超高齡長者失智預防.

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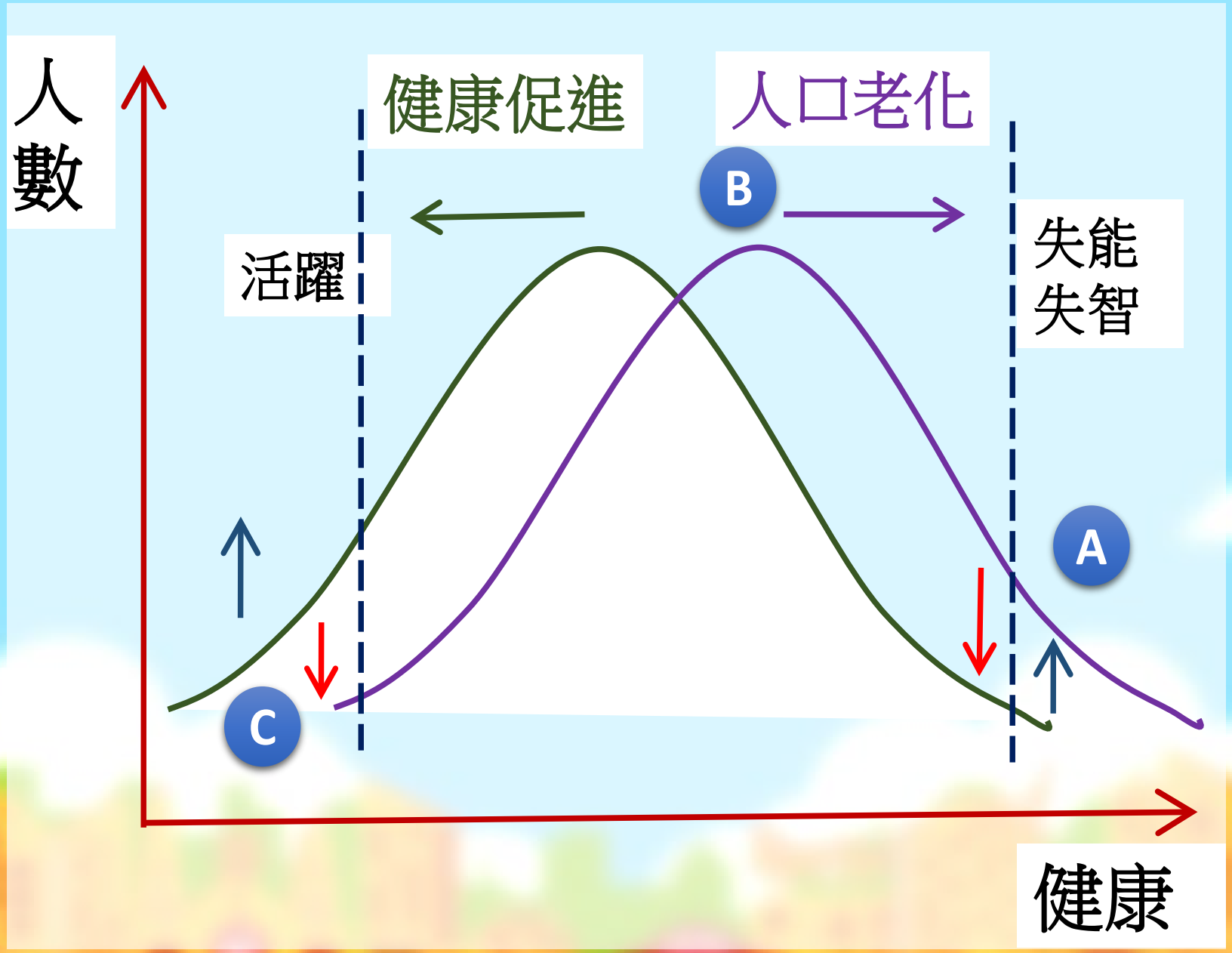
陳俊忠教授

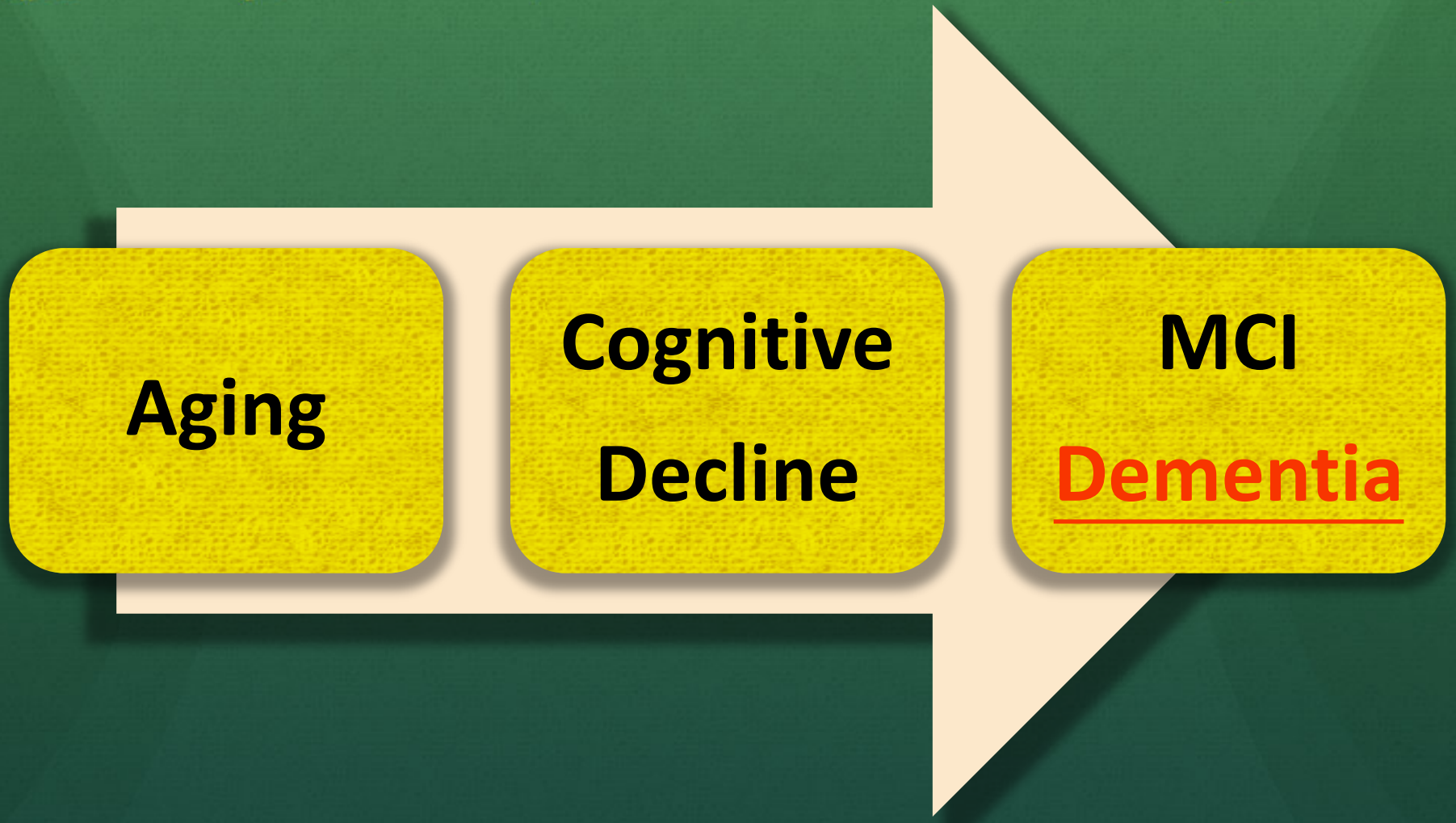
演講大綱

- 老化與認知功能衰退及失智衝擊
- 輕度認知功能障礙與失智篩檢
- 運動介入預防失智之效益
- 結語

老化與認知功能衰退及失智衝擊


人數
健康促進
人口老化
B
活躍
失能
失智
A
C
健康

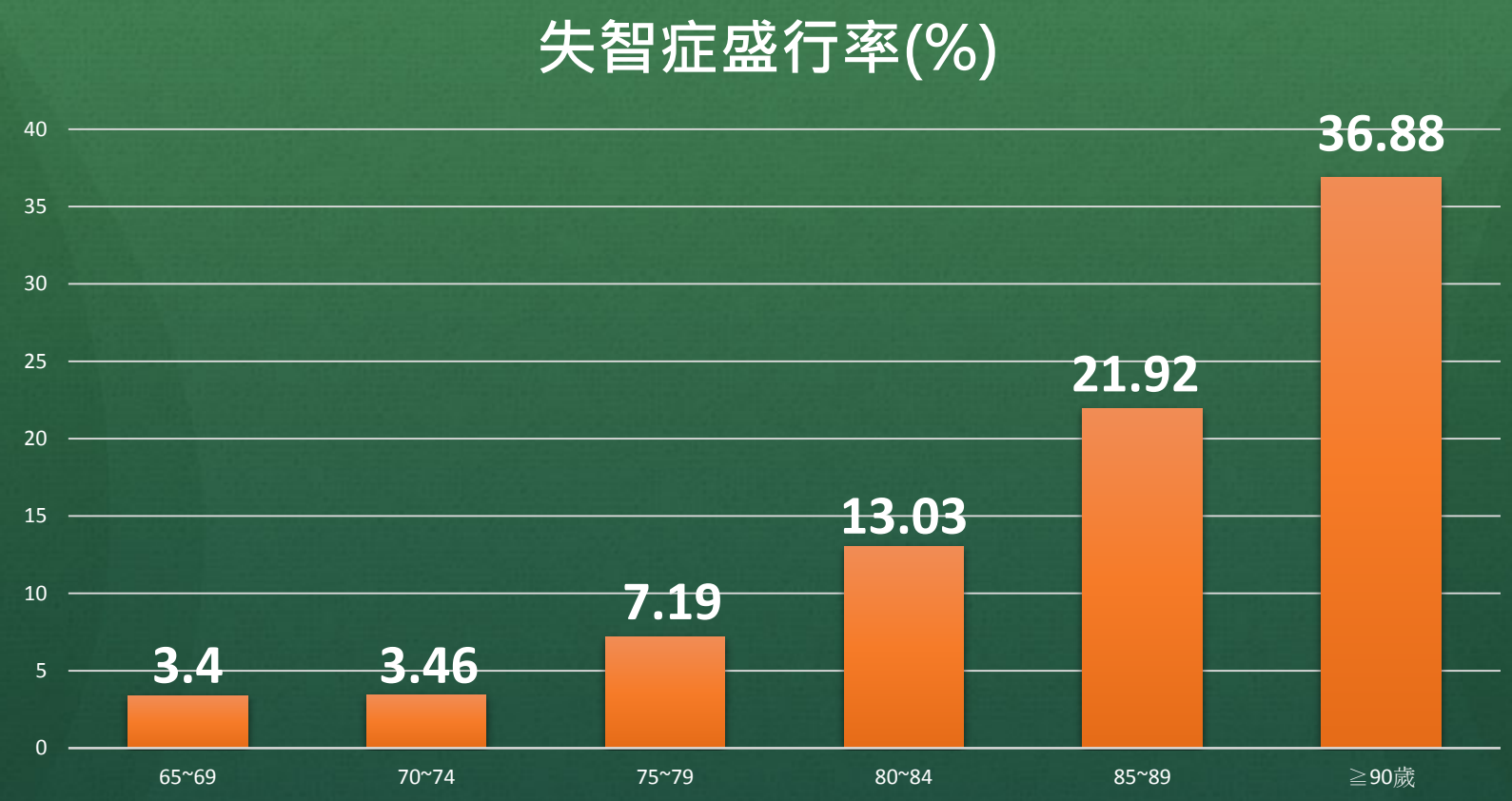
Aging Issues



失智症人口分析

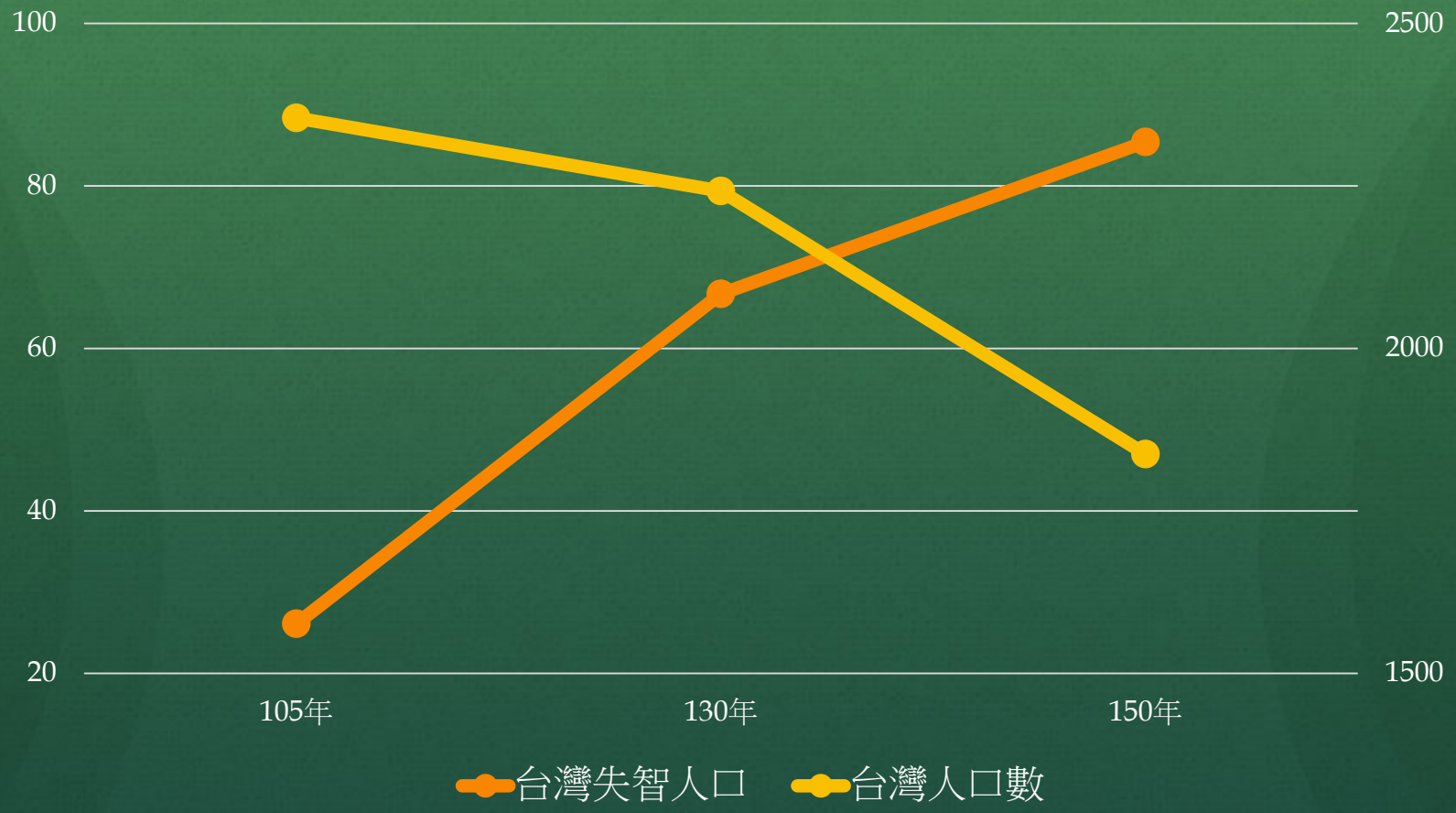
- 國際失智症協會(Alzheimer's Disease International, ADI)《2015全球失智症報告》
  - 2015年全球有4680萬失智者，約占全球老年人口的5%
  - 全球每年有990萬人罹患失智症，平均每三秒鐘新增一 個病例
  - 估計2030年將增至7500萬人，在2050年將達到1億3150萬人
  - 於2017年9月ADI也指出2017年估計新增1000萬個新病例
- 台灣每五歲之失智症盛行率分別為：
  - 65~69歲3.40%、70~74歲3.46%、 75~79歲7.19%、80~84歲13.03%、85~89歲21.92%、90歲以上36.88%
  - 未來的46年， 台灣失智人口數將以平均每天增加36人的速度成長

失智風險隨年齡而上升



內政部105年9月公布，104年國人的平均壽命達80.2歲，
其中男性77.01歲、女性83.62歲，均創歷年新高。

台灣失智人數



資料來源:台灣失智症

失智症所造成的衝擊

一. 經濟面衝擊

《2015全球失智症報告》估計 全球失智症的社會經濟成本將在2018年到達1兆美元，失智症照護成本預計到2030年時，將增加到2兆美元。

《失智症亞太地區 盛行報告》估計，2015年台灣地區失智症醫療成本約4億1,200萬美元， 非醫療成本約33億2,600萬美元，非正式照護成本約32億5,200萬美元， 總計約69億9,000萬美元。

二. 人權面衝擊

性別議題 、工作權議題、自主選擇權議題

三. 家庭面衝擊

失智症家屬照顧負荷沈重，影響身心健康，比一般人平均服用更多安眠鎮靜藥物，為 憂鬱症高危險群。

全球失智症行動計畫七大行動領域

一.將失智症列為公衛政策之優先議題

二.提升失智症認知與友善

三.降低罹病風險

四.失智症診斷、治療、照護與支持

五.支持失智症照顧者

六.建置失智症資訊系統

七.失智症研究與創新

執行策略

策略一、列失智症為公共衛生之優先任務

策略二、提升大眾對失智症之認識及友善態度

策略三、降低失智的風險

- 降低可改變的罹患失智症之風險，包含肥胖、糖尿病、高血壓、體能活動不足、吸菸、飲酒過量等

策略四、健全失智症診斷、治療、照護網絡

策略五、普及對失智家庭照顧者的支持協助

策略六、建置失智症資訊蒐集與分析平台

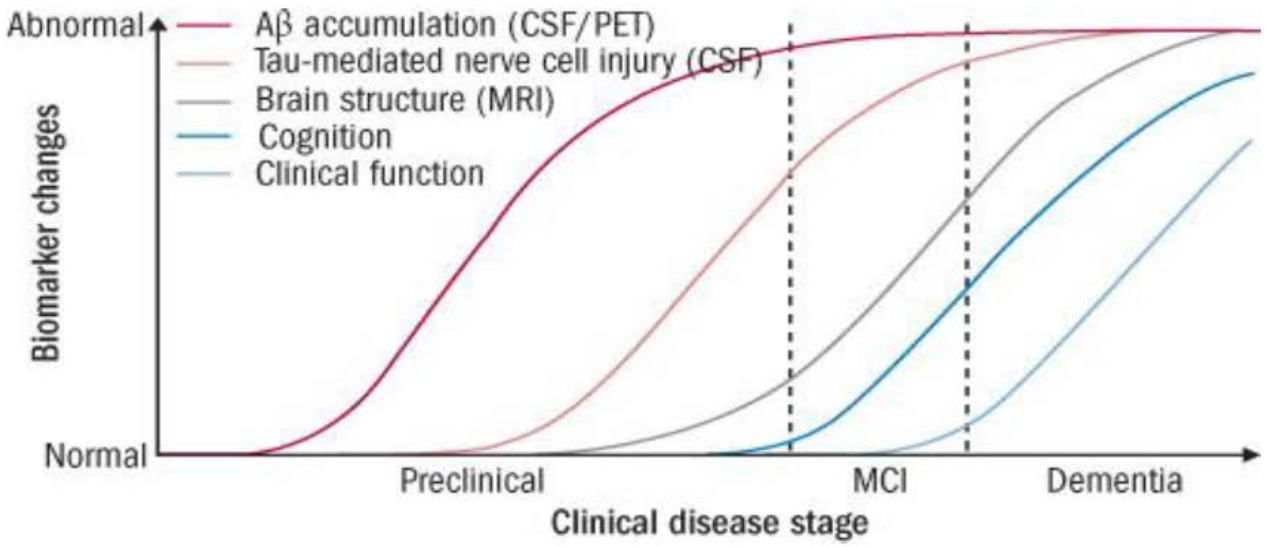
策略七、推動失智症之研究與創新發展

輕度認知功能障礙與輕度失智篩檢

阿茲海默症之病程

MCI: Mild cognitive impairment

輕度知能障礙



Dubois et al, Lancet Neurology, 2010

誰適合做檢測?

Aggregate Risk Scoring for Alzheimer's Disease

Risk	Odds Ratio
一等親為阿茲海默症患者	3.0
腦部損傷	2.0
年齡 >65	1.0
年齡 >75	4.0
年齡 >85	16.0
受教育年齡 <7 年	3.6
女性	1.5
收縮壓> 140mm Hg	2.2
BMI >30 kg/m^2	2.3
Cholesterol >6.5mmol/L	1.9
Apo E 4 陽性	4.0
有中風病史	2.4
有心肌梗塞病史	2.5
無治療的第二型糖尿病	2.0
Low physical activity (sedentary)	1.7
持續吸菸者	2.3

Risk score
<5 = low
5-12= moderate
>12=high

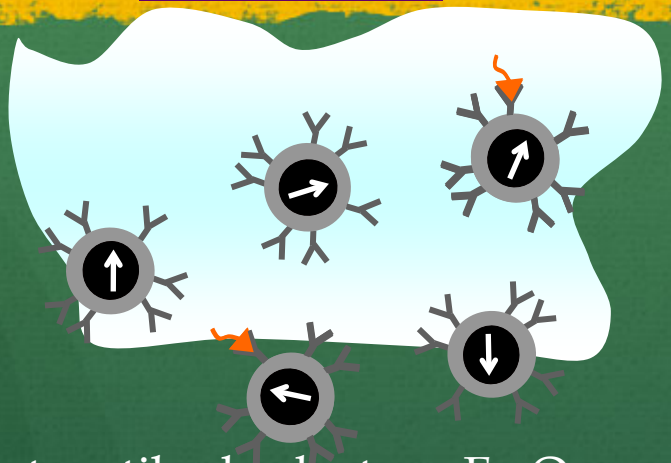
風險值= 3+4+2.2+2.3+2.3= **13.8!!**

Adapted from
Kivipelto et al 2006, Norton et al (Brayne) 2014

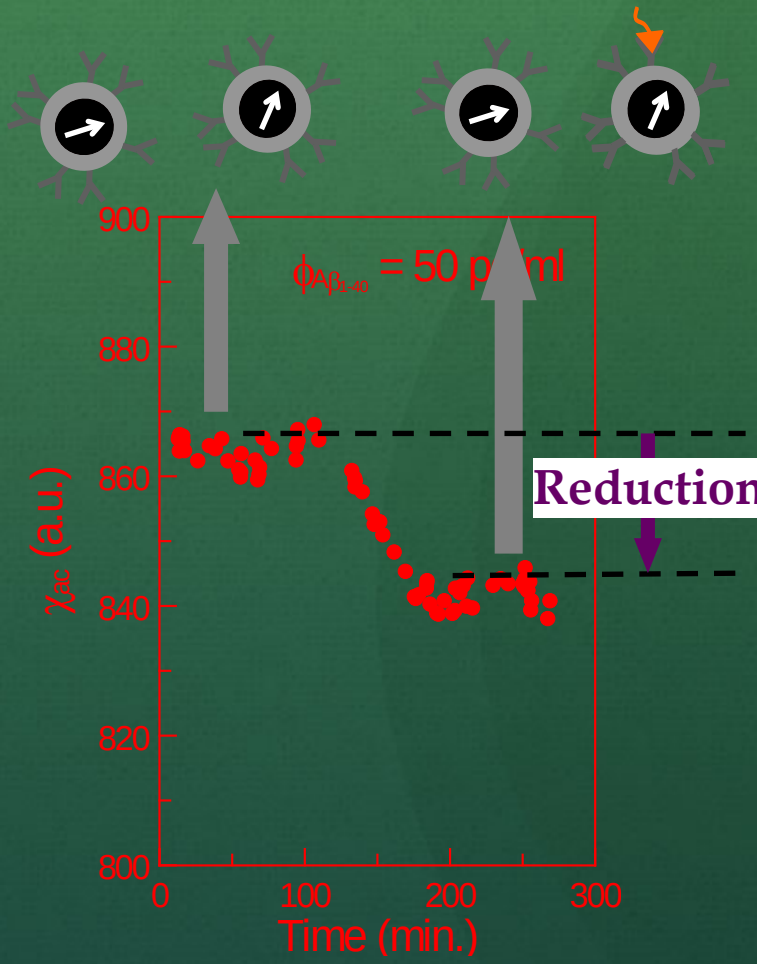
ImmunoMagnetic Reduction

免疫磁減量(IMR)檢測原理

Mechanism



Real Example



Reagent: antibody-dextran-Fe_3O_4 nanoparticles in PBS (D~55nm)

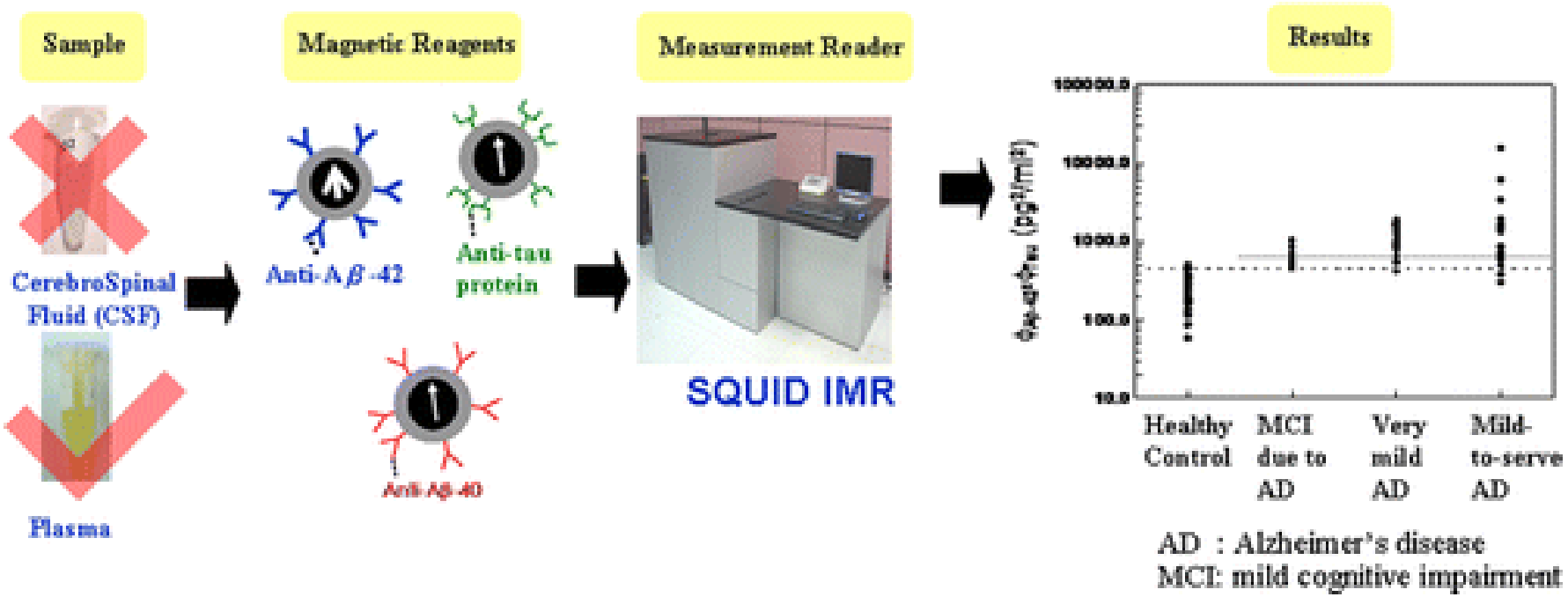
Applying rotating magnetic fields
→ reagent generates rotating magnetic signal

Mixing reagent with plasma
→ nanoparticles bind with target protein
→ rotating magnetic signal is reduced

Appl. Phys. Lett., **90**, 74105 (2007)

*J . Appl. Phys.***112**, 24704 (2012)

臨床檢驗結果應用 –
可區分健康、認知功能障礙(MCI)、早期阿茲海默症(Early-AD)



High correlation to clinical diagnosis

Curr. Alzheimer Res. ***9****, 1142 (2012)*
ACS Chem. Neurosci. ***4****, 1530 (2013)*

TUG功能性檢測表現與認知功能的相關性

	Walking speed-u	Walking speed-f	Stand and sit	TUG	2 min stepping
MoCA-TS	.353 .034*	.330 .049*	X	-.428 .009**	X
MoCA-MIS	X	X	X	X	X
MMSE	X	X	X	-.390 .019*	X
CCVLT	X	X	X	-.381 .022*	X
GDS	X	X	X	X	X

科技部計畫未發表資訊

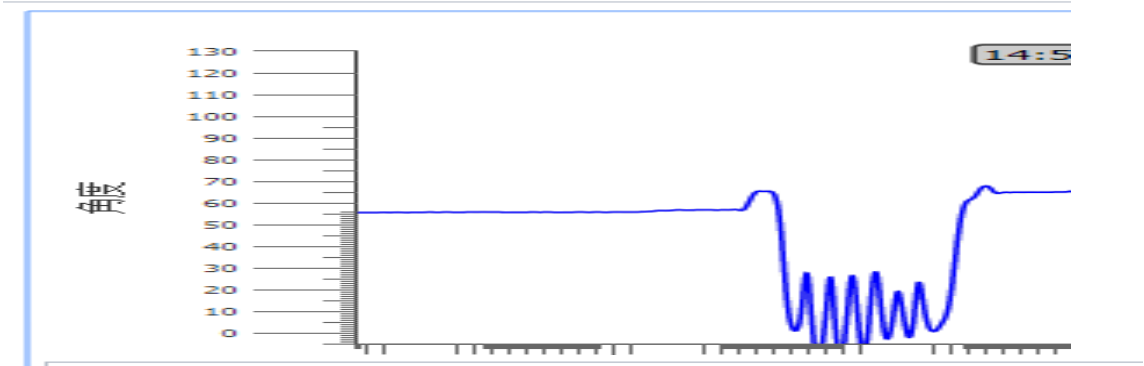
Association Between Performance on Timed Up and Go Subtasks and Mild Cognitive Impairment

- Subjects wore a small, light-weight sensor that measured acceleration and angular velocity while they performed the instrumented TUG (iTUG).
- Measures of iTUG were derived from 4 subtasks:
  - walking,
  - turning,
  - sit-to-stand
  - stand-to-sit
- MCI had less walking consistency (p=0.0091), smaller pitch range during transitions (p=0.005), lower angular velocity during turning, and required more time to complete the turn-to-walk (p=0.042).
- Gait consistency was correlated with perceptual speed (p=0.012) and turning was correlated with perceptual speed (p=0.024) and visual-spatial abilities (p=0.049).

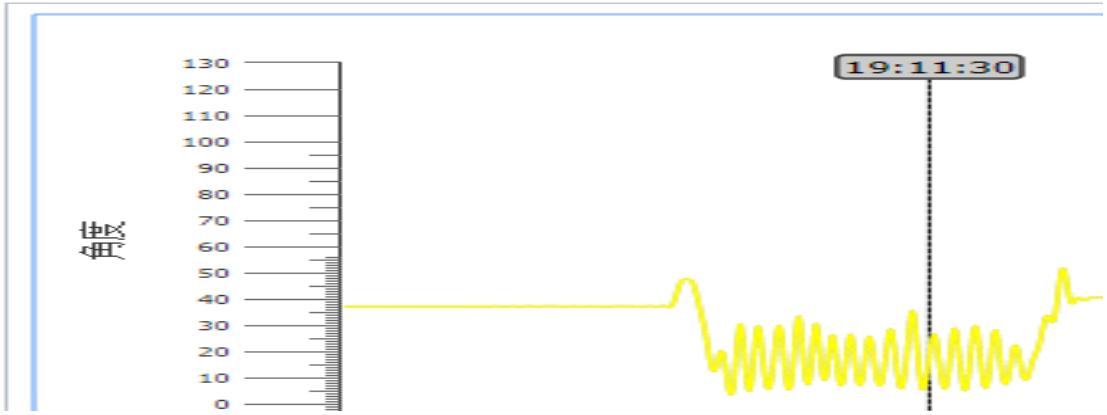
J Am Geriatr Soc. 2014 April ; 62(4): 673–678.

iKnee 應用於TUG功能性檢測

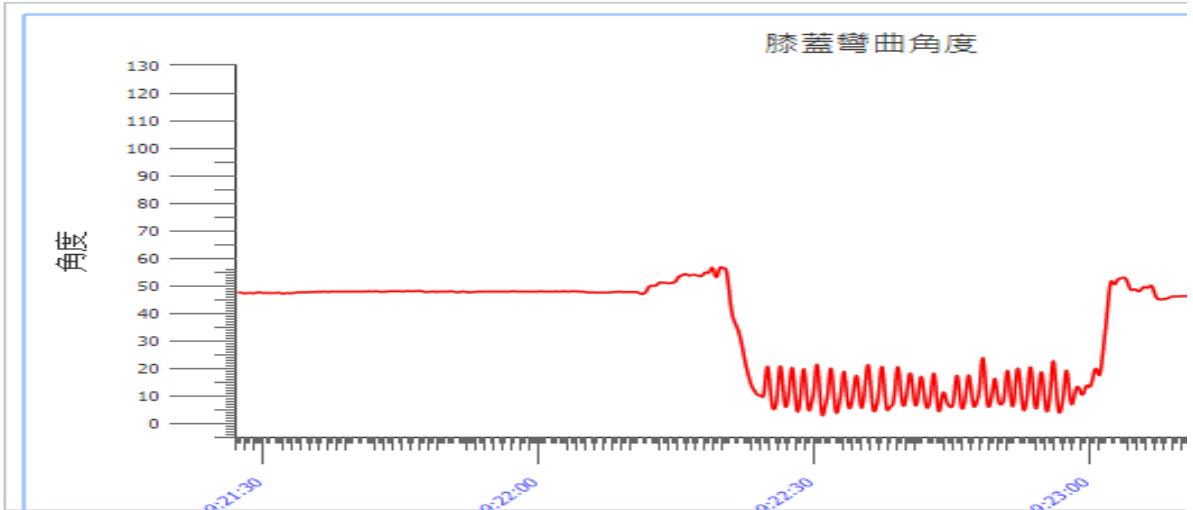
健康年輕人



超高齡MCI

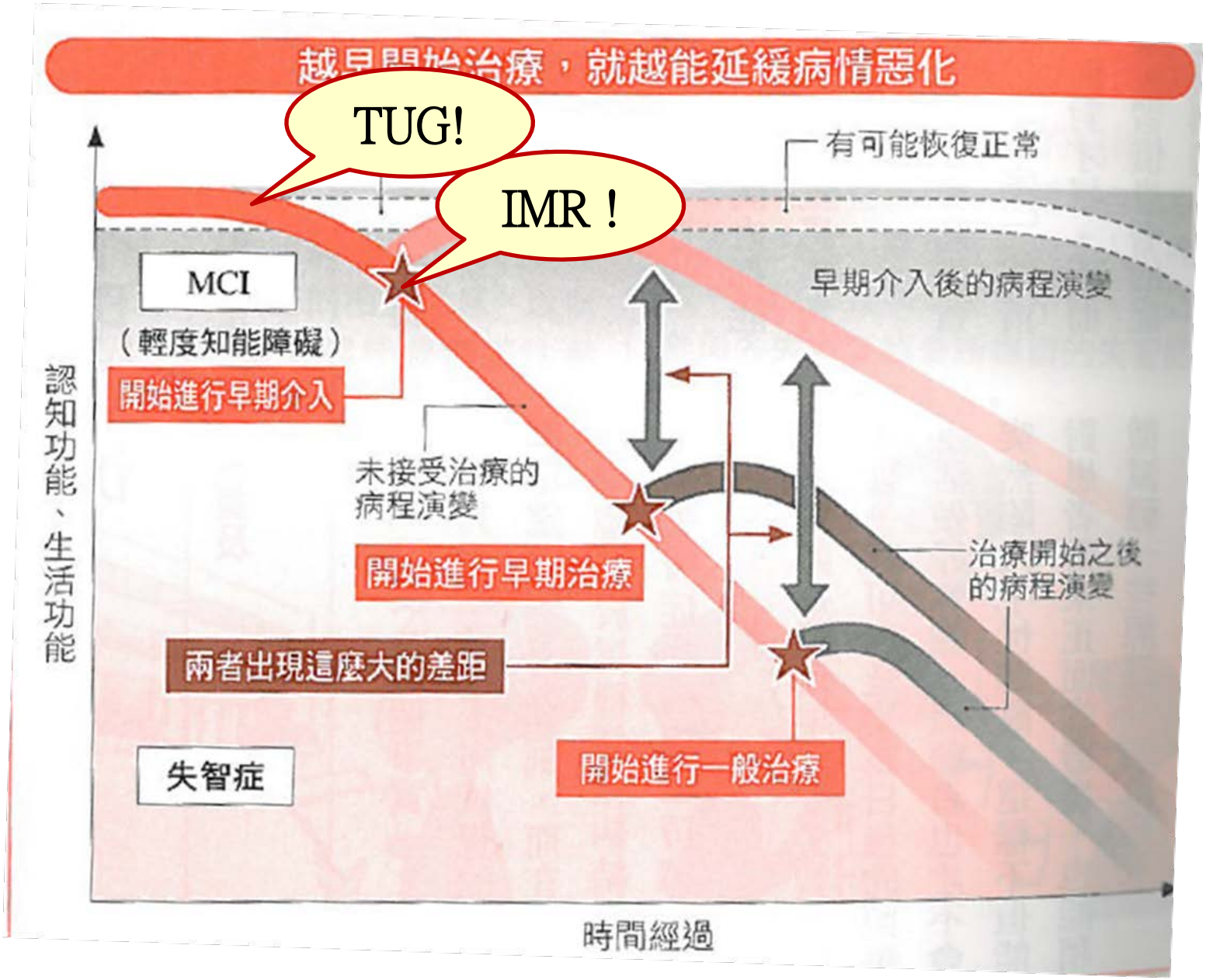


超高齡AD



iKnee 應用於TUG功能性檢測

個案	起站時間	步行時間	坐下時間	彎曲角度
健康 年輕人	快，且平順	短	快，且平順	大，約0-30度
超高齡 MCI	普通，曲折	普通	普通，曲折	普通，約10-30度
超高齡 AD	慢，曲折	長	慢，曲折	小，約10-20度



陪他走更遠 初版 p.29 今井幸充/著

運動介入預防失智之效益

What can we do?

Exercise is the most effective and directive way to improve brain health and cognitive function.

Mechanisms of Benefits Effects

EXERCISE

Mediated physiologic mechanisms

Cerebral blood circulation hypothesis (Metabolism)

Nerve stimulation and efficiency hypothesis (Neurotrophic)

Secondary aging disease hypothesis (Mediation)

(Kirk-Sanchez NJ et al., 2014; Radak Z, et al., 2010)

Exercise Design in study

- Structural, personal, moderate-vigorous intensity, long duration or high frequency and multi-components

(Kirk-Sanchez NJ et al., 2014)

- Tai chi: multi-components exercise

Tai chi

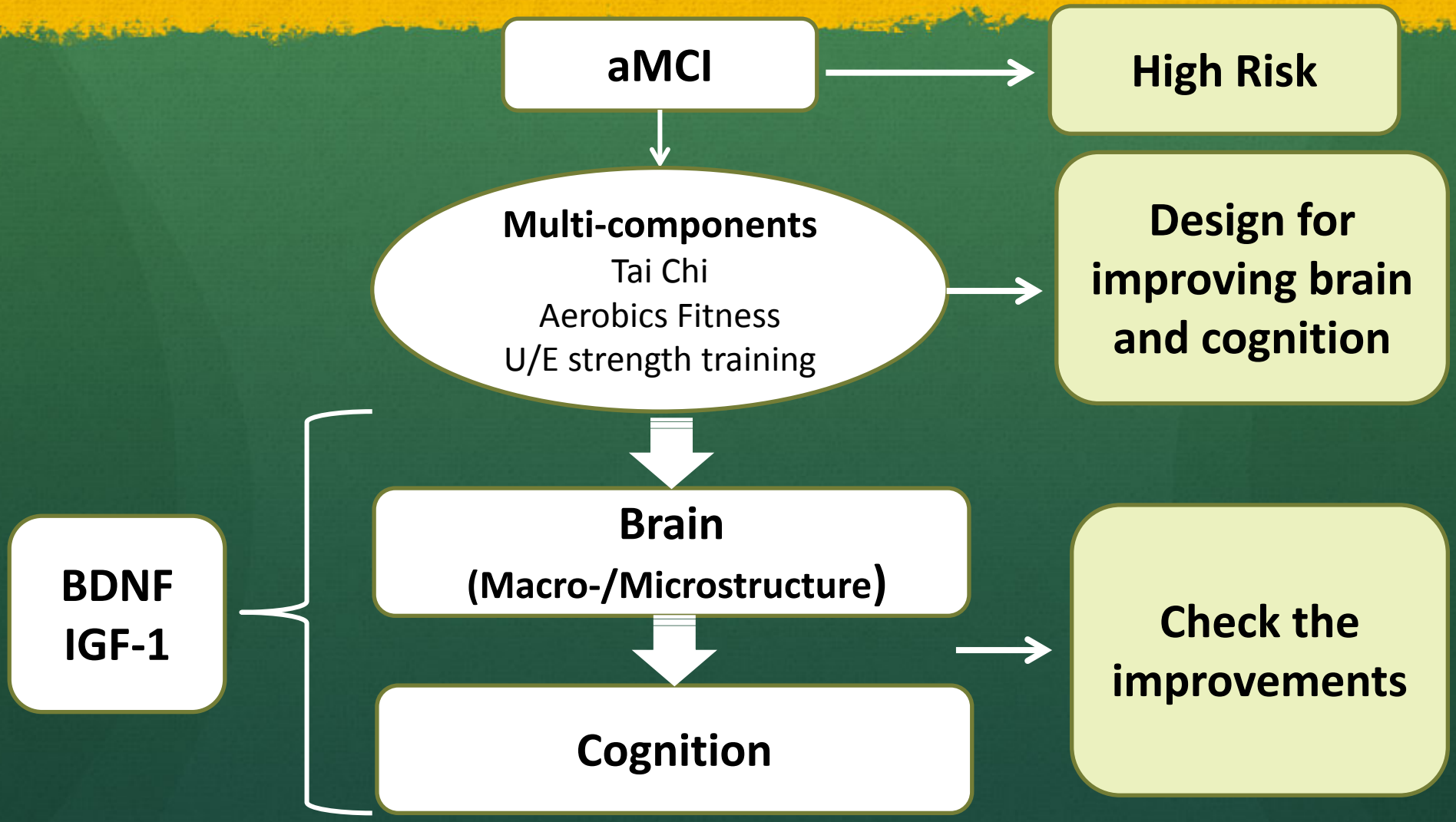
Low intensity

Strength training focus on L/E

Aerobics

U/E strength training

Exercise intervention



Intervention

Control group

- Maintain lifestyle, health education, BP/ weight/ PC record
- 1 time/ 2 week, 12weeks

Multi-components exercise group

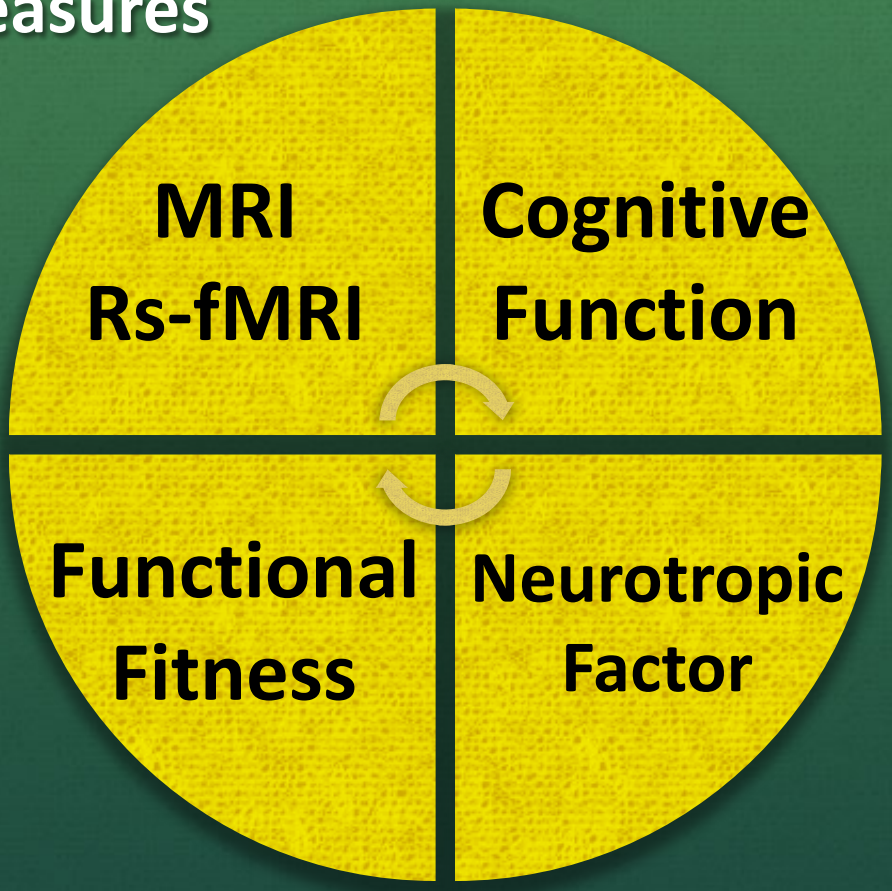
- Tai chi + Aerobics fitness + Thera-band training
- 3 time/ week, 60 min, 12 weeks (RPE: 10-13)

24 weeks follow-up: phone call care 1 times/ month

vedio

How do we know the affects ?

Outcome Measures



Aims of study

Fitness

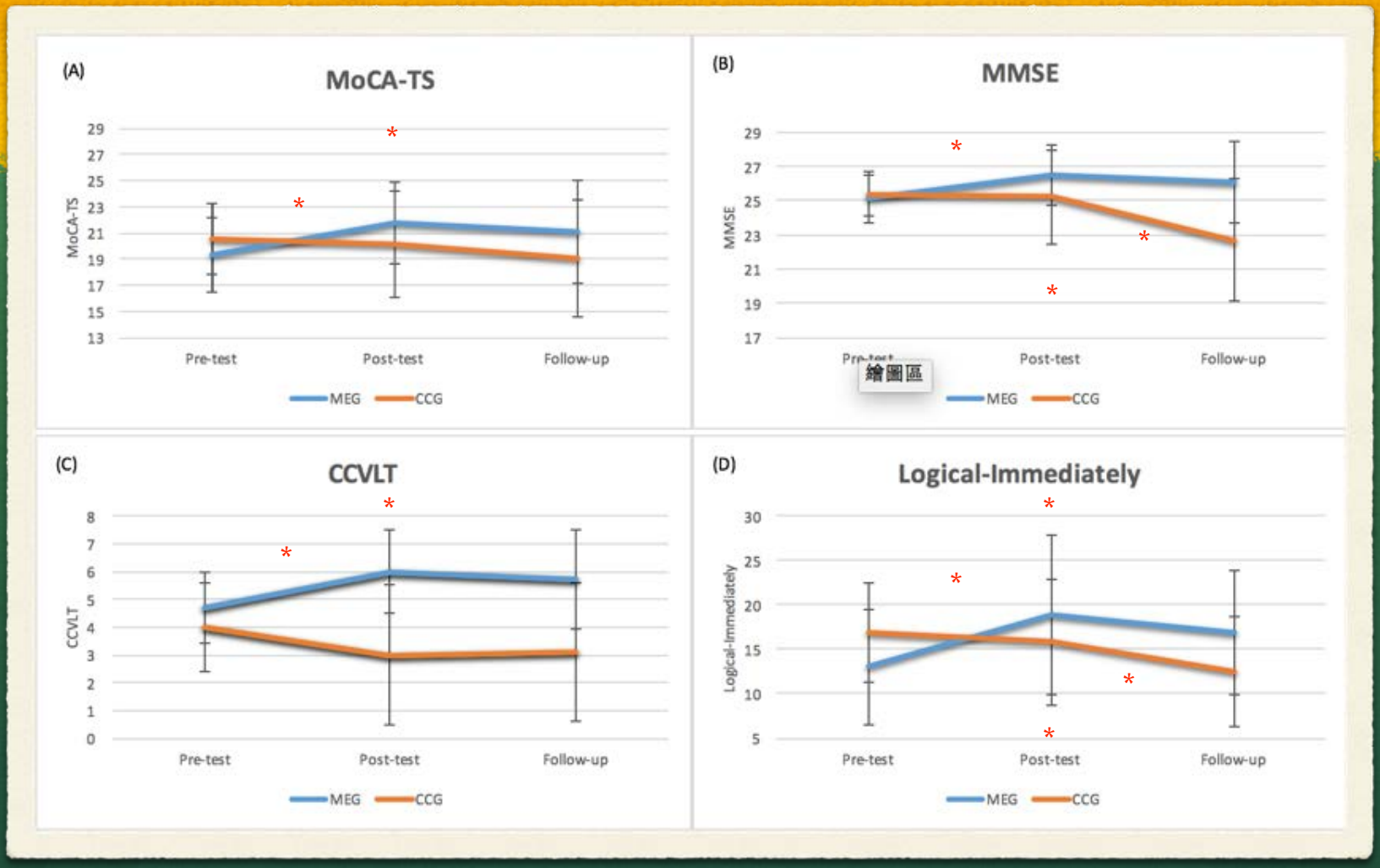
BDNF
IGF-1

Brain
Macrostructure
Microstructure

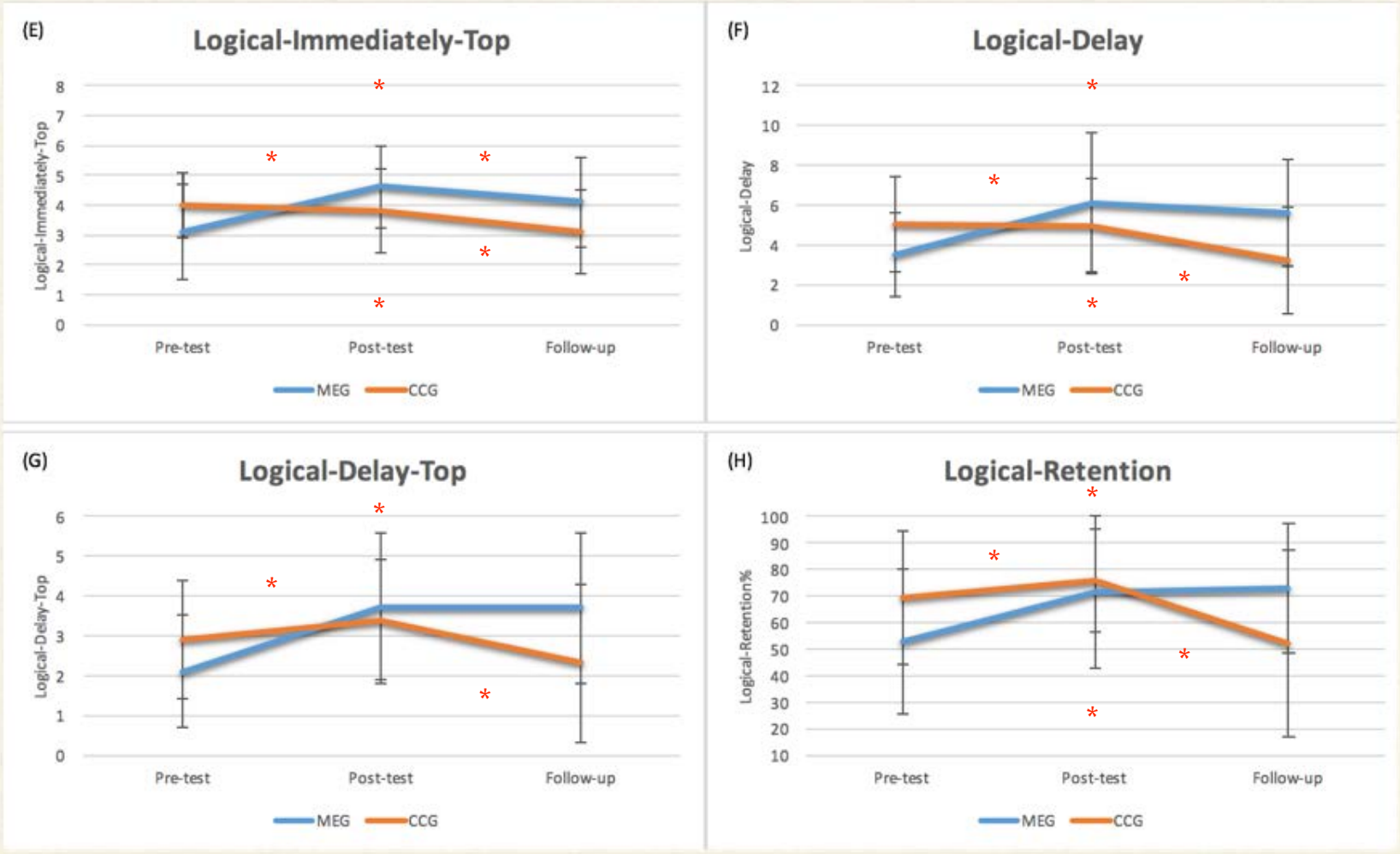
Cognition

Reversion Rate?

Results



The effects of intervention on cognitive outcome measures revealed significant groups (MEG and CCG) by time (pre-test, post-test and follow up-test) interactions.



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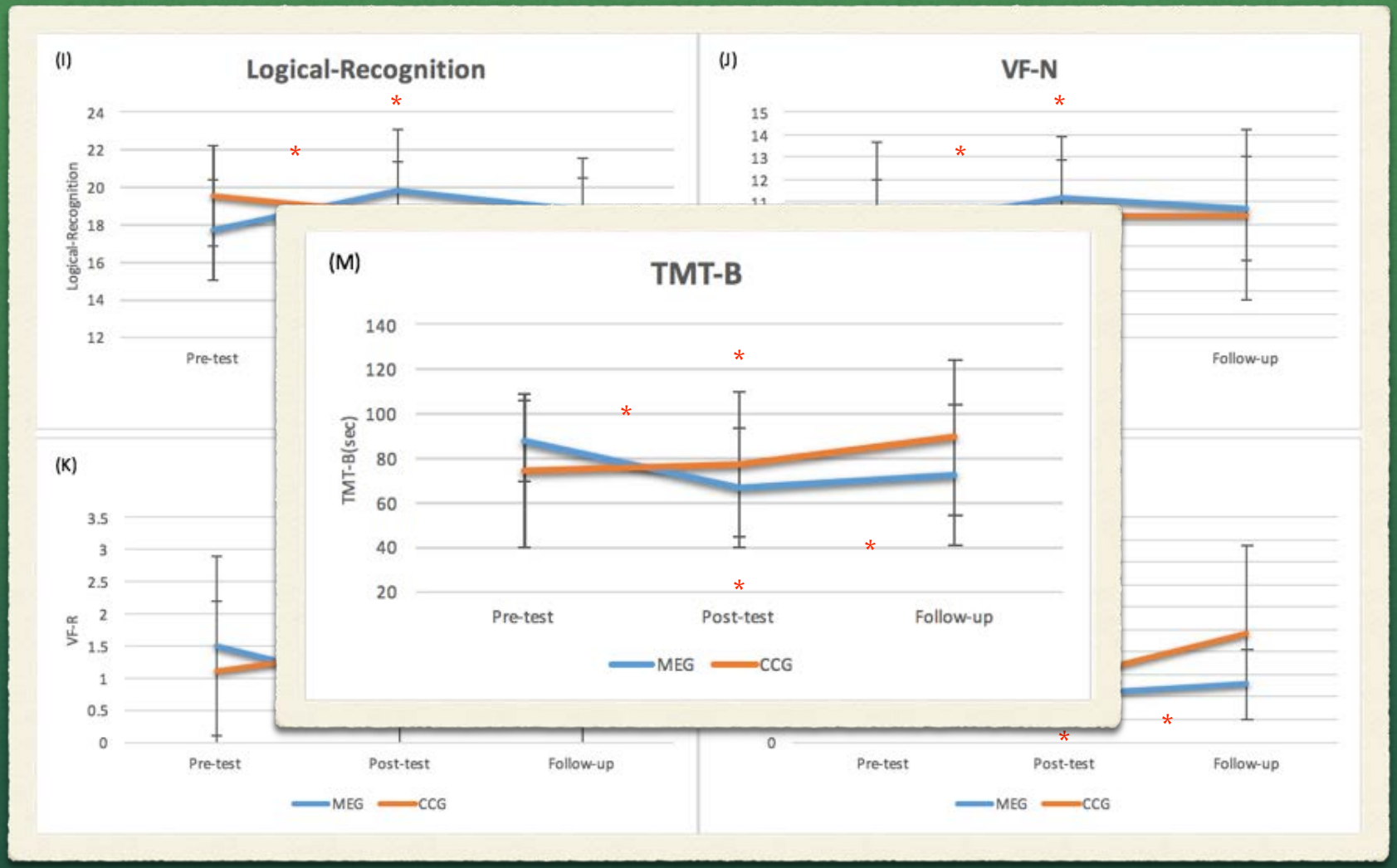

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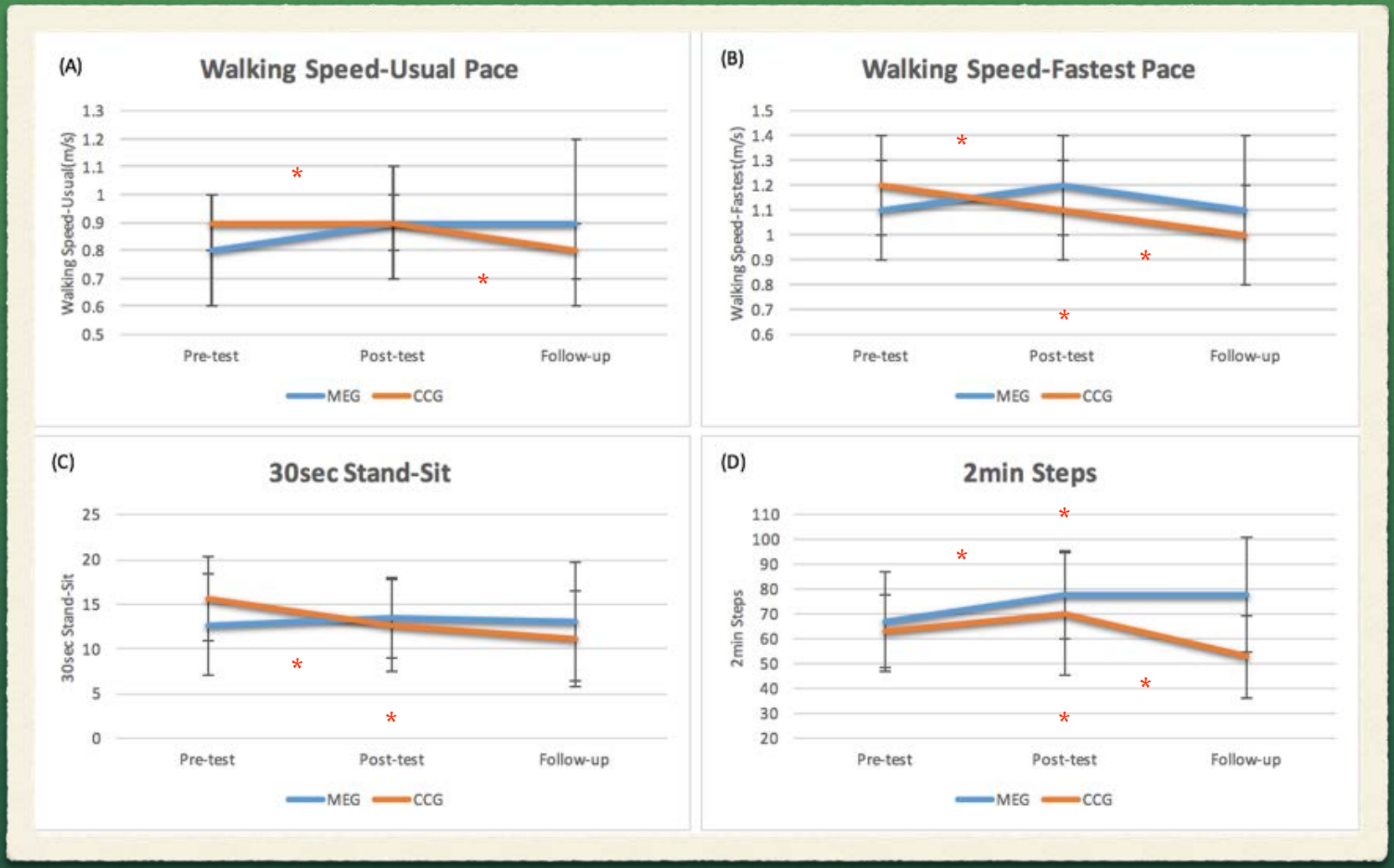


The effects of intervention on functional fitness revealed significant groups (MEG and CCG) by time (pre-test, post-test and follow up-test) interactions.

Short Summary

Cognitive Function

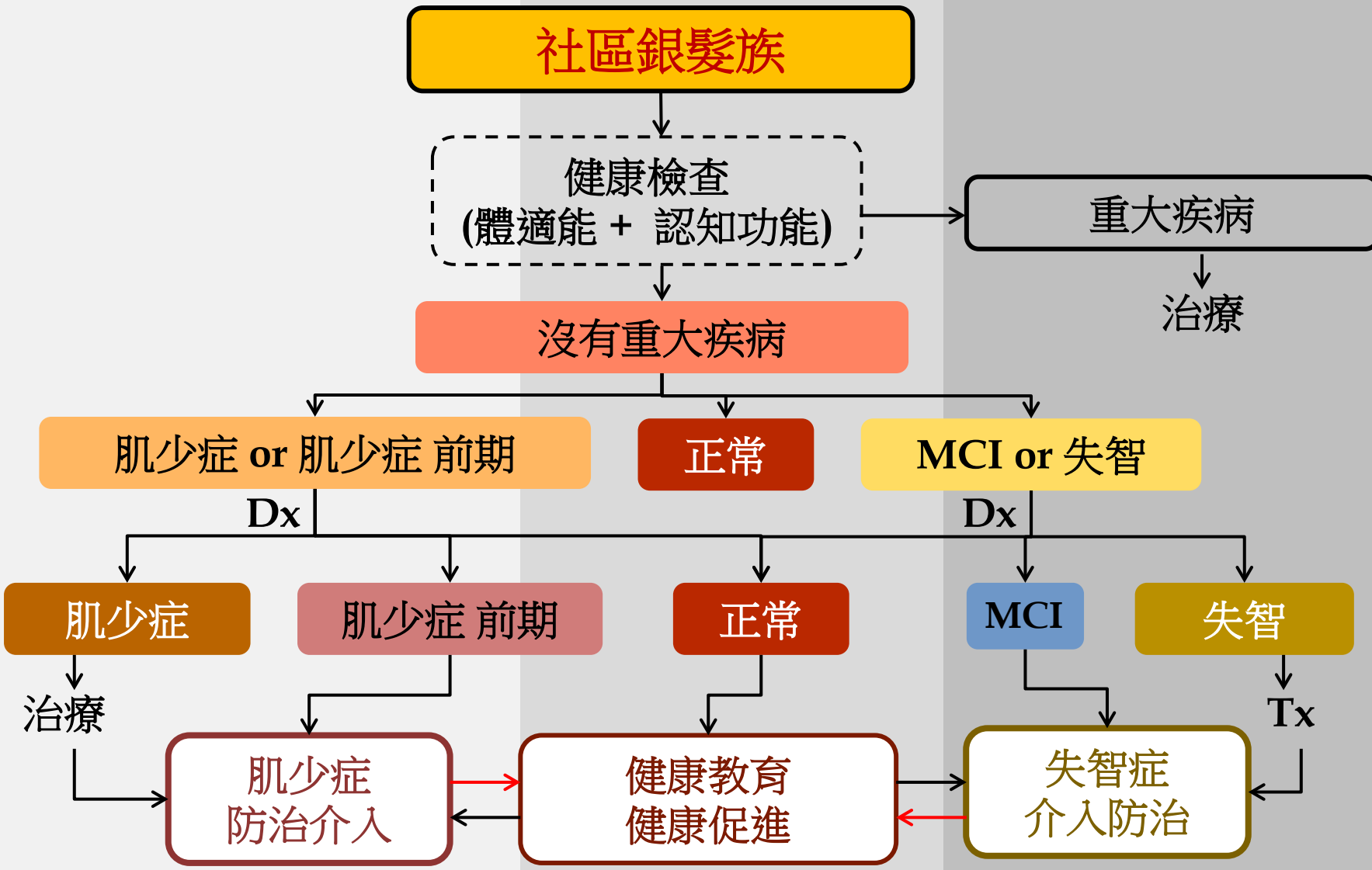
- Significantly Group by Time interaction include general cognition, Memory, Verbal Fluency and executive function.
- Cognitive function were improved after 12 weeks intervention in MEG.
- Have prolong effects to maintain cognitive function during 24 weeks in MEG.
- Cognitive function were declined after 24 weeks follow up period in CCG.

Functional Fitness

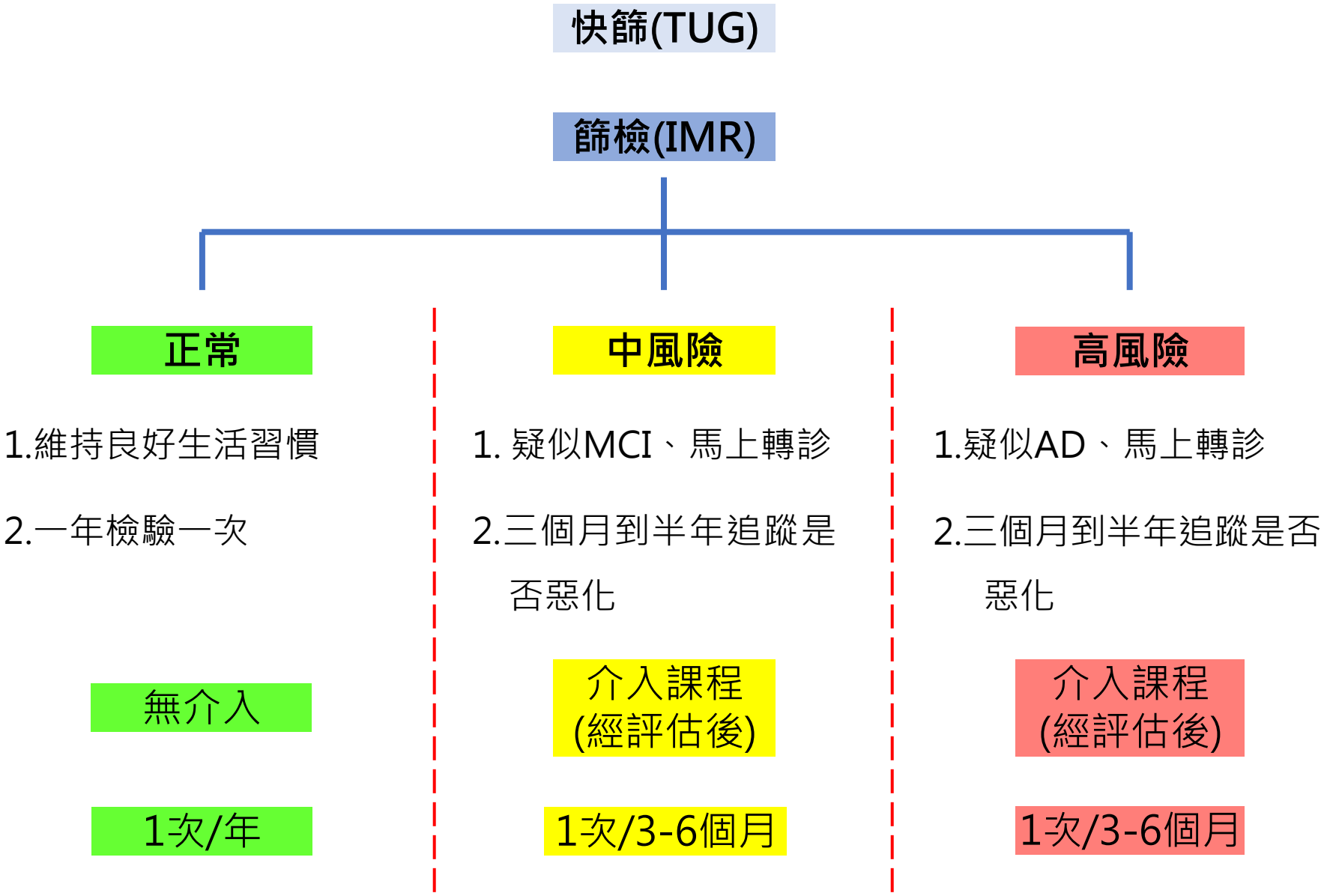
- Significantly Group by Time interaction include Walking Speed, Lower extremity endurance and cardiopulmonary function.
- Functional fitness were improved after 12 weeks intervention in MEG.
- Have prolong effects to maintain functional fitness during 24 weeks in MEG.
- Functional fitness were declined after 24 weeks follow up period in CCG.

結語

完整的健康促進與疾病預防架構



快篩(TUG)、篩檢(IMR)、轉診、介入及追蹤建議



Tai Chi Exercise

Mind- Body Exercise

Mind

- Learning
- Attention
- Working memory,
- Memory (recall),
- Cognitive flexibility
- Executive function

Physical

- Strength and Endurance
- Balance
- Coordination
- Gravity transfer
- Alternative movement

Activation of physiological and neurophysiological processes that drive positive adaptations in the brain

(Li F, Harmer P et al., 2015; Zheng G et al., 2015)

Rich Environment Stimulation

- Multiple stimulus inputs
- Rich environment could enhanced sensory inputs, cognitive processing and motor stimulation, and then improved the brain plasticity and cognitive function.

(Nithianantharajah, J. et al. 2006; Mora, F. et al. 2013)