCI组AVLT-即刻回忆、短延迟回忆、长延迟回忆和再认评分亦低于对照组(*P* = 0.003, 0.000, 0.000, 0.003)和抑郁组(*P* = 0.006, 0.002, 0.002, 0.005; 表5)。注意力和执行功能方面, 伴抑郁MCI组SCWT-A、SCWT-B和SCWT-C以及TMT-A和TMT-B完成时间均长于对照组(*P* = 0.001, 0.000, 0.000, 0000, 0.000)、抑郁组(*P* = 0.008, 0.001, 0.001, 0.001, 0.001)和无抑郁MCI组(*P* = 0.001, 0.000, 0.000, 0.000, 0.004); 伴抑郁MCI组SCWT-A、SCWT-B、SCWT-C正确个数均少于对照组(*P* = 0.003, 0.008, 0.001)和抑郁组(*P* = 0.016, 0.031, 0.002), 伴抑郁MCI组SCWT-A和SCWT-C正确个数亦少于无抑郁MCI组(*P* = 0.003, 0.008; 表6)。语言功能方面, 伴抑郁MCI组VFT-动物和蔬菜个数、BNT正确个数均少于对照组(均*P* = 0.000)、抑郁组(*P* = 0.016, 0.003, 0.000)和无抑郁MCI组(*P* = 0.010, 0.005, 0.000), 无抑郁MCI组(*P* = 0.018)和抑郁组(*P* = 0.012)VFT-动物个数少于对照组(表7)。日常生活活动能力方面, 伴抑郁MCI组ADL评分高于对照组(*P* = 0.000)、抑郁组(*P* = 0.001)和无抑郁MCI组(*P* = 0.000), 抑郁组ADL评分高于对照组(*P* = 0.014)和无抑郁MCI组(*P* = 0.001, 表8)。抑郁情绪方面, 对照组和无抑郁MCI组GDS评分低于抑郁组(均*P* = 0.000)和伴抑郁MCI组(均*P* = 0.000, 表8)。

Pearson相关分析结果显示, GDS评分与MMSE(*r* = -0.320, *P* = 0.000)和MoCA(*r* = -0.375, *P* = 0.000)评分, ROCFT-临摹(*r* = -0.230, *P* = 0.001)、回忆(*r* = -0.184, *P* = 0.009), CDT(*r* = -0.207, *P* = 0.003), LMT-即刻回忆(*r* = -0.247, *P* = 0.000)、延迟回忆(*r* = -0.218, *P* = 0.002), AVLT-即刻回忆(*r* = -0.197, *P* = 0.004)、短延迟回忆(*r* = -0.191, *P* =

表6 4组受试者注意力及执行功能的两两比较

Table 6. Pairwise comparison of attention and execution ability among 4 groups

组间两两比	SCWT-A时间		SCWT-A正确数		SCWT-B时间		SCWT-B正确数		SCWT-C时间		SCWT-C正确数		TMT-A时间		TMT-B时间	
	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值
(1):(2)	-0.751	0.455	1.731	0.087	-1.666	0.099	0.953	0.343	-0.527	0.599	0.358	0.721	-0.293	0.770	-0.703	0.484
(1):(3)	0.296	0.767	0.826	0.410	-0.735	0.463	0.879	0.381	0.293	0.770	1.024	0.308	-0.143	0.887	-0.880	0.380
(1):(4)	-3.241	0.001	3.037	0.003	-4.387	0.000	2.671	0.008	-3.797	0.000	3.288	0.001	-3.644	0.000	-3.648	0.000
(2):(3)	1.138	0.257	-0.955	0.421	0.646	0.519	0.324	0.746	0.739	0.461	0.795	0.428	0.149	0.882	-0.460	0.646
(2):(4)	-2.676	0.008	2.434	0.016	-3.312	0.001	2.173	0.031	-3.400	0.001	3.146	0.002	-3.497	0.001	-3.294	0.001
(3):(4)	-3.359	0.001	3.015	0.003	-3.876	0.000	1.923	0.056	-4.042	0.000	2.679	0.008	-3.636	0.000	-2.924	0.004

SCWT, Stroop Colour-Word Test, Stroop色词测验; TMT, Trail Making Test, 连线测验

表7 4组受试者语言功能的两两比较

Table 7. Pairwise comparison of language function among 4 groups

组间两两比	VFT-动物		VFT-蔬菜		BNT正确数	
	*t*值	*P*值	*t*值	*P*值	*t*值	*P*值
(1):(2)	2.555	0.012	0.467	0.641	1.410	0.162
(1):(3)	2.404	0.018	0.758	0.450	1.687	0.094
(1):(4)	4.974	0.000	3.613	0.000	5.119	0.000
(2):(3)	-0.166	0.868	0.162	0.871	0.378	0.706
(2):(4)	2.431	0.016	3.032	0.003	4.096	0.000
(3):(4)	2.595	0.010	2.859	0.005	3.747	0.000

VFT, Verbal Fluency Test, 词语流畅性测验; BNT, Boston Naming Test, Boston命名测验

表8 4组受试者日常生活活动能力和抑郁情绪的两两比较

Table 8. Pairwise comparison of activities of daily living and depression among 4 groups

组间两两比	ADL		GDS	
	*t*值	*P*值	*t*值	*P*值
(1):(2)	-2.518	0.014	-14.156	0.000
(1):(3)	0.345	0.731	0.352	0.726
(1):(4)	-4.870	0.000	-14.656	0.000
(2):(3)	3.299	0.001	15.463	0.000
(2):(4)	-3.241	0.001	-1.334	0.184
(3):(4)	-5.287	0.000	-15.587	0.000

ADL, Activities of Daily Living Scale, 日常生活活动能力量表; GDS, Geriatric Depression Scale, 老年抑郁量表

0.005)和长延迟回忆(r = -0.170, P = 0.013)和再认(r = -0.155, P = 0.024),以及SCWT-A(r = -0.167, P = 0.016)、VFT-动物(r = -0.304, P = 0.000)和蔬菜(r = -0.164, P = 0.017)、BNT(r = -0.235, P = 0.001)正确个数呈负相关;与SCWT-A(r = 0.188, P = 0.006)、SCWT-B(r = 0.216, P = 0.002)和SCWT-C(r = 0.215, P = 0.002)完成时间,TMT-A(r = 0.199, P = 0.004)和TMT-B(r = 0.152, P = 0.028)完成时间,ADL评分(r = 0.377, P = 0.000)呈正相关。为排除混杂因素的影响,进一步行偏相关分析结果显示,GDS评分与MMSE(r = -0.300, P = 0.000),MoCA(r = -0.357, P = 0.000),ROCFT-临摹(r = -0.192, P = 0.006)和回忆(r = -0.142, P = 0.044),CDT(r = -0.171, P = 0.015),LMT-即刻回忆(r = -0.213, P = 0.002)和延迟回忆(r = -0.193, P = 0.005),AVLT-即刻记忆(r = -0.159, P = 0.021)、短延迟回忆(r = -0.161, P = 0.020)和长延迟回忆(r = -0.137, P = 0.047)评分,以及SCWT-A(r = -0.156, P = 0.025)、VFT-动物(r = -0.271, P = 0.000)和蔬菜(r = -0.145, P = 0.038)、BNT(r = -0.194, P = 0.005)正确个数呈负相关;与SCWT-A(r = 0.162, P = 0.020)、SCWT-B(r = 0.189, P = 0.007)和SCWT-C(r = 0.184, P = 0.009)完成时间,TMT-A完成时间(r = 0.189, P = 0.006),ADL评分(r = 0.367, P = 0.000)呈正相关关系(表9)。

讨 论

流行病学调查显示,全球范围内轻度认知损害患病率为16.0%~22.2%[20-21],国内老年人群轻度认知损害患病率约为19%,远高于发达国家,不同省份和地区存在一定差异,女性高于男性,总体呈增长趋势[22]。轻度认知损害临床主要表现为记忆力减退,以及注意力、执行功能、语言功能、视空间能力、计算力减退[5]。本研究采用协方差分析消除性别、年龄和受教育程度的影响后发现,伴或不伴抑郁MCI组患者整体认知功能、记忆力、注意力、执行功能和语言功能均低于对照组,表明老年轻度认知损害患者存在多认知域损害。除认知功能障碍外,

表9 GDS评分与各项神经心理学测验评分的相关分析

Table 9. Pearson and partial correlation analyses between GDS score and neuropsychological tests

观察指标	Pearson相关分析		偏相关分析		观察指标	Pearson相关分析		偏相关分析	
	*r*值	*P*值	*r*值	*P*值		*r*值	*P*值	*r*值	*P*值
MMSE	-0.320	0.000	-0.300	0.000	SCWT-B时间	0.216	0.002	0.189	0.007
MoCA	-0.375	0.000	-0.357	0.000	SCWT-C时间	0.215	0.002	0.184	0.009
ROCFT-临摹	-0.230	0.001	-0.192	0.006	SCWT-A正确数	-0.167	0.016	-0.156	0.025
ROCFT-回忆	-0.184	0.009	-0.142	0.044	SCWT-B正确数	-0.044	0.525	-0.011	0.886
CDT	-0.207	0.003	-0.171	0.015	SCWT-C正确数	-0.123	0.076	-0.043	0.563
LMT-即刻回忆	-0.247	0.000	-0.213	0.002	TMT-A时间	0.199	0.004	0.189	0.006
LMT-延迟回忆	-0.218	0.002	-0.193	0.005	TMT-B时间	0.152	0.028	0.130	0.064
AVLT-即刻回忆	-0.197	0.004	-0.159	0.021	VFT-动物	-0.304	0.000	-0.271	0.000
AVLT-短延迟回忆	-0.191	0.005	-0.161	0.020	VFT-水果	-0.045	0.513	-0.001	0.985
AVLT-长延迟回忆	-0.170	0.013	-0.137	0.047	VFT-蔬菜	-0.164	0.017	-0.145	0.038
AVLT-再认	-0.155	0.024	-0.132	0.059	BNT正确数	-0.235	0.001	-0.194	0.005
SCWT-A时间	0.188	0.006	0.162	0.020	ADL	0.377	0.000	0.367	0.000

MMSE, Mini-Mental State Examination, 简易智能状态检查量表; MoCA, Montreal Cognitive Assessment, 蒙特利尔认知评价量表; ROCFT, Rey-Osterrieth Complex Figure Test, Rey-Osterrieth复杂图形测验; CDT, Clock Drawing Test, 画钟测验; LMT, Logical Memory Test, 逻辑记忆测验; AVLT, Auditory Verbal Learning Test, 听觉词汇学习测验; SCWT, Stroop Colour-Word Test, Stroop色词测验; TMT, Trail Making Test, 连线测验; VFT, Verbal Fluency Test, 词语流畅性测验; BNT, Boston Naming Test, Boston命名测验; ADL, Activities of Daily Living Scale, 日常生活活动能力量表

老年轻度认知损害患者还伴有精神行为异常，尤以抑郁、焦虑情绪多见，其中抑郁发病率为9%～63.3%，显著高于普通老年人群[23]。认知功能障碍和抑郁情绪是老年人常见状态，二者密切联系，抑郁情绪与记忆力、执行功能减退相关[24]；与无抑郁老年轻度认知损害患者相比，伴抑郁的老年轻度认知损害患者存在即刻回忆和延迟回忆障碍[25]，执行功能、灵活性以及词汇语义功能下降[26]，生活质量更差[27]。

本研究结果显示，GDS评分与多项神经心理学测验评分存在负相关关系，表明抑郁情绪越严重、认知功能越差。伴抑郁MCI组视空间能力、记忆力、注意力、执行功能和日常生活活动能力均低于无抑郁MCI组，提示伴抑郁MCI患者认知功能障碍更广泛、更严重，存在多认知域损害。额顶皮质功能障碍可导致边缘系统兴奋，增强机体对负性刺激的感知和持续注意力，导致抑郁的发生；同时，边缘系统过度兴奋又可抑制高级皮质功能，使其无法正常接收并处理外界信息，导致认知功能障碍[28]。韩国一项横断面研究纳入痴呆临床研究中心1724例轻度认知损害患者和1247例阿尔茨海默病患者，采用GDS量表韩国版评价抑郁情绪、首尔神经心理成套测验评价认知功能，结果显示，轻度认知损害患者视空间能力、记忆力和执行功能与抑郁程度呈负相关关系，且其抑郁症状与认知功能之间的相关性显著高于阿尔茨海默病患者[29]。视空间和记忆是认知功能障碍患者最先受损、最常累及的两大认知域[29-30]。Dickerson和Eichenbaum[31]发现，老年人抑郁症状和轻度认知损害与内侧颞叶结构异常有关，内侧颞叶结构接受来自大脑皮质的信息传入，经内嗅皮质（EC）和海马旁回到达海马，并最终到达丘脑，这一通路中海马与记忆力、精神行为等有关，内侧颞叶结构异常可使传入的信息无法长时存储。此外，抑郁症状与海马损伤存在一定联系，糖皮质激素级联假说指出，抑郁症状可引起内源性糖皮质激素水平升高，导致海马等特殊脑区继发性损伤，增加认知功能障碍风险[32]，同时，海马还是情景记忆网络中心，对记忆的形成、存储、提取及其与情感的结合具有重要作用[33]。抑郁症状和认知功能障碍均存在海马网络功能异常，且抑郁可加速认知功能减退，使轻度认知损害患者记忆力损害加重[34]。在本研究中，伴抑郁MCI组AVLT评分低于无抑郁MCI组，表明轻度认知损害伴抑郁情绪的患者记忆力更差；伴抑郁MCI组视空间能力低于无抑郁MCI组，fMRI研究显示，抑郁患者认知功能障碍涉及多脑区结构和功能异常，背外侧前额皮质（DLPFC）、背

侧前扣带回(dACC)、后顶叶皮质(PPC)和额叶眼动区等脑区构成的认知控制网络中断[29]。视空间能力包括视空间感知能力、视空间结构能力等[35],其中,视空间感知能力涉及纹状体、前纹状体皮质、下颞叶和下顶叶[36]。Biesbroek等[35]的研究发现,右侧顶上小叶和顶下小叶、角回及枕中回对视空间结构能力有重要作用,视空间结构能力损害患者通常表现为无法准确复制图像或三维结构。抑郁患者视空间能力障碍可能与前额叶、顶叶、扣带回等脑区结构和功能异常有关[37]。

轻度认知损害伴抑郁情绪患者认知功能障碍和抑郁情绪还与额叶功能密切相关。Sacuiu等[38]认为,抑郁情绪与额叶皮质萎缩加速有关,认知功能障碍则部分由于额叶功能障碍所致。额叶在维持注意力和执行功能方面具有重要作用,注意力减退也是抑郁患者的特异性表现,注意力主要涉及前额皮质、前扣带回、右侧额顶皮质,且前额皮质及前扣带回是调节情绪和注意网络的重要脑区,抑郁患者fMRI成像前额皮质及前扣带回呈低灌注且代谢显著降低[39]。研究发现,老年轻度认知损害和老年抑郁患者脑白质结构连接网络存在相似的神经回路损害[40],二者在发病机制上有内在联系,均存在前额叶、扣带回等多脑区白质异常,并累及这些脑区的皮质及皮质下功能连接,前额叶-皮质下回路是维持执行功能的重要神经回路,其功能障碍可以导致认知功能障碍,还可导致抑郁[41],二者相互影响,导致伴抑郁的老年轻度认知损害患者注意力、执行功能损害更严重。本研究伴抑郁MCI组TMT测验完成时间长于对照组、抑郁组和无抑郁MCI组,而无抑郁MCI组与对照组、抑郁组相比并无显著差异,提示轻度认知损害伴抑郁情绪患者的注意力和执行功能更差[42]。

本研究还发现,伴抑郁MCI组ADL评分高于无抑郁MCI组和对照组,而无抑郁MCI组与对照组无显著差异,表明轻度认知损害伴抑郁情绪患者的日常生活活动能力显著降低,且降低程度较轻度认知损害不伴抑郁情绪患者更严重。由于老年轻度认知损害伴抑郁情绪患者在日常生活中缺乏积极性,活动范围缩小,信息接收量减少,导致大脑活动积极性减弱,引起神经功能下降,加重认知功能障碍,降低部分复杂生活能力[43]。同时,老年轻度认知损害患者日常生活活动能力减退越严重,其发生抑郁的风险越高,并呈恶性循环[44]。2019年,国内一项横断面研究纳入114例伴抑郁的轻度认知损害患者、191例不伴抑的轻度认知损害郁患者、225例认知功能正常的抑郁患者和1995例健康对照者,采用8条目痴呆筛查问卷(AD8)评价认知功能,GDS量表评价抑郁情绪,Lawton工具性日常生活活动能力量表(Lawton IADL)评价日常生活活动能力,36条简明健康状况调查表(SF-36)评价健康相关生活质量(HRQoL),结果显示,伴抑郁的轻度认知损害患者Lawton IADL评分和SF-36评分最低,表明伴抑郁的老年轻度认知损害患者生理和心理健康、生活质量较差,认知功能障碍和抑郁情绪均可导致患者自我效能感下降,日常生活活动能力下降[45]。

本研究尚存在以下局限性:(1)为横断面研究,未对研究对象进行长期随访,仅探究抑郁情绪与认知功能之间的相关性,未探究二者因果关系。(2)以记忆门诊就诊患者为研究对象,样本量较小且相对局限,可能存在选择偏倚。(3)未对轻度认知损害患者进行亚型分类。未来尚待进一步扩大样本量,并对其进行亚型分类,结合临床生物学标志物,进行长期纵向随访以明确抑郁情绪与认知功能之间的因果关系。

综上所述,老年轻度认知损害伴抑郁情绪患者的认知功能障碍更严重、更广泛,在照料轻度认知损害患者时,除应重视其认知功能障碍,还应注重其情绪状态[46]。临床医师应制定针对性干预方案并定期随访,以改善患者抑郁情绪和认知功能,维持其日常生活活动能力,提高生活质量,延缓其进展为痴呆[37]。

利益冲突 无

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·小词典·

中英文对照名词词汇(二)

功能性神经系统疾病
functional neurological disorder(FND)

功能性运动障碍 functional movement disorder(FMD)

功能性震颤 functional tremor(FT)

谷氨酸脱羧酶65 glutamic acid decarboxylase 65(GAD65)

γ-谷氨酰转移酶 γ-glutamyl transferase(GGT)

骨髓间充质干细胞
bone marrow-derived mesenchymal stem cells(BM-MSCs)

CT灌注成像 CT perfusion imaging(CTP)

国际疾病分类法-10
International Classification of Disease-10(ICD-10)

国际抗癫痫联盟
International League Against Epilepsy(ILAE)

国际老年痴呆协会
Alzheimer's Disease International(ADI)

国际细胞治疗协会
International Society for Cellular Therapy(ISCT)

汉密尔顿焦虑量表 Hamilton Anxiety Rating Scale(HAMA)

汉密尔顿抑郁量表
Hamilton Depression Rating Scale(HAMD)

红细胞沉降率 erythrocyte sedimentation rate(ESR)

宏基因组第二代测序技术
metagenomic next-generation sequencing(mNGS)

后部皮质萎缩 posterior cortical atrophy(PCA)

后顶叶皮质 posterior parietal cortex(PPC)

画钟测验 Clock Drawing Test(CDT)

混合性痴呆 mixed dementia(MD)

霍普金斯词语学习测验修订版
Hopkins Verbal Learning Test Revised(HVLT-R)

基底前脑 basal forebrain(BF)

基质细胞衍生因子-1 stromal cell-derived factor-1(SDF-1)

Cohen-Mansfield激越行为量表
Cohen-Mansfield Agitation Inventory(CMAI)

即时血液介导的炎症反应
instant blood-mediated inflammatory reaction(IBMIR)