

FIEPS EUROPEAN CONGRESS 2023

GALATI, ROMANIA



EFFECTS OF MICROCURRENT THERAPY WITH RESISTANCE EXERCISES ON STATE AND TRAIT ANXIETY IN MIDDLE-AGED ADULTS: A PILOT STUDY

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MICROCURRENT THERAPY

It was developed in the 1970s, and it has been applied as a therapeutic, non-invasive method which requires the use of a microcurrent device that provides different frequencies, and it transmits sub-sensory currents through the skin within the range of milliamperes (<1 mA).



The Effects of Electric Currents on ATP Generation, Protein Synthesis, and Membrane Transport in Rat Skin

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European Journal of Applied Physiology (2019) 119:2641–2653
<https://doi.org/10.1007/s00421-019-04243-1>

ORIGINAL ARTICLE

Effectiveness of combining microcurrent with resistance training in trained males

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Bioelectricity and microcurrent therapy for tissue healing – a narrative review

Leon Poltawski and Tim Watson

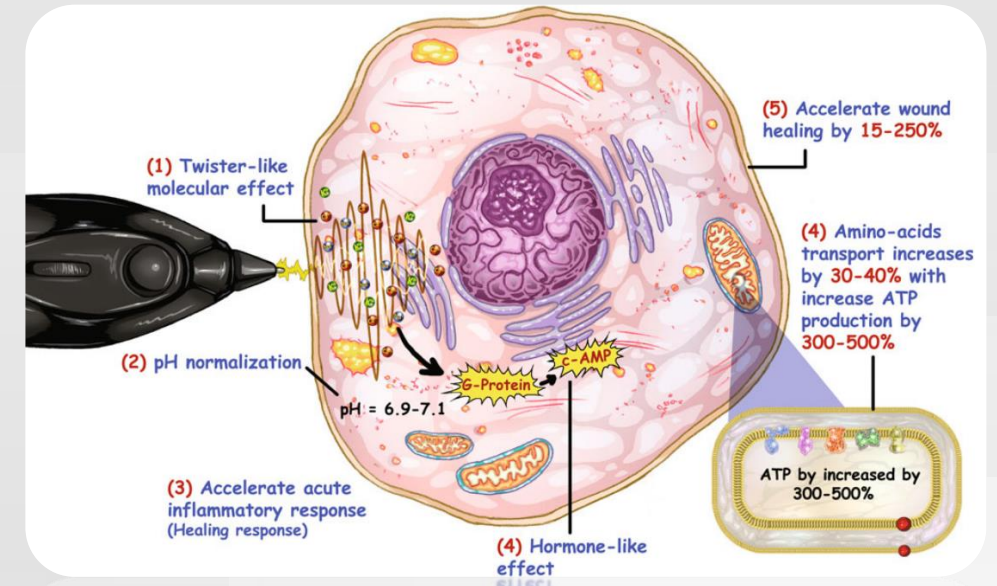
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Background: Microcurrent therapy (MCT) uses electric currents similar to those produced by the body during tissue healing. It may be a particularly beneficial where endogenous healing has failed.

Self-Rated Recovery and Mood Before and After Resistance Training and Muscle Microcurrent Application

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Al-Tubaikh JA. Energy Medicine. Internal Medicine: An Illustrated Radiological Guide. Second ed: Springer; 2018.



Physiological effects of microcurrent and its application for maximising acute responses and chronic adaptations to exercise

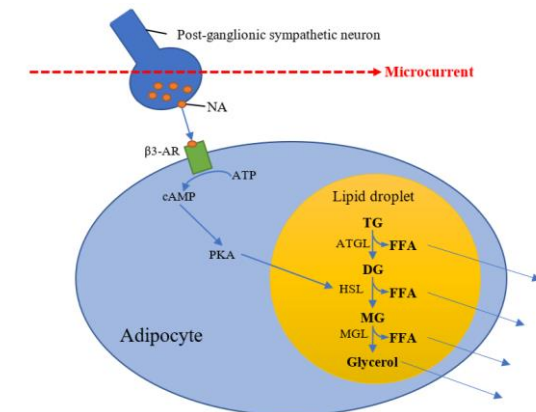
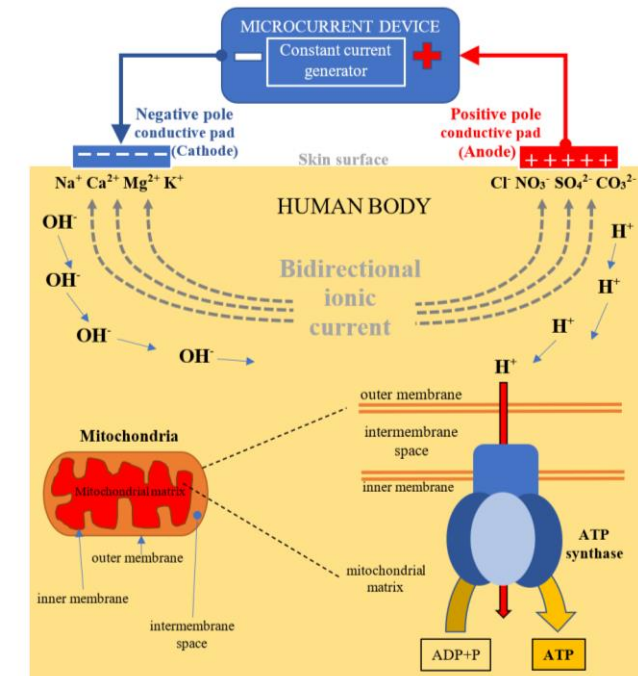
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Received: 5 September 2022 / Accepted: 11 November 2022
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Abstract

Microcurrent is a non-invasive and safe electrotherapy applied through a series of sub-sensory electrical currents (less than 1 mA), which are of a similar magnitude to the currents generated endogenously by the human body. This review focuses on examining the physiological mechanisms mediating the effects of microcurrent when combined with different exercise modalities (e.g. endurance and strength) in healthy physically active individuals. The reviewed literature suggests the following candidate mechanisms could be involved in enhancing the effects of exercise when combined with microcurrent: (i) increased adenosine triphosphate resynthesis, (ii) maintenance of intercellular calcium homeostasis that in turn optimises exercise-induced structural and morphological adaptations, (iii) eliciting a hormone-like effect, which increases catecholamine secretion that in turn enhances exercise-induced lipolysis and (iv) enhanced muscle protein synthesis. In healthy individuals, despite a lack of standardisation on how microcurrent is combined with exercise (e.g. whether the microcurrent is pulsed or continuous), there is evidence concerning its effects in promoting body fat reduction, skeletal muscle remodeling and growth as well as attenuating delayed-onset muscle soreness. The greatest hindrance to understanding the combined effects of microcurrent and exercise is the variability of the implemented protocols, which adds further challenges to identifying the mechanisms, optimal patterns of current(s) and methodology of application. Future studies should standardise microcurrent protocols by accurately describing the used current [e.g. intensity (μA), frequency (Hz), application time (minutes) and treatment duration (e.g. weeks)] for specific exercise outcomes, e.g. strength and power, endurance, and gaining muscle mass or reducing body fat.

Keywords Microcurrent electrical nerve stimulation · Subsensory · Non-invasive electrical micro-ampere stimulus · Delayed-onset muscle soreness · Muscle thickness · Lipolysis · Body composition



This review article was published in the **European Journal of Applied Physiology** (3.346 Journal Impact Factor™)

<https://doi.org/10.1007/s00421-022-05097-w>



AIM OF THE STUDY

The aim of this double blind randomised controlled trial was to analyse whether resistance training (RT) combined with microcurrent therapy (MCT) affects state and trait anxiety in middle-aged adults.



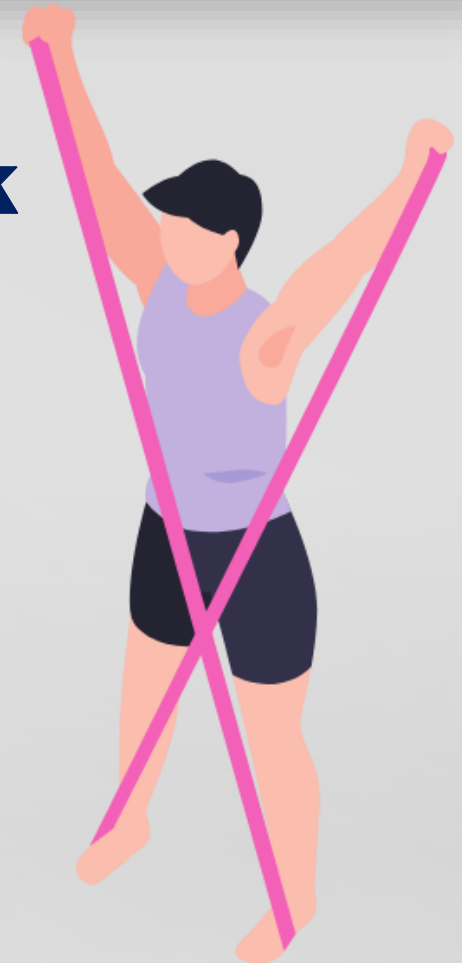


METHODS

Participants

**8 middle-aged, healthy, non-trained adults from the UK
(54.4 ± 7.4 years)**

- **Randomly assigned into an
MCT (n = 4) or a sham (n = 4) group.**
- **6-week RT programme.**
- **Validated anxiety questionnaire.**





MICROCURRENT

A microcurrent or a sham device was used on the dominant upper arm for 3 hours post-workout or in the morning on non-training days.

➤ **Intensity: between 50 and 400 μ A**

Frequency: 1.03 kHz.

➤ **The sham device delivered no current.**

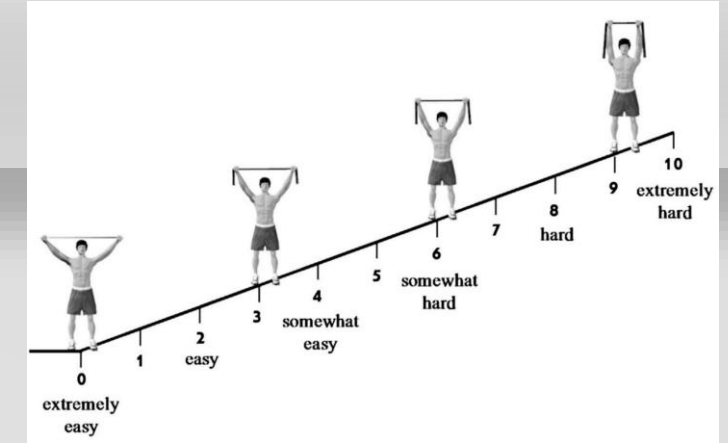
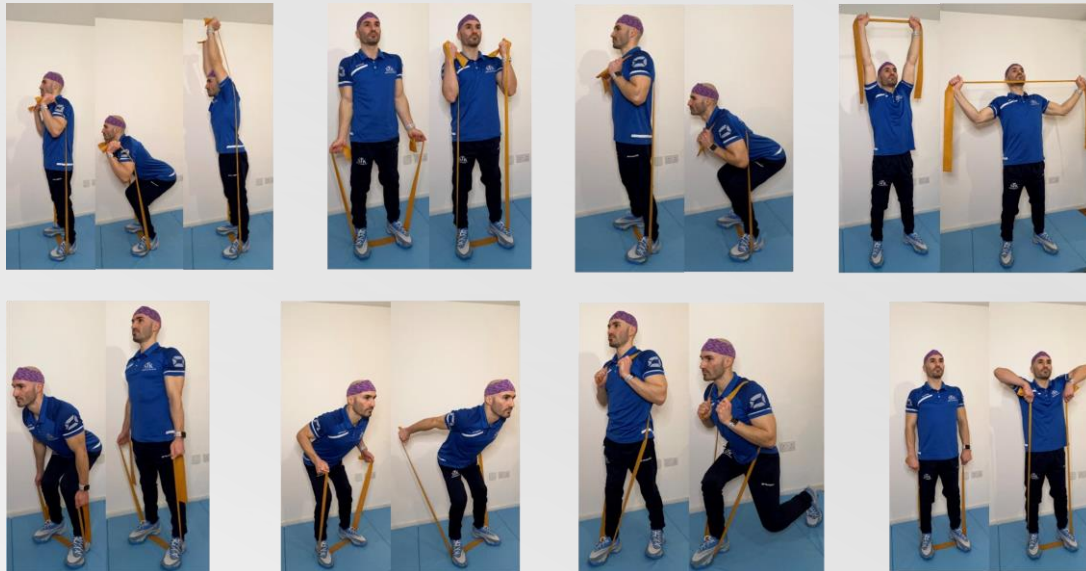


Arc4Health (manufactured by ARC Microtech Ltd, UK)



RESISTANCE TRAINING

**The RT programme included the following exercises:
shoulder press-squat, biceps curl, back squat,
lateral pull down, deadlift, triceps extension,
lunge, and upright row.**



OMNI-Resistance Exercise Scale of perceived exertion with TheraBand resistance bands (Colado et al., 2018)

- **2 sessions/week for 6 weeks.**
- **3 sets of 12 to 15,
with 1.5 to 2 min of rest.**
- **RPE of 6 to 7, 7 to 8, and 8 to 9 during
weeks 1, 2, and 3 to 6 respectively.**



ANXIETY QUESTIONNAIRE

State-Trait Anxiety Inventory for Adults

- **40 self-report items.**
- **4-point Likert scale.**
- **Scores range from 20 to 80.**
- **Higher scores = greater anxiety.**

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name _____ Date _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm.....	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive.....	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused.....	1	2	3	4
19. I feel steady.....	1	2	3	4

Spielberger, C., & Sydeman, S. (1994). State-Trait Anxiety Inventory and State-Trait Anger Expression Inventory. In M. E. Maruish (Ed.), The use of psychological testing for treatment planning and outcome assessment (pp. 292–321). Hillsdale, NJ: Lawrence Erlbaum Associates



RESULTS

Table 1. State and Trait anxiety levels and pre-post differences (mean \pm SD)

	MICROCURRENT		SHAM	
	PRE	POST	PRE	POST
State anxiety	23.5 \pm 4.5	21.8 \pm 2.9	27.5 \pm 5.8	26.8 \pm 7.5
Difference	-1.8 \pm 2.1		-0.8 \pm 3.3	
Trait anxiety	29.3 \pm 2.9	26.3 \pm 4.0	36.5 \pm 7.9	32.0 \pm 10.1
Difference	-3.0 \pm 2.5		-4.5 \pm 4.4	

No significant differences were observed from pre to post within the groups, and in the pre-post changes between groups, $p > 0.05$.



CONCLUSIONS

- **Although RT seems to attenuate state and trait anxiety in middle-aged adults, the application of MCT did not appear to be clearly related to the reduction of anxiety in our population.**
- **Further research with a larger sample size is needed to detect important effects and associations.**



THANK YOU

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