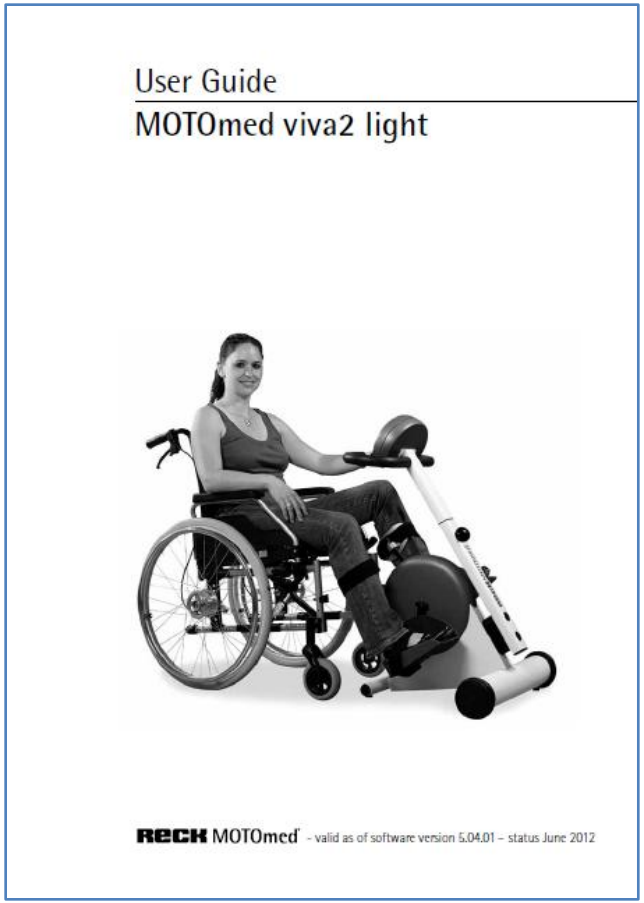
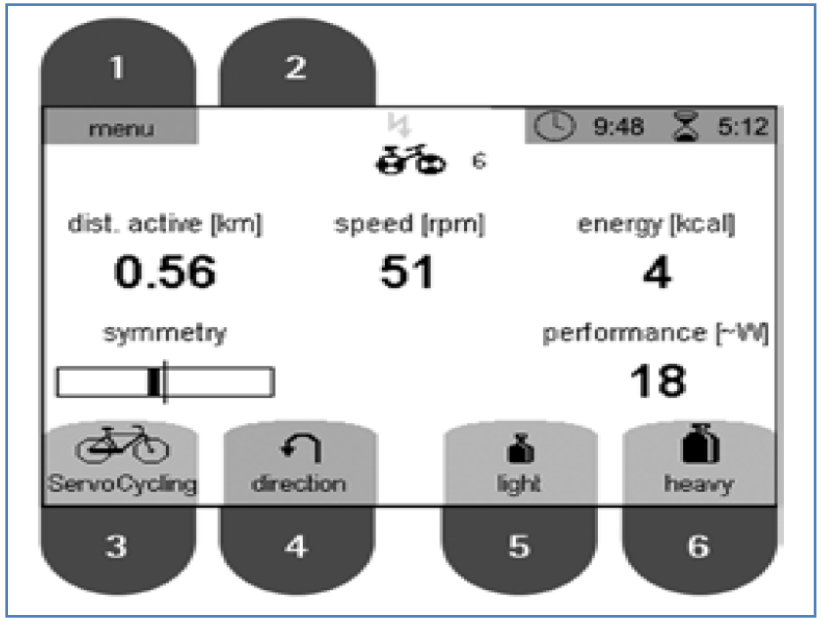
MOTOmed viva 2 light

Hồ Quang Hưng

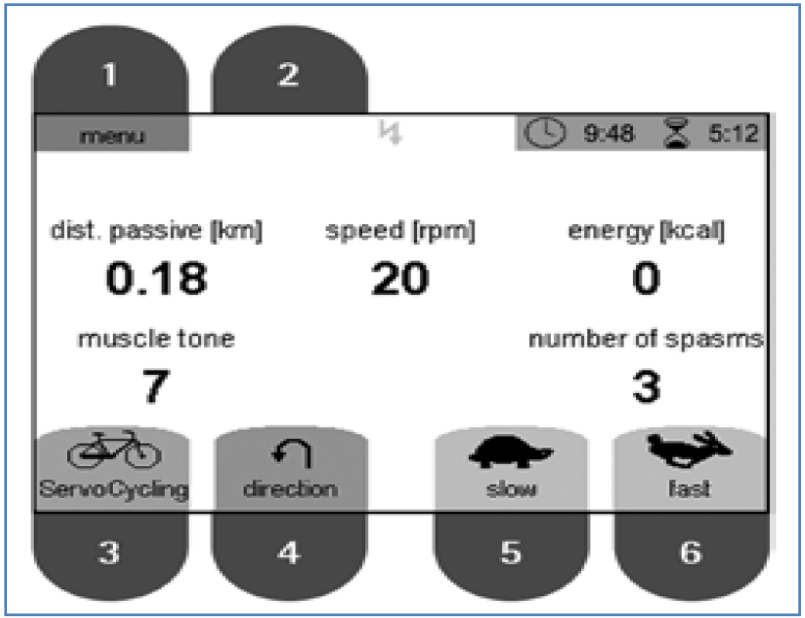
10/06/2021



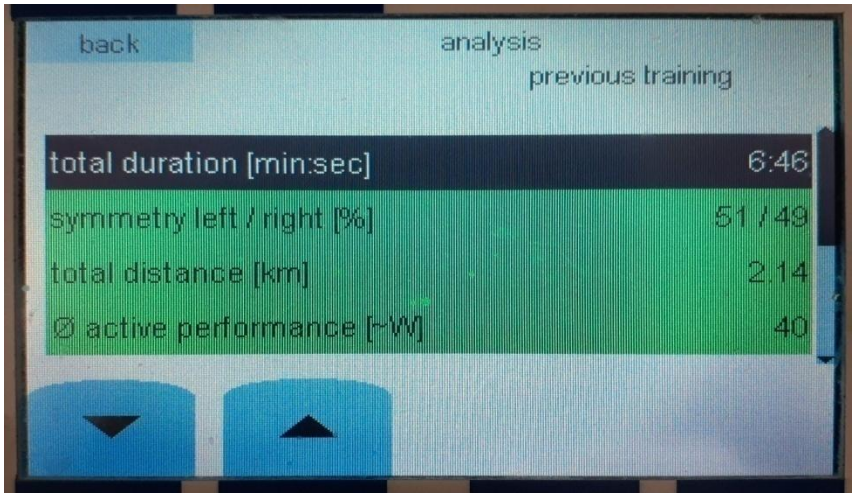
Active

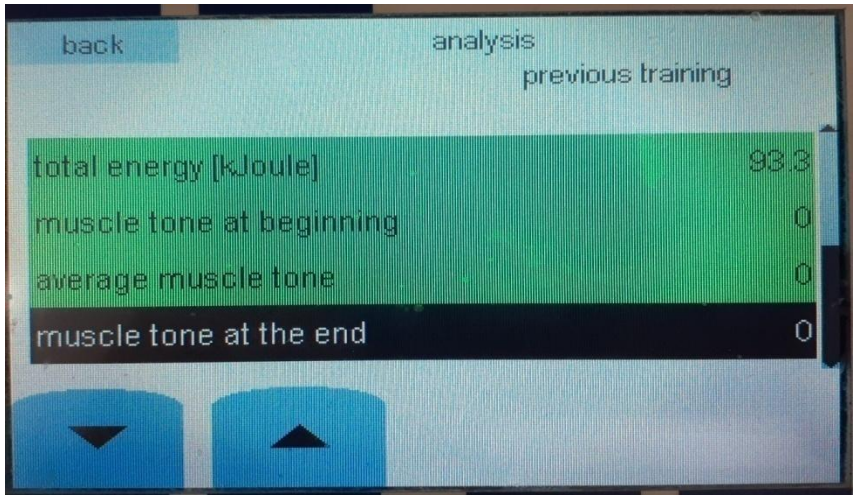


Passive



Analysis after training





Total energy = Average Active Performance x Total duration
= 40 Watt x 406 sec (6min46sec) = 16.240 J, **>< 93.3 KJoule ???**.

Studies and research results

- Muscle Disease
- Children
- Cancer
- Spastic Paralysis/ICP
- Elderly Persons
- Spinal Cord Injury
- Orthopedics
- Multiple Sclerosis
- Hemodialysis
- Diabetes Type 2
- Early Mobilization
- COPD
- Recumbency
- Hypertension
- Dementia/Alzheimer's
- Stroke
- Parkinson

https://www.motomed.com/en/download-center/studies-and-research-results/

1 Lennon O., Carey A., Gaffney N., Stephenson J., Blake C. (2008). **A pilot randomized controlled trial to evaluate the benefit of the cardiac rehabilitation paradigm for the non-acute ischaemic stroke population**. Clinical Rehabilitation, 22(2), 125-133

- **Objective:** To evaluate risk factor reduction and health-related quality of life following a 10-week cardiac rehabilitation program in non-acute ischaemic stroke subjects.
- **Design:** Single-blinded randomized control trial.
- **Setting:** Outpatient rehabilitation.
- **Subjects:** Forty-eight community-dwelling ischaemic stroke patients (38 independently mobile, 9 requiring assistance, 1 non-ambulatory) were randomly assigned to intervention or control groups by concealed allocation.
- **Intervention:** The trial consisted of a 10-week schedule with measures taken at weeks 1 and 10. Both groups continued usual care (excluding aerobic exercise); intervention subjects attended 16 cycle ergometry sessions of aerobic-training intensity and two stress-management classes.
- **Main outcome measures:** Cardiac risk score (CRS); VO_2 (mL O_2/kg per minute) and Borg Rate of Perceived Exertion (RPE) assessed during a standardized ergometry test; Hospital Anxiety and Depression Scale (HADS); Frenchay Activity Index; Fasting Lipid Profiles and Resting Blood Pressure.
- **Results:** Group comparison with independent t-tests showed significantly greater improvement at follow-up by intervention subjects than controls in VO_2 (intervention 10.6 ±1.6 to 12.0 ± 2.2, control 11.1 ±1.8 to 11.1 ±1.9 t=4.734, P<0.001) and CRS (intervention 13.4 ±10.1 to 12.4 ±10.5, control 9.4 ±6.7 to 15.0 ±6.1 t=-2.537, P<0.05). RPE rating decreased in intervention subjects (13.4 ±12.2 to 12.4 ±2.0) and increased in controls (13.8 ±1.8 to 14.4 ±1.6); Mann—Whitney U (U = 173.5, P<0.05). Within-group comparison showed significant decrease in the HADS depression subscale in the intervention group alone (5.1 ±3.4 to 3.0 ±2.8) (Wilcoxon signed ranks test Z=-3.278, P<0.001).
- **Conclusion:** Preliminary findings suggest non-acute ischaemic stroke patients can improve their cardiovascular fitness and reduce their CRS with a cardiac rehabilitation programme. The intervention was associated with improvement in self-reported depression.

1 Lennon O., Carey A., Gaffney N., Stephenson J., Blake C. (2008). **A pilot randomized controlled trial to evaluate the benefit of the cardiac rehabilitation paradigm for the non-acute ischaemic stroke population**. Clinical Rehabilitation, 22(2), 125-133

1. The Cardiac Rehabilitation Programme:
   - 10-week schedule, 16 cycle ergometry sessions of aerobic-training intensity.
   - twice weekly for 30-minute cycle ergometry exercise (Motomed Viva 2) using either the upper or lower limbs.
   - biofeedback alarms set at 50–60% of their maximal heart rate, calculated sessionally (Karvonen formula THR = (Hrmax - HRrest)(50–60%) + HRrest). Resistance and speed were adjusted daily to ensure tailored progression.
2. Standardized ergometry test:
   - cycle ergometer (Reck, Motomed Viva 2) at resistance setting 8 (5.6 Nm).
   - pedalling for 3 minutes, at a steady state of 50 rpm with a workload of 5.6 Nm.
   - a metronome was present to assist with pacing.
   - VO2 (mL O2/kg/min) = (10.8 x W x M^{-1}) +7, using average wattage output during the test.
   - RPE was rated at the end of the test
   - Peak wattage was recorded at the end test.

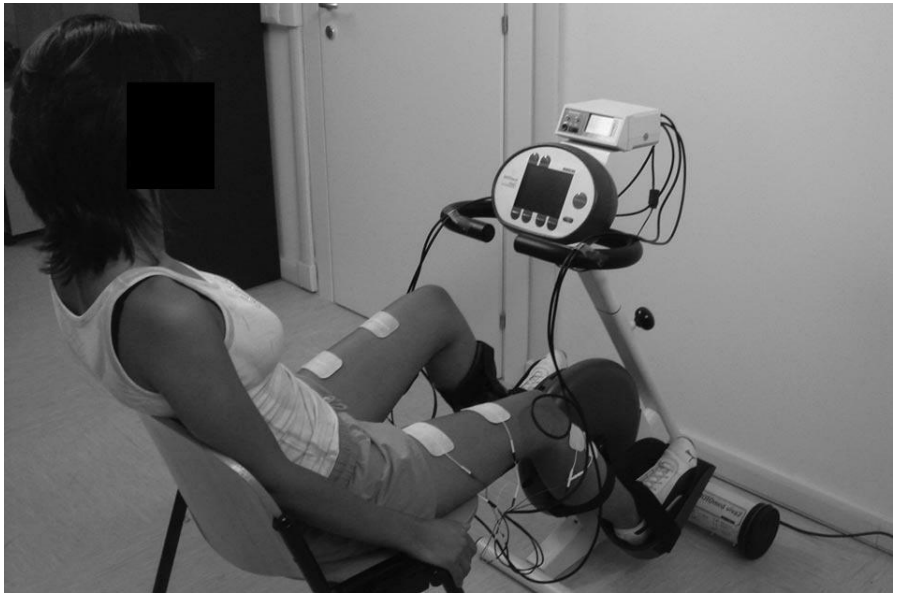
1. Gordon NF, Gulanick M, Costa F et al. Physical activity and exercise recommendations for stroke survivors. Circulation 2004; 109: 2031–41
2. American College of Sports Medicine. ACSM's guidelines for exercise testing and prescription. Sixth edition. Lippincott Williams and Wilkins, 2000: 165–93

2 Ambrosini E., Ferrante S., Pedrocchi A., Ferrigno G., Molteni F. (2011). **Cycling Induced by Electrical Stimulation Improves Motor Recovery in Postacute Hemiparetic Patients: a Randomized Controlled Trial**. Stroke, 42(4), 1068-1073

- **Background and Purpose:** This study assessed whether cycling induced by functional electrical stimulation (FES) was more effective than passive cycling with placebo stimulation in promoting motor recovery and walking ability in postacute hemiparetic patients.
- **Methods:** In a double-blind, randomized, controlled trial, 35 patients were included and randomized to receive FES-induced cycling training or placebo FES cycling. The 4-week treatment consisted of 20 sessions lasting 25 minutes each. Primary outcome measures included the leg subscale of the Motricity Index and gait speed during a 50-meter walking test. Secondary outcomes were the Trunk Control Test, the Upright Motor Control Test, the mean work produced by the paretic leg, and the unbalance in mechanical work between paretic and nonparetic legs during voluntary pedaling. Participants were evaluated before training, after training, and at 3- to 5-month follow-up visits.
- **Results:** No significant differences were found between groups at baseline. Repeated-measures ANOVA ($P<0.05$) revealed significant increases in Motricity Index, Trunk Control Test, Upright Motor Control Test, gait speed, and mean work of the paretic leg after training and at follow-up assessments for FES-treated patients. No outcome measures demonstrated significant improvements after training in the placebo group. Both groups showed no significant differences between assessments after training and at follow-up. A main effect favoring FES-treated patients was demonstrated by repeated-measures ANCOVA for Motricity Index ($P<0.001$), Trunk Control Test ($P=0.001$), Upright Motor Control Test ($P=0.005$), and pedaling unbalance ($P=0.038$).
- **Conclusions:** The study demonstrated that 20 sessions of FES cycling training significantly improved lower extremity motor functions and accelerated the recovery of overground locomotion in postacute hemiparetic patients. Improvements were maintained at follow-up.

2 Ambrosini E., Ferrante S., Pedrocchi A., Ferrigno G., Molteni F. (2011). **Cycling Induced by Electrical Stimulation Improves Motor Recovery in Postacute Hemiparetic Patients: a Randomized Controlled Trial**. Stroke, 42(4), 1068-1073

- 20 sessions, 5 sessions of 25 min / week
- current-controlled 8-channel stimulator (RehaStim; Hasomed GmbH) : quadriceps, hamstrings, gluteus maximum, and tibialis anterior of both legs
- Patients were required not to contribute voluntarily to the pedaling but to keep concentrating on the exercise
- Passive cycling: 20 rpm , motorized cycle-ergometer (MOTOmed; Reck GmbH)



Ferrante S, Pedrocchi A, Ferrigno G, Molteni F. Cycling induced by functional electrical stimulation improves the muscular strength and the motor control of individuals with post-acute stroke. Europa Medicophysica-SIMFER 2007 Award Winner. *Eur J Phys Rehabil Med.* 2008;44:159 –167

3 Diserens K., Perret N., Chatelain S., Bashir S., Ruegg D., Vuadens P., Vingerhoets F. (2007). **The effect of repetitive arm cycling on post stroke spasticity and motor control: Repetitive arm cycling and spasticity**. Journal of the Neurological Sciences, 253 (1-2), 18-24

- **Objectifs:** (1) to test whether training on an arm ergometer improves motor performance, and (2) to develop a technique to quantify individual muscle spasticity.
- **Intervention:** Nine patients with a stabilized hemisyndrome (in average 22 months after ischemic stroke in the territory of middle cerebral artery) underwent a 3-week training on an arm ergometer, 5 days/week.
- **Evaluation:** The patients were tested one week before training, at training onset, at the end of training and 2 weeks after training. Spasticity was quantified by (1) the Ashworth Scale of the elbow flexors and extensors, (2) the maximum active extension of the biceps, and (3) the minimum torque on the lesioned side during arm cycling.
- **Result:** decrease of the spasticity by the training ($p = 0.076$). Similarly muscle force was evaluated by the Rivermead Motorik Assessment, the Motricity Index and the cycling force, and the range of active movement as the sum of the angles at a maximum shoulder flexion, shoulder abduction, elbow flexion and elbow extension. The training increased the force ($p < 0.01$) and also the range of motion ($p < 0.05$) significantly. The patients confirmed the clinical relevance of the results. The spasticity index – the relation between the muscle activity modulation on the normal and lesioned side – was shown to be a useful tool in quantifying individual muscle spasticity.
- **Conclusion:** cycling on an arm ergometer is a useful tool for rehabilitation

3 Diserens K., Perret N., Chatelain S., Bashir S., Ruegg D., Vuadens P., Vingerhoets F. (2007). **The effect of repetitive arm cycling on post stroke spasticity and motor control: Repetitive arm cycling and spasticity**. Journal of the Neurological Sciences, 253 (1-2), 18-24

- Inclusion criteria were (1) to be able to participate for at least 30 min of exercise using a hand ergometer and to be able even with the paretic arm to reach the arm-pedal without pain….
- Training was conducted on a commercial motorized arm ergometer (Motomed viva Reck), which allows optimization of the training by biofeedback.
- An A–B–A protocol with (1) a base line phase A of one week, (2) a training phase B of 3 weeks and (3) a follow-up phase A of 2 weeks was used.
- The patients, who were positioned in front of the ergometer in their wheelchair or on an armless chair, performed the arm training at a constant, relatively low resistance for 30 min daily, 5 days a week. Each training session comprised 15 min of arm cycling in a forward direction and 15 min in a backward direction with a 5 min break in between. Patients were not assisted in any way during the exercise apart from being given verbal encouragement from the therapist.

4 Ridgel A., Peacock C., Fickes E., Kim Ch. (2012). **Active-Assisted Cycling Improves Tremor and Bradykinesia in Parkinson's Disease**. Archives of Physical Medicine and Rehabilitation, 93 (11), 2049-2054

- **Objectives:** To develop a rapid cadence cycling intervention (active-assisted cycling [AAC]) using a motorized bike and to examine physiological perimeters during these sessions in individuals with Parkinson's disease (PD). A secondary goal was to examine whether a single session of AAC at a high cadence would promote improvements in tremor and bradykinesia similar to the on medication state.
- **Design:** Before-after pilot trial with cross-over.
- **Setting:** University research laboratory.
- **Participants:** Individuals with idiopathic PD (N=10, age 45–74y) in Hoehn and Yahr stages 1 to 3.
- **Intervention:** Forty minutes of AAC.
- **Main Outcome Measures:** Heart rate, pedaling power, and rating of perceived exertion were recorded before, during, and after a bout of AAC. Functional assessments included tremor score during resting, postural, and kinetic tremor.
- **Results:** This AAC paradigm was well tolerated by individuals with PD without excessive fatigue, and most participants showed improvements in tremor and bradykinesia immediately after a single bout of cycling.
- **Conclusions:** This paradigm could be used to examine changes in motor function in individuals with PD after bouts of high-intensity exercise.

4 Ridgel A., Peacock C., Fickes E., Kim Ch. (2012). **Active-Assisted Cycling Improves Tremor and Bradykinesia in Parkinson's Disease**. Archives of Physical Medicine and Rehabilitation, 93 (11), 2049-2054

- During AAC (Motomed Viva 2 movement therapy trainer):
  - The motor speed was set at 75rpm and participants were asked to pedal 80 to 85rpm for the 30-minute main set.
  - Participants were instructed to overpower the motor to maintain the cadence and were given visual feedback from the trainer monitor.
  - If the individuals were unable to maintain 80 to 85rpm, the motor would take over and would move the legs at 75rpm.
  - The 30-minute AAC set was preceded and concluded by a 5-minute warm up/cool down at 40 to 50rpm.
  - Heart rate, RPE, and pedal power (watts) were monitored by a laboratory assistant who also provided support and encouragement during the entire session.

Characteristics and Therapy Options

of the MOTOmed Movement Therapy

	viva2	viva2 light	viva2 Parkinson	gracile12	letto2	letto2 leg/arm
Motorized movement of the legs (passive training)	✓	✓	✓	✓	✓	✓
Motorized movement of the arms (passive training)	•	•	•	•	–	✓
ServoCycling = motor-assisted active training	✓	✓	✓	✓	✓	✓
Active movement with own muscle strength against finely adjusted resistance levels (gear 0 to 20)	✓	✓	✓	✓	✓	✓
Separate button for ServoCycling - visual and noticeable transfer from passive to active training. Activity is detected immediately and is indicated by a bicycle symbol (🚲) on the display	✓	✓	✓	✓	✓	✓
Active/passive biofeedback (automatic)	✓	✓	✓	✓	✓	✓
Regulation of passive speed from 1 to 60 r.p.m.	✓	✓	up to 90 r.p.m.	✓	✓	✓
MOTOmax and TRAMPOLINEmax MotivationPrograms	✓	–	✓	✓	✓	✓
13 Therapy Programs (can be individually edited)	✓	–	✓	✓	✓	✓
Pause-function	✓	–	✓	✓	✓	✓
Training analysis via chip card (accessory »MOTOmed sam2«)	•	–	•	•	•	•
MOTOmed Cardio16 Pulse Control regulates the resistance level up or down	•	–	•	•	•	•
Combination with functional electrical stimulation (FES)	•	–	•	•	•	•
SmoothDriveSystem for a smooth rotation	✓	✓	✓	✓	✓	✓
MovementProtector for sensible spasm detection	✓	✓	✓	✓	✓	✓
SpasmControl with automatic change of rotation direction	✓	✓	✓	✓	✓	✓
Electronic foot insertion aid with safety stop	✓	✓	✓	✓	✓	✓
Large, high-contrast color screen (11.5 x 8.5 cm / 4.5 in. x 3.4 in.)	✓	✓	✓	✓	✓	✓
Stationary operating panel with 8 big, easy-feel buttons and automatic user promts	✓	✓	✓	✓	✓	✓
SymmetryTraining - Activity performance display is divided into the right and the left hemisphere	✓	✓	✓	✓	✓	✓
SymmetryTraining in a clear 2-bar-diagram and analysis display in percent	✓	–	✓	✓	✓	✓
SymmetryTraining for leg and arm/upper body trainer	✓	✓	✓	✓	✓	✓
Muscle tone measurement (tone at the beginning, at the end, and average)	✓	–	✓	✓	✓	✓
Passive and active training results are displayed separately (distance, duration)	✓	–	✓	✓	✓	✓
Standard color (no extra charge)	silversand	blue	silversand	blue	blue	blue
Mobile by large transport castors	✓	✓	✓	✓	✓	✓

✓ = *included in base price* • = *optional accessory* – = *not available*

Tóm tắt

- Chế độ PASSIVE: thư giãn, warm-up
- Chế độ ACTIVE:
  - Kiểm soát được kháng lực
  - Năng lượng tiêu hao
  - Đánh giá sự đối xứng bên trái/phải