Additional file 1: Characteristics of included RCTs

| Aerobic exercise only ( $\mathrm{n}=18$ ) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Study ID | Participants (Int/Con) | Intervention (Int) | Control (Con) | Primary outcomes (instrument) | Other outcomes (instrument) |
|  | $\begin{aligned} & \hline \text { Barbeau } \\ & (2003)^{[29]} \end{aligned}$ | $\begin{aligned} & \hline n=100 \\ & (50 / 50) \\ & (\text { LE/LE) } \end{aligned}$ | F: 4x/w for 6w <br> I: ur <br> T: 20min/d <br> T: TAEX with BWS +PT | ```F: 4x/w for 6w I: ur T: 20min/d T: TAEX without BWS +PT``` | ```Walking endurance & speed (10MWT) + Motor recovery (STREAM) + Balance (BBS) +``` |  |
|  | $\begin{aligned} & \text { Kosak } \\ & (2000){ }^{[30]} \end{aligned}$ | $\begin{aligned} & \hline n=56 \\ & (22 / 34) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 5d/w for duration of inpatient stay <br> I: ur <br> T: $45 \mathrm{~min} / \mathrm{d}$ <br> T: PBWSTT +PT of the same FIT | ```F: 5d/w for duration of inpatient stay I: ur T: 45min/d T: ABAW+PT of the same FIT``` | Walking endurance (distance until fatigue) 0 Walking speed (patients' average speed during 2 min ) 0 |  |
|  | $\begin{aligned} & \text { Visintin }^{[1]} \\ & (1998)^{331} \end{aligned}$ | $\begin{aligned} & \hline n=100 \\ & (50 / 50) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: $4 x / w$ for 6 w I: ur T: $20 \mathrm{~min} / \mathrm{d}$ T: TAEX with BWS +PT |  | ```Walking endurance (10MWT) + Walking speed (middle 3m of a 10m-walkway) + Motor recovery (STREAM) + Balance (BBS) +``` |  |
|  | $\begin{aligned} & \hline \text { Mayo } \\ & (2013){ }^{[45]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=87 \\ & (43 / 44) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: daily for 12 months <br> I: 50-70\% HRR <br> T: 15-30min/d <br> T: home ex. program with mobility ex. \& brisk walking involving stationary cycling | F: daily for 12 months <br> I: 11-15 on Borg Scale (6-20 ratings) <br> T: 15-30min/d <br> T: home ex. program with mobility ex. \& brisk walking | Walking capacity (6minWT) 0 | $\begin{aligned} & \hline \text { HRQoL (RAND-36) } \mathbf{0} \\ & \text { Balance (BBS) } \mathbf{0} \\ & \text { Physical function (SIS) } \mathbf{0} \\ & \text { Depression (GDS) } \mathbf{0} \end{aligned}$ |
| $$ | $\begin{aligned} & \text { Dean } \\ & (2012){ }^{[42]} \end{aligned}$ | $\mathrm{n}=151$ <br> (76/75) <br> (LE/UE) | F: at least 3x/w for 40w over 12 months <br> I: nr <br> T: 45-60min/d <br> T: home ex. program and weekly circuit-style group ex. class (progressive balance \& strengthening ex., walking, stair climbing) | ```F: at least 3x/w for 40w over 12 months I: nr T: 45-60min/d T: home ex. program and weekly circuit-style group ex. class to improve UE and cognitive functions (task-related strength & coordination training; sequencing tasks)``` | Walking capacity (6minWT) <br> Walking speed (10MWT) + Amount of falls (Fall calendars) 0 | Fall risk (SF-PPA) 0 <br> Physical activity (steps/d) <br> (Digimax pedometer) 0 <br> HRQoL (SF-12) 0 <br> Community participation (AAP) + <br> Isometric knee muscle <br> strength 0 <br> Activity (TUG) 0 |
|  | $\begin{aligned} & \hline \text { Bang } \\ & (2013)^{[40]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=30 \\ & (15 / 15) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 5x/w for 4 weeks <br> I: $1 / 2$ of max overground walking speed, then increased <br> T: 30min/d plus 10 min video <br> T: gait-related video, then treadmill training | F: 5x/w for 4 weeks <br> I: $1 / 2$ of max overground walking speed, then increased <br> T: 30min/d plus 10 min video <br> T: gait-unrelated video, then treadmill training | Walking endurance (6minWT) + Dynamic balance test (TUG) + <br> Gait speed (10MWT) + <br> Walking capacity (max flexed knee angle in the swing phase (Dartfish motion analysis software)) + |  |
|  | $\begin{aligned} & \hline \text { Carda } \\ & (2013){ }^{[41]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=38 \\ & (19 / 19) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 5x/w for 6w <br> I: $80 \%$ of 6 minWT speed, then progressively increased <br> T: 45min/d (PT) + 30min/d (treadmill training) | F: 5x/w for 6 w <br> I: $80 \%$ of 6 minWT speed, then progressively increased <br> T: 45min/d (PT) + 30min/d (treadmill training) | Walking endurance (6minWT) + | $\begin{aligned} & \text { Gait speed (10MWT) + } \\ & \text { Dynamic balance test (TUG) } \\ & + \end{aligned}$ |

Additional file 1: Characteristics of included RCTs

|  |  |  | T: PT + treadmill training with 5\% descending slope | T: PT + treadmill training with 5\% ascending slope |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { n} \\ & 0 \\ & 0 \\ & 0 \\ & \vdots \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{aligned} & \hline \operatorname{Jin} \\ & (2013)^{[43]} \end{aligned}$ | $\mathrm{n}=128$ <br> (65/63) <br> (LE/LE) | F: 5x/w for 12w <br> I: 50-70\%HRR <br> T: 40min/d <br> T: progressive aerobic cycling | F: 5x/w for 12w <br> I: 20-30\%HRR <br> T: 40min/d <br> T: conventional therapy (stretching and overground walking training) | Cardiovascular fitness $\left(\mathrm{VO}_{2} \mathrm{peak}\right)+$ HRR + (cycle ergometer) | Knee extension muscle strength (isokinetic dynamometer) + Walking endurance (6minWT) + Balance (BBS) 0 Spasticity of LE (MASc) 0 |
|  | $\begin{aligned} & \text { Tang } \\ & (2013)^{[46]} \end{aligned}$ | $\mathrm{n}=50$ <br> (25/25) <br> (LE/LE) | F: 3x/w for 6 months <br> I: progressed from 40-80\%HRR <br> T: 60min/d <br> T: high-intensity aerobic ex. (brisk level and inclined overground walking, cycle ergometry) | F: 3x/w for 6 months I: < 40\% HRR <br> T: 60min/d <br> T: low-intensity non-aerobic balance/flexibility program (stretching, weight bearing, balance ex.) | Cardiovascular fitness ( $\mathrm{VO}_{2}$ peak) 0 | Arterial stiffness (pulse pressure in $\mathrm{mm} / \mathrm{Hg}$ ) + Ambulatory capacity (6minWT) 0 <br> Hemodynamics \& cardiac function (echocardiography; 2D-Doppler) + Lipid, glucose \& homocysteine levels 0 |
|  | Globas $(2012)^{[32]}$ | $\mathrm{n}=38$ <br> (20/18) <br> (LE/LE\&UE) | F: 3d/w for 13w <br> I: 40-80\% HRR <br> T: 30-50min/d <br> T: Progressive graded, high-intensity TAEX | F: 3d/w for 13w <br> I: 40-80\% HRR <br> T: 30-50min/d <br> T: PT, then TAEX-cross | Peak exercise capacity ( $\mathrm{VO}_{2}$ peak) + Walking capacity (6minWT) | Gait velocity (10MWT) + Leg strength (5 chair-raise) 0 <br> Balance (BBS) 0 <br> Self-rated mobility (RMI) + HRQoL (SF-12) + |
|  | $\begin{aligned} & \mathrm{Jin} \\ & (2012)^{[44]} \end{aligned}$ | $\mathrm{n}=133$ <br> (68/65) <br> (LE/LE) | F: 5x/w for 8w <br> I: 50-70\%HRR <br> T: 40min/d (plus 30min+10min) <br> T: progressive aerobic cycling with lower limb weights on the paretic limb (plus balance exercise and stretching) | F: 5x/w for 8w <br> I: 20-30\% HRR <br> T: 40min/d (plus $30 \mathrm{~min}+10 \mathrm{~min}$ ) <br> T: low intensity overground walking (plus balance exercise and stretching) | Cardiorespiratory fitness $\left(\mathrm{VO}_{2}\right.$ peak) + Walking endurance (6minWT) + Mobility (RMI) 0 | Muscle strength (isokinetic dynamometer) + Balance (BBS) 0 Spasticity of LE (MASc) 0 |
|  | $\begin{aligned} & \text { Moore } \\ & (2010){ }^{[33]} \end{aligned}$ | $\mathrm{n}=20$ <br> (10/10) <br> (LE/LE) | F: 2-5d/w for 4w for PT and LT <br> I: 0-85\% HRR or Borg 17/ LT session <br> T: nr <br> T: Progressive TAEX with BWS 4w PT- 4w LT- 4w delay period | F: 2-5d/w for 4w for PT and LT <br> I: 0-85\%HRR or Borg 17/ LT session <br> T: nr <br> T: Progressive TAEX with BWS 4w PT- 4w delay period- 4w LT | Self-selected 0 and fastest Walking endurance (12MWT) Physical fitness ( $\mathrm{O}_{2}$ cost +; p Mobility (TUG 0; StepWatch Balance (BBS) 0 | $\begin{aligned} & \text { city }+(\text { Gait MAt II) } \\ & \left.k \text { treadmill speed }+; \mathrm{VO}_{2} \mathbf{0}\right) \end{aligned}$ |
|  | $\begin{aligned} & \text { Quaney }^{[1]} \\ & (2009)^{[34]} \end{aligned}$ | $\mathrm{n}=38$ <br> (19/19) <br> (LE/LE\&UE) | F: 3d/w for 8w <br> I: 40-70\% HRR <br> T: 45min/d <br> T: Progressive, resistive aerobic ex. on a stationary bike | $\begin{aligned} & \text { F: } 3 \mathrm{~d} / \mathrm{w} \text { for } 8 \mathrm{w} \\ & \text { I: } \mathrm{nr} \\ & \text { T: } 45 \mathrm{~min} / \mathrm{d} \\ & \text { T: Stretching ex. at home } \end{aligned}$ | $\mathrm{Vo}_{2}$ max (metabolic stress te Mobility (TUG) + Motor learning (SRTT) for re sequence response time 0 Balance (BBS) 0 <br> Sensorimotor function (FMM | nse time + / for random |

Additional file 1: Characteristics of included RCTs

|  |  |  |  |  | ```Conditional learning ability (PGFM) + Rule learning (WCST) 0 Selective attention (Stroop task21) 0 Visual search ability & working memory (Trail-Making Task) O``` |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 000200000000000000 | $\begin{aligned} & \text { Lennon } \\ & (2008){ }^{[35]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=48 \\ & (24 / 24) \\ & \text { (LE\&UE / } \\ & \text { LE\&UE) } \end{aligned}$ | $\begin{aligned} & \text { F: } 2 \mathrm{~d} / \mathrm{w} \text { for } 10 \mathrm{w} \\ & \text { I: } 50-60 \% \text { HRR } \\ & \text { T: } 30 \mathrm{~min} / \mathrm{d} \\ & \text { T: Cycle ergometer ex. } \end{aligned}$ | F: nr I: nr T: nr T: Usual care (excluding aerobic $\quad$ ex.) | ```Fitness testing ( }\mp@subsup{\textrm{VO}}{2}{}+;\mathrm{ ; RPE 0; peak wattage (Nm) +; CRS +; resting heart rate (bpm) 0; blood pressure 0; BMI 0; fasting lipids 0) Daily activities (FAI) 0 Depression (HADS) 0``` |  |
|  | $\begin{aligned} & \hline \text { Luft } \\ & (2008)^{[36]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=113 \\ & (37 / 34) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 3d/w for 6 month <br> I: 40-60\% HRR <br> T: 40min/d <br> T: Progressive TAEX <br> Subset ( $N=15$ ) for fMRI testing | F: 3d/w for 6 month <br> I: nr <br> T: 40min/d <br> T: Stretching <br> Subset ( $N=17$ ) for fMRI testing | Cardiorespiratory fitness ( $\mathrm{VO}_{2}$ peak) + Gait velocity (10MWT) + Walking ability \& endurance ( 6 minWT ) 0 | fMRI + |
|  | $\begin{aligned} & \text { Macko } \\ & (2005)^{[37]} \end{aligned}$ | $\begin{aligned} & \mathrm{n}=61 \\ & (32 / 29) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 3d/w for 6 month <br> I: 40-70\% HRR <br> T: 40min/d <br> T: Progressive TAEX | F: 3d/w for 6 month <br> I: Treadmill at 30-40\% HRR <br> T: $35 \mathrm{~min} / 5 \mathrm{~min}$ <br> T: Stretching / Treadmill walking | Cardiorespiratory fitness ( $\mathrm{VO}_{2}$ peak $\mathrm{L} / \mathrm{min}$ ) + <br> Economy of gait $\left(\mathrm{VO}_{2} \mathrm{~mL} / \mathrm{kg} / \mathrm{min}\right) 0$ <br> Ambulatory performance measures (10MWT 0; 6minWT +) <br> Functional Mobility (RMI 0; WIQ +) |  |
|  | $\begin{aligned} & \text { Peurala } \\ & (2005)^{[38]} \end{aligned}$ | $\mathrm{n}=45$ $(15 / 15 / 15)$ <br> (LE/LE/LE) | F: 5d/w for 3w \& additional PT 5d/w for 3w for all groups I: ur <br> T: 20min/d \& additional PT 55min/d for all groups <br> T: G1: Gait trainer ex. with FES <br> G2: Gait trainer ex. without FES <br> G3: Practicing walking |  | Walking speed (10MWT) 0 \& endurance (6minWT) 0 <br> Postural sway (force plate) 0 <br> Spasticity of LE (MASc) + in the ankle (only in G3) but $\mathbf{0}$ in the knee and hip (all groups) <br> Muscle force (scale 0-5) + for the ankle dorsiflexors (only in G1) and + for the hip flexors (only in G2) but $\mathbf{0}$ for the knee extensors (all groups) <br> Motor ability (MMAS) 0 <br> Functional independence (FIM) 0 |  |
|  | $\begin{aligned} & \hline \text { Potempa } \\ & (1995)^{[39]} \end{aligned}$ | $\mathrm{n}=42$ <br> (19/23) <br> (LE/LE\&UE) | F: 3d/w for 10w <br> I: 20-94 watts <br> T: 30min/d <br> T: Progressive cycle ergometer | F: 3d/w for 10w <br> I: nr <br> T: 30min/d <br> T: PROM ex. | Physical fitness (HR at rest and during ex. (RR interval) 0; blood pressure (sphygmomanometer) for the systolic + but for the diastolic blood pressure during ex. 0; metabolic parameters $\mathrm{VO}_{2}+; \mathrm{VCO}_{2}+$; VE + and RER 0 (MGCESTS); workload (ergometer) +; exercise time (ergometer) +) Sensorimotor function (FMMA) 0 |  |

Additional file 1: Characteristics of included RCTs

| Resistance exercise only ( $\mathrm{n}=8$ ) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Study ID | Participants (Int/Con) | Intervention (Int) | Control (Con) | Primary outcomes (instrument) | Other outcomes (instrument) |
|  | $\begin{aligned} & \hline \text { Clark } \\ & (2013)^{[52]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=35 \\ & (18 / 17) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: $3 x / w$ for $5 w$ (plus $3 w$ ) <br> I: $3-4 \mathrm{x} 10$ reps (nr) <br> T: 90min/d (90min/d) <br> T: ECC-PRT of the paretic leg (followed by PBWSTT) | F: 3x/w for 5w (plus 3w) <br> I: $3-4 \times 10$ reps (nr) <br> T: 90min/d (90min/d) <br> T: CON-PRT of the paretic leg (followed by PBWSTT) | CON 0 and ECC 0 muscle strength quadriceps (isokinetic dynamometer) <br> Muscle activity of the (RF+VM) +, (ST+BF) 0 (EMG) Walking speed (motion analysis system) 0 |  |
|  | $\begin{aligned} & \text { Lee } \\ & (2013)^{[53]} \end{aligned}$ | $n=33$ <br> (11/11/11) <br> (LE/LE/nr) | F: $5 \mathrm{x} / \mathrm{w}$ for 6 w <br> I: 3 sets of $70 \%$ of 1RM <br> T: ur <br> T: G1: PRT with CKC ex. on a leg press <br> G2: PRT with OKC ex. on a leg press <br> G3: routine activities, no regular exercise program |  | LE muscle activity (in \%) of the RF + BF +, GC + + and TA + + (EMG) <br> Balance (Good Balance System platform: (A-P) + + \& (M-L) + + sway velocities ( $\mathrm{mm} / \mathrm{s}$ )) <br> + (more significant changes in favor of G1 in post hoc analysis) |  |
|  | $\begin{aligned} & \text { Waldman } \\ & (2013)^{[54]} \end{aligned}$ | $\begin{aligned} & \mathrm{n}=24 \\ & (12 / 12) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ |  | F: 3x/w for 6w <br> I: nr <br> T: 60min/d <br> T: stretching plantar flexors and AROM exercises for ankle mobility and strength | Isometric ankle muscle strength (DF + \& PF 0) and PROM (DF +) (robotic de LE muscle endurance (6minWT) 0 <br> LE movement (STREAM) + <br> Gait evaluations (F-SCAN; in-shoe pla system) + <br> Balance ability (BBS) 0 <br> Plantar flexor spasticity (MASc) + | \& PF 0) / ankle AROM (DF 0 ce) <br> tar pressure mapping |
|  | $\begin{aligned} & \text { Flansbjer } \\ & (2008)^{[47]} \end{aligned}$ | $\begin{aligned} & \mathrm{n}=24 \\ & (15 / 9) \\ & (\mathrm{LE} / L E \& U E) \end{aligned}$ | F: 2d/w for 10w <br> I: 6-8 reps in 2 sets, $80 \% 1$ RM <br> T: $90 \mathrm{~min} / \mathrm{d}$ with 6 min PRT <br> T: PRT of the knee muscles | F: $n \mathrm{n}$ I: $n \mathrm{r}$ T: $n \mathrm{r}$ T: Usual daily activities | Muscle strength (dynamic +\& isokinetic Gait performance (TUG +; Fast gait sp Perceived participation (SIS) + | +; MASc 0) <br> ed 0; 6minWT 0) |
|  | $\begin{aligned} & \text { Yang } \\ & (2006) \end{aligned}$ | $\begin{aligned} & \mathrm{n}=48 \\ & (24 / 24) \\ & (\mathrm{LE} / \mathrm{LE} \& \mathrm{UE}) \end{aligned}$ | F: $3 \mathrm{~d} / \mathrm{w}$ for 4 w I: ur T: $30 \mathrm{~min} / \mathrm{d}$ T: ex. for LE strengthening (circuit class) | F: $n \mathrm{n}$ I: $n \mathrm{n}$ T: nr T: Usual care | LE muscle strength (dynamometer) + LE muscle endurance ( 6 minWT ) + Gait velocity, cadence \& stride length Mobility (TUG) + Balance (step test) + | AlTRite) + |
|  | Ouellette $(2004)^{[49]}$ | $\mathrm{n}=42$ <br> (21/21) <br> (LE/LE\&UE) | F: 3d/w for 12w <br> I: 3 sets, $8-10$ reps/set,70\% 1RM <br> T: nr <br> T: Supervised high-intensity PRT with 4 ex. | ```F: 3d/w for 12w I: nr T: nr T: Bilateral ROM ex. + UE stretching``` | LE muscle strength (1RM Leg Press +; knee extension ex.+; DF-ex. in the paretic $+\&$ in the non-paretic limb $\mathbf{0}$; PF-ex. +; peak muscle power Leg Press 0; knee extension ex. +) LE muscle endurance ( 6 minWT ) 0 Stair-climb time (10-stair flight) 0 Repeated chair-rise time 0 Gait velocity (10MWT) 0 Function \& disability (LLFDI) 0 | Self-perceived ability for 5 functional tasks (ESES) 0 Self-reported functional outcome (PF10) 0 Depression (GDS) 0 |

## Additional file 1: Characteristics of included RCTs

|  | $\begin{aligned} & \hline \operatorname{Kim} \\ & (2001)^{[50]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=20 \\ & (10 / 10) \\ & (\mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 3d/w for 6w <br> I: 3 sets, 10 reps/set at RM <br> T: $45 \mathrm{~min} / \mathrm{d}$ <br> T: max concentric isokinetic strength training | $\begin{aligned} & \text { F: } 3 \mathrm{~d} / \mathrm{w} \text { for } 6 \mathrm{w} \\ & \text { I: } \mathrm{nr} \\ & \text { T: } 45 \mathrm{~min} / \mathrm{d} \\ & \text { T: PROM of paretic LE } \end{aligned}$ | Isokinetic strength of LE (dynamometer) 0 Walking speed (level-walking and stair-walking) 0 HRQoL (SF-36) 0 Mental health (MSC) 0 |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { Dean } \\ & (2000){ }^{[51]} \end{aligned}$ | $\mathrm{n}=9$ <br> (5/4) <br> (LE/UE) |  | F: 3d/w for 4w <br> I: nr <br> T: 60min/d <br> T: Practiced UE tasks (circuit of workstations \& ex.) | Walking speed (10MWT) + and endurance (6minWT) + LE function; force production (TUG) + Balance (step test) + |

Additional file 1: Characteristics of included RCTs

| Aerobic and resistance exercises ( $\mathrm{n}=11$ ) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Study ID | Participants (Int/Con) | Intervention (Int) | Control (Con) | Primary outcomes (instrument) | Other outcomes (instrument) |
|  | $\begin{aligned} & \hline \text { Duncan } \\ & (2003)^{[55]} \end{aligned}$ | $\mathrm{n}=92$ <br> (44/48) <br> (LE\&UE / <br> LE\&UE) | F: 3d/w for 12w <br> I: nr <br> T: 90min/d <br> T: Supervised in-home strength, endurance and balance program | F: nr I: nr T: nr T: Usual care + completing $\quad$ intervention log | Muscular strength (dynamometer and ankle \& knee isometric peak torque) 0 <br> Cardiorespiratory endurance (peak aerobic capacity) + <br> UE-function (WMFT) 0 <br> LE \& UE motor control (Fugl-Meyer) 0 <br> Mobility (10MWT 0, 6minWT +) <br> Balance (BBS) + |  |
|  | $\begin{aligned} & \text { Duncan } \\ & (1998)^{[56]} \end{aligned}$ | $\begin{aligned} & \hline n=20 \\ & (10 / 10) \end{aligned}$ <br> (LE\&UE / LE\&UE) | F: 3d/w for 12w <br> I: nr <br> T: 90min/d <br> T: Supervised in-home strength, endurance and balance program | ```F: nr I: nr T: nr T: Usual care + completing intervention log``` | Gait speed (10MWT) + \& walking distance (6minWT) 0 Motor recovery LE + and UE 0 (FMMA) <br> ADL (BI of ADL) 0 and (LS-IADL) 0 <br> HRQoL (SF-36) 0 <br> Balance (BBS) 0 <br> Upper extremity function (Jebsen test) 0 |  |
| ¢ | $\begin{aligned} & \text { Salbach } \\ & (2004)^{[57]} \end{aligned}$ | $n=91$ <br> (44/47) <br> (LE/UE) | F: 3d/w for 6w <br> I: nr <br> T: 60min/d <br> T: 10 functional tasks to strengthen the LE \& to improve walking balance, speed \&distance | F: $3 \mathrm{~d} / \mathrm{w}$ for 6 w I: $n \mathrm{r}$ T: $n \mathrm{r}$ T: Seated UE activities | Walking capacity (6minWT) + | Comfortable and max pace (5MWT) + <br> Mobility (TUG) 0 <br> Balance (BBS) 0 |
| 00000000000000000 | $\begin{aligned} & \hline \text { Lee } \\ & (2010)^{[58]} \end{aligned}$ | $\begin{aligned} & \hline \mathrm{n}=48 \\ & (12 / 12 / 12 / 12) \\ & (\mathrm{LE} / \mathrm{LE} / \mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 3d/w for 12w for all groups <br> I: PRT: 2 sets, 8 reps/set, 50-80\% 1 <br> Cycling: 50-80\% HRR <br> T: 30min/d for all groups <br> T: G1: aerobic cycling + sham PRT <br> G2: sham cycling + PRT <br> G3: aerobic cycling + PRT <br> G4: sham cycling + sham PRT |  | Max muscle force (pneumatic resistance machines; fixed dynamometer) + 0 <br> Max muscle power (peak force, velocity) +0 <br> Muscle endurance (as many repetitions as possible) +0 <br> Strength/PRT <br> Aerobic/cycling |  |
|  | $\begin{aligned} & \text { Lee } \\ & (2008)^{[59]} \end{aligned}$ | $\begin{aligned} & \mathrm{n}=52 \\ & (13 / 13 / 14 / 12) \\ & (\mathrm{LE} / \mathrm{LE} / \mathrm{LE} / \mathrm{LE}) \end{aligned}$ | F: 3d/w for 12 w for all groups <br> I: PRT: 2 sets, 8 reps/set, 50-80\% 1 RM <br> Cycling: 50-80\% HRR <br> T: 30min/d for all groups <br> T: G1: aerobic cycling + sham PRT <br> G2: sham cycling + PRT <br> G3: aerobic cycling + PRT <br> G4: sham cycling + sham PRT |  | Mobility (10MWT, 6minWT) 0 0 <br> Stair climbing test \& power +0 <br> Strength/PRT <br> Aerobic/cycling | Max muscle force (pneumatic resistance machines; fixed dynamometer) +0 <br> Muscle endurance (as many repetitions as possible) +0 Cardiorespiratory fitness + ( $\mathrm{VO}_{2}$ peak, PO peak +, peak HR) HRQoL (SF-36) +0 |
|  | $\begin{aligned} & \text { Pang } \\ & (2008)^{[60]} \end{aligned}$ | $\begin{aligned} & n=63 \\ & (32 / 31) \end{aligned}$ | F: $3 \mathrm{~d} / \mathrm{w}$ for 19 w I: ur T: $60 \mathrm{~min} / \mathrm{d}$ T: FAME: cardiorespiratory |  | Walking capacity (6minWT) + <br> $\mathrm{VO}_{2}$ max (Excalibur cycle ergometer) + <br> Muscle strength (dynamometer) in the paretic $+\&$ in the non-paretic knee 0 |  |

Additional file 1: Characteristics of included RCTs

|  |  | (LE/UE) | fitness, mobility, balance, LE strengthening | aerobic ex., no LE strengthening, no balance | Balance (ABCS 0; BBS 0) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| chronic stroke survivors | $\begin{aligned} & \text { Mead } \\ & (2007) \end{aligned}$ | $\begin{aligned} & \hline n=66 \\ & (32 / 34) \end{aligned}$ <br> (LE\&UE / LE\&UE) | F: 3d/w for 12w <br> I: Endurance: at least Borg 13, PRT: 4-15 reps per ex. <br> T: 75min/d <br> T: Progressive endurance training (cycle ergometer) \& PRT | F: 3d/w for 12w <br> I: nr <br> T: 75min/d <br> T: Relaxation | Physical fitness ( $\mathrm{VO}_{2} \mathrm{~mL} / \mathrm{kg}+$; NPR 0) <br> Mobility (RMI 0; reach 0; sit-to-stand 0; elderly mobility score 0; TUG +) <br> ADL (FIM 0; NE-ADL 0) <br> HRQoL (SF-36) + <br> Depression (HADS) 0 |  |
|  | $\begin{aligned} & \hline \text { Olney } \\ & (2006)^{[62]} \end{aligned}$ | $n=74$ <br> (38/36) <br> (LE/LE) | ```F: 3d/w for 10w I: ur T: 90min/d T: Supervised ex. sessions: graded walking and/or cycling program+ strength training``` | ```F: 3d/w for 10w I: nr T: 90min/d T: 1w supervised \& 9w unsupervised ex. Sessions at home, (same sessions as intervention group)``` | Walking endurance (6minWT) 0 | Strength of LE muscles (dynamometer) 0 <br> Oxygen cost (PCI) 0 <br> Activity (HAP) + <br> Physical and mental health (SF36) 0 |
|  | $\begin{aligned} & \text { Pang } \\ & (2005) \end{aligned}$ | $\mathrm{n}=63$ <br> (32/31) <br> (LE/UE) | ```F: 3d/w for 19w I: ur T: 60min/d T: FAME: mobility, cardiorespiratory fitness, balance, LE strengthening``` | F: 3d/w for 19w <br> I: ur <br> T: 60min/d <br> T: Seated UE program, no aerobic ex., no LE strengthening, no balance | $\mathrm{VO}_{2}$ max (Excalibur cycle ergometer) + <br> Walking endurance (6minWT) + <br> Muscle strength (dynamometer) in the paretic $+\&$ in the non-paretic knee 0 <br> Activity and participation (PASIPD) 0 <br> Femoral neck bone mineral density (dual-energy x-ray absorptiometry) in the paretic $+\&$ in the non-paretic leg 0 Balance (BBS) 0 |  |
|  | $\begin{aligned} & \text { Carr } \\ & (2003)^{[64]} \end{aligned}$ | $\mathrm{n}=40$ <br> (nr/nr) <br> (LE\&UE/ <br> LE\&UE) | F: 3d/w for 16w <br> I: Endurance: 40-70\% of max wattage, Strength: 2sets, 10 reps/set <br> T: 20-40min/d + strength ex. <br> T: Aerobic \& strength training (same aerobic program \& progressively increasing strength-training) | F: 3d/w for 16w <br> I: 40-70\% of max wattage <br> T: 20-40min/d <br> T: Aerobic training only (UE\&LE body ergometer) | $\begin{aligned} & \mathrm{VO}_{2} \max \text { (stress test) } \boldsymbol{+} \\ & \text { Muscle strength (Biodex strength assessment): knee flexion, knee } \\ & \text { extension } \mathbf{0} \text {, shoulder extension\&flexion } \boldsymbol{+} \\ & \text { Blood lipid panel (cholesterol } \boldsymbol{+} \text {, glucose } \mathbf{0} \text {, lipids } \mathbf{0} \text { ) } \end{aligned}$ |  |
|  | TeixeiraSalmela $(1999)^{[65]}$ | $\mathrm{n}=13$ <br> (6/7) <br> (LE/LE) | F: 3d/w for 10w <br> I: Aerobic ex.: 50-70\% HRR, Strength: 3sets, 10 reps/set, 50-80\% 1RM <br> T: 60-90min/d <br> T: Graded walking\& stepping or cycling\& LE muscle strengthening | F: nr <br> I: nr <br> T: nr <br> T: No intervention for 10w, then the same 10-week program as intervention group | Comfortable gait speed (middle 22meters of 30meters) + <br> Activity per day (AAS) + <br> Quality of life (NHP) + <br> Comfortable stair-climbing speed + <br> Physical activity (HAP) + <br> LE muscle strength (dynamometer) + <br> LE spasticity of quadriceps (pendulum test) $\mathbf{0}$ \& ankle PF (controlled resistance to passive stretch) 0 |  |

## Additional file 1: Characteristics of included RCTs

Legend: + = significant between-group difference / $0=$ non-significant difference between groups / both in favor of intervention group.
 antero-posterior, BBS = Berg Balance Scale, BF = biceps femoris, BI = Barthel Index, BMI = Body Mass Index, BWS = body weight support, BWSTT = body weight supported
 eccentric, EMG = electromyography, ESES = Ewart's Self Efficacy Scale, ex. = exercise, FAI = Frenchay Activities Index, FAME = Fitness and Mobility Exercises, FIM = Functional Independence Measure, FMMA = Fugl-Meyer Motor Assessment, fMRI = functional Magnet Resonance Imaging, GC = gastrocnemius, GDS = Geriatric Depression Scale, HADS =

 $=$ Motor Assessment Scale, MASc = Modified Ashworth Scale, max = maximum, min = minutes, minWT = minute walking test, (M-L) $=$ medio-lateral, MSC $=$ Mental Health Component Summary Score, MWT = meter walking test, NE-ADL = Nottingham Extended Activities of Daily Living, NPR = Nottingham Power Rig, nr = not reported, OKC = open kinetic chain, PADS = Physical Activity and Disability Scale, PASIPD = Physical Activity for Individuals with Physical Disability, PBWSTT = Partial body weight supported treadmill training, $\mathrm{PCI}=$ Physiological Cost Index, $\mathrm{PF}=$ plantar flexion, PF10 = Physical Functioning Subscale, PGIC $=$ Patient Global Impression of Change, PNF = Proprioceptive Neuromuscular Facilitation Patterns, PO = power output, PPA = Physiological Profile Assessment, PROM = Passive Range of Motion, PRT = Progressive resistance training, PT = Physical Therapy, reps = repetitions, RF = rectus femoris, (1)RM = (One) Repetition Maximum, RMI = Rivermead Mobility Index, RPE = Borg Rate of Perceived Exertion, SF = Short Form, SF36 = 36-item Short-Form Health Survey, SIS = Stroke Impact Scale, ST = semitendinosus, STREAM = Stroke Rehabilitation Assessment of Movement, TA = tibialis anterior, TAEX = Aerobic Treadmill Exercise, TUG $=$ Timed up and go test, UE $=$ upper extremity, ur $=$ unclear reporting, $\mathrm{VM}=\mathrm{vastus}$ medialis, $\mathrm{V} 0_{2}=0 \times y g e n ~ c o n s u m p t i o n, ~ w=$ weeks, WIQ = Walking Impairment Questionnaire, WMFT = Wolf Motor Function Test, FES = Functional Electric Stimulation.

