



# The feasibility of bicycle retraining of lower limb function early after stroke

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## Introduction

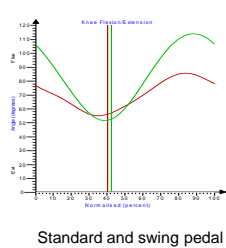
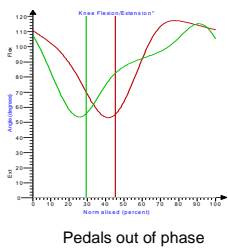
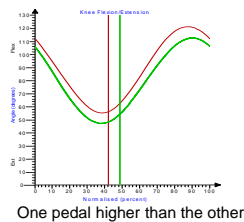
An important goal for stroke patients is to walk again, but many do not achieve this goal. Recent advances in neuroscience suggest that recovery may be improved if aspects of normal walking can be started early after stroke. This is clearly difficult as stroke patients are often paralysed at this time.

A novel adaptation to an exercise bike using the UNICAM (Universal Crank Assisted Mechanism) system might be able to help. UNICAM has three components which can be changed.



1. Changing the moment of pedal 'arm' (lever) in nine different positions
2. Change the phase of pedalling in three different positions
3. Change of pedal from:
  - a) Fixed pedal
  - b) Swing pedal

Changes to these three components result in a variety of different pedalling patterns. The graphs adjacent to this text show three of the possible different patterns of movement.



## Aims

The aims of this feasibility study are to find:

- Whether patients are able to pedal a bike fitted with UNICAM early after stroke
- Which stroke patients can use UNICAM
- Which UNICAM settings might be the most useful "starting dose" in subsequent evaluative studies

## Subjects

Twenty patients will be invited to participate in this study:

- At least 14 days after stroke
- Able to sit without support for at least one minute
- Be unable to walk independently even with an aid
- Able to communicate sufficiently to participate in this study

## Methods

### Design

A two phase exploratory feasibility study.

### Phase 1

Subjects will attend the movement analysis laboratory at SGHMS on a single occasion to find if they are able to pedal with UNICAM set so that the stronger leg drives the reciprocal action of the weaker leg.

### Phase 2

Those who can pedal will attend for a second time. During this visit we will make incremental changes to the UNICAM setting so that the weaker leg gradually has to do more work during pedalling. The point at which increments are no longer possible will be recorded.

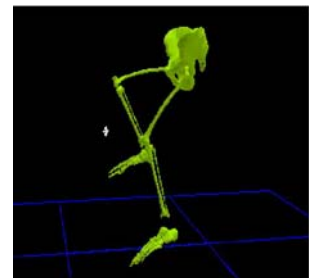
## Measurements

Before patients pedal with UNICAM we will measure:

- Stroke severity and sub-type - how bad the stroke is and what caused it
- Movement - range of movement and muscle strength in both legs
- Functional ability - how well patients manage everyday tasks that involve mobility e.g. standing up from a chair

During pedalling with UNICAM we will use movement analysis technology which is able to reconstruct lower limb pedalling in 3D and EMG to measure:

- How both legs move during cycling
- How muscles are working during cycling



## Use of results

This pilot study is expected to inform "dose setting" for future studies to test whether UNICAM cycling will enhance the effects of existing therapies which help stroke patients learn to walk again after stroke.

### Acknowledgements

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