

# **JULIE JONES: PARKINSON'S GAIT – WHERE THE JOURNEY BEGINS AND WHERE WE SHOULD TAKE IT**

*Summary by Alison Williams, Member Parkinson's UK Edinburgh Branch (Terminology Notes are given at the end of the Summary)*

## **What is gait, and how does it happen?**

Gait (step and stride length) is a complex activity, related to quality of life. In walking we use almost all of our bodies: as well as the obvious parts (muscles, bones, joints) and our fitness level, it also involves our brain, spinal cord, peripheral nerves, biomechanics, sensation, and mood.

## **What goes wrong with gait in Parkinson's?**

Movement is not lost, it is the access to it which is lost.

- a) **What happens neurologically?** Our dopamine is compromised through the build-up of Lewy bodies (misfolded proteins) which disrupts the work of the synapses and the messages being transmitted between brain cells and the dopamine cells (dopaminergic neurones) start to die. The depletion of dopamine impairs the basal ganglia where automatic movement patterns are stored, affecting (among many other things) our ability to select movement, control individual muscles, make fast and large movements, prepare and sequence our movements, awareness of the context of our movements, the amplitude, speed and accuracy/precision of movement. Depletion of dopamine is also linked to sleep and social behaviour disorders.

Julie's slides, available on the Branch website, provide more detail on the neurology of Parkinson's.

- b) **What effect does that have?** The net effect is that our muscle power and strength are reduced, along with our ability to select the right muscles for a movement and the right degree of force for the movement. We have a reduction in co-ordination, stability and balance, and our proprioceptive sensitivity (Note a). We also get sensory disturbances. The sensory messages coming from our brain to our muscles are compromised, and so are the messages coming back to our brains from the periphery.
- c) **What is the result?** This is what Julie called "poverty of movement": hypokinesia (slowness of movement); akinesia (no movement/freezing), reduced arm swing, reduced amplitude (length of stride) and reduced speed.

## **What can we do about it?**

Because well-learned movements are affected, we have to bypass the basal ganglia by thinking. There are different kinds of exercise that we can do to help this, and Julie took us through research findings for the value of different kinds of exercise to PD.

One study showed that **intensive activity** maximises synaptic plasticity (changes in how neurones connect to each other), **complex activities** promote greater structural

adaptation of the brain, **rewarding activities** increase dopamine levels and promote learning, **exercise and the lack of it** strongly affect the activity of dopaminergic neurones, and **early initiation of exercise** slows down progression of PD symptoms.

Other kinds of exercise/intervention which have a beneficial impact:

- Visual and auditory **cueing** (Note b) improves gait.
- **Tai Chi** improves balance and motor function.
- **LSVT BIG** (Note d) shows improvements in UPDRS measures (Unified Parkinson's Disease Rating Scale, used to follow the progression of a person's PD), TUG (timed up and down – how long it takes a PwP to get up from sitting and move a set distance), the 10 Metre Walk Test (the time required to walk 10 metres).
- **Treadmill training** shows improvements in gait speed and stride length.
- **ParkFit** (Note e) showed good results especially for sedentary people, women, people with greater disease severity and shorter duration and older people.

### **Where does this all leave us?**

Physiotherapists need to design a programme that improves an individual's strength and power, speed, posture and balance, biomechanics, endurance, ROM (range of movement), skills acquisition, empowerment and education.

They must do this in partnership with PwPs, academics, and Parkinson's UK.

The **message for health professionals** is:

**Fit the exercise to what people want to be able to do. It should be fun, use concentration, mental fitness and focus on movement. It should empower and educate the PwP.**

The **message for PwPs** is:

**Make your exercising functional, relevant and meaningful – what is it FOR? What do you want to achieve?**

### **Terminology Notes:**

a. **Proprioceptors:** sensory receptors in muscles, joint capsules and surrounding tissues and that signal information to the central nervous system about position and movement of body parts.

b. **Cueing** refers to external cues being applied in the form of visual, auditory and tactile information that can trigger movements or can provide rhythmic or spatial support to improve the quality of movements.

d. **LSVT BIG:** an innovative physical/occupational therapy programme for improving motor skills in PwPs and other neurological conditions. The LSVT (Lee Silverman Voice

Treatment) Programme for individuals with PD has been developed and researched over the past 20 years. The Programme was extended to address movement. It is intensive involving one-to-one physiotherapy sessions and homework practise.

e. **Parkfit** is an individually tailored training programme to improve physical activity in PwPs, developed and trialled in the Netherlands. It involves activity coaches, goal setting and regular physiotherapy sessions.