Benefit of exercise for Parkinson’s disease

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Objectives

• Review evidence of exercise in animal models of PD
• Review evidence of exercise benefitting patients with PD
• Recommendations
Disclaimer

• If you have chest pain, shortness of breath or loss of consciousness – check with internist or cardiologist before embarking on exercise

• Prone to falls – check with physical therapist which exercise is more suitable

• Deconditioned – physical therapist can help build up exercise endurance

• No financial disclosures
Benefits of exercise

• Improves physical wellbeing
• Improves mental wellbeing
• How does it benefit patients with Parkinson’s disease?
Animal models of Parkinson’s disease

- Daily exercise of affected leg reduced brain cell loss by 20-30%
- Exercised animals have more brain derived neurotropic factor than sedentary animals
- Exercise duration and intensity matches prevention of brain cell loss
- Sedentary - exacerbates the brain cell loss
- Exercise has neuroprotective effect against brain cell loss
Does it apply to humans?

• In humans, brain derived neurotropic factor (BDNF) concentrations rise after exercise
• Brain cells making dopamine are protected from spontaneous death by BDNF
• In Parkinson’s disease, there is loss of dopamine making brain cells
• In PD patients, there’s less BDNF than normal population
• With intense exercise, more BDNF is released
Does it apply to humans?

• Vigorous exercise
  – Increase heart rate (above 100 bpm)/ cardio training zone
  – Sustained – 20-30 min at a time
  – Daily
  – Jogging, swimming, raking leaves, digging, shoveling snow

• Cardiovascular fitness associated with better memory and movement scores for PD

• Many studies suggest it lessens depression

• Longevity in PD associated with exercise

• Combined exercise with PD medications help achieve maximum benefit from exercise

• No long-term exercise studies in PD < 1 year
Exercise in Parkinson’s disease patients

• Scientific evidence
  – 6 well designed studies looking at exercise in Parkinson’s disease patients, compared with PD patients no exercise

• Varies in:
  – Types of exercise
  – Measurement of outcome
  – Followup duration

• No one exercise regimen is better than another
Study 1

- Balance training and high resistance training – 30 min each time, 3 times a week

• Measured outcome
  - Before and after exercise training 10 weeks
  - Percentage of falls during postulography
  - Time to fall

• Result
  - Falls reduced from 28% to 7% during postulography in exercise group
  - Harder to induce falls in exercise group (2 seconds longer)
  - Balance + high resistance training benefit >> balance training alone
Studies 2 and 3

Treadmill training with body weight support using hoist
Compared with standard physical therapy and occupational therapy

• Measured time and step in 10 meter walk

• Results
  – Treadmill training group had slightly faster walk (8 compared to 10 seconds)
  – Treadmill training group had slightly bigger steps (took 20 steps instead of 22 steps)

• Difficulty getting equipment
Study 4

- Repetitive exercises to improve range of motion, endurance, balance, walking, fine motor function
- PT and OT supervised 1 month, then at home
- 1 hour each session 3 times a week
- Compared to non exercise group

• 4 weeks later - Exercise group significantly improved in speed of movement, stiffness, activities of daily living score
• No improvement in tremor
• Improvement disappeared when reviewed at 6 months after stopping exercise
Study 5

– “cued” exercise with feedback (mirror, metronome and tactile feedback) compared to non cued exercise

• Measured outcome
  – baseline/after exercise/6 weeks after stopped exercise
  – Motor Parkinson’s rating scale
  – Activities of daily living scale

• Results
  – Cued exercise group has same improvement in speed of movement, posture as non cued exercise group
  – Cued exercise group has better retention of improvement 6 weeks after stopping exercise than non cued exercise group
Study 6

• 3 months physical therapy compared to music therapy at 1.5 hours per week
• Measured Parkinson’s disease rating scale
• Results
  – Music therapy had improvement in speed of movement, ability to do daily tasks and improved quality of life (esp in emotional and social scores)
  – Physical therapy had less stiffness
Conclusion

- Exercise is beneficial in people with Parkinson’s disease
- Exercise that increase heart rate produces factors that prevent brain cell death
- Tailor type of exercise to physical fitness
- Daily sustained exercise to raise heart rate >100 bpm for 20-30 minutes
  - Preserved balance - dancing, brisk walk
  - Risk of falls – stationary bike, swimming, seated exercise
- Safety – consult internist if chest pain, lose consciousness or shortness of breath
Thank you!