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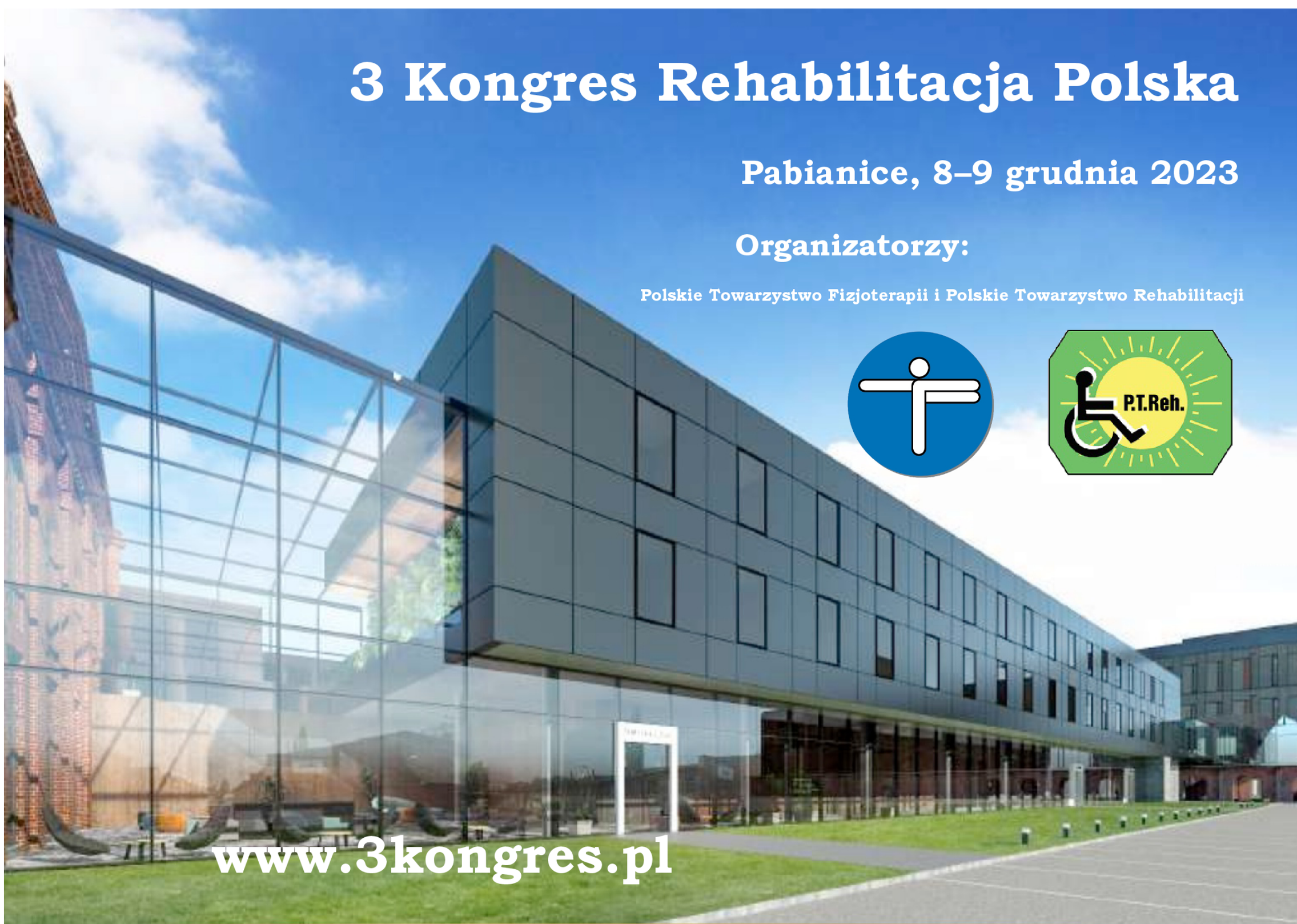

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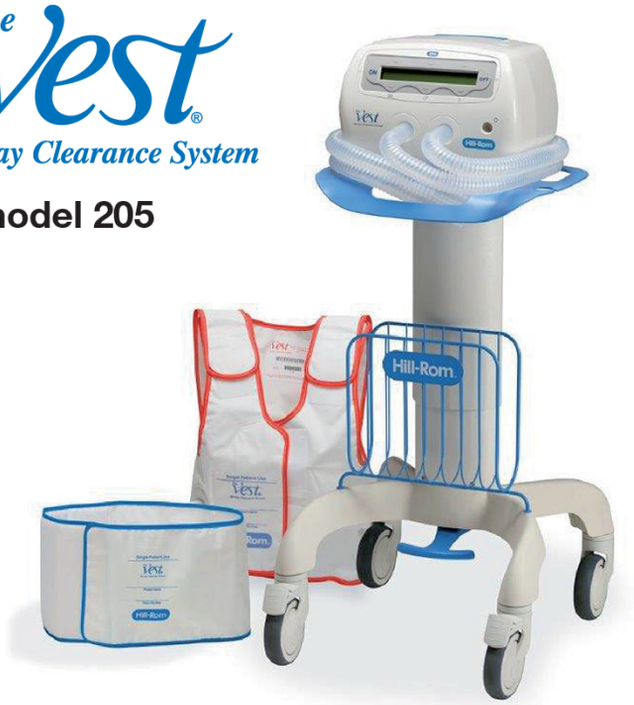

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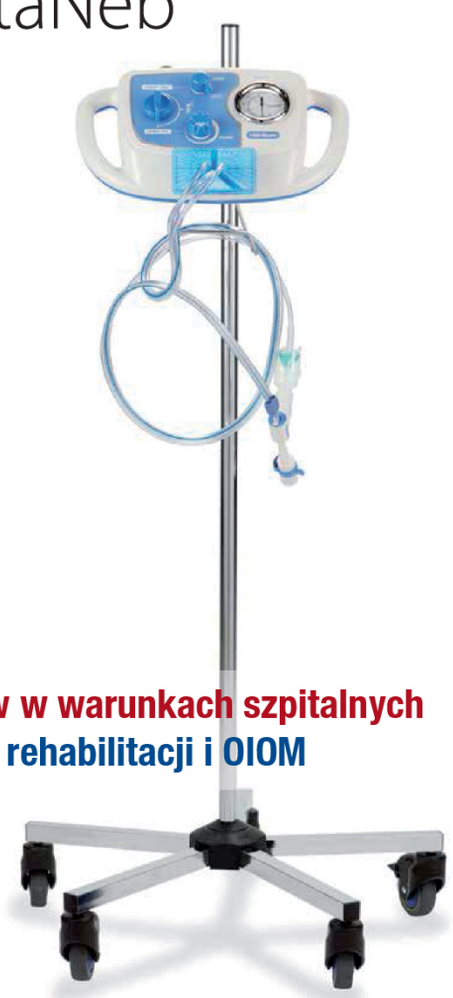

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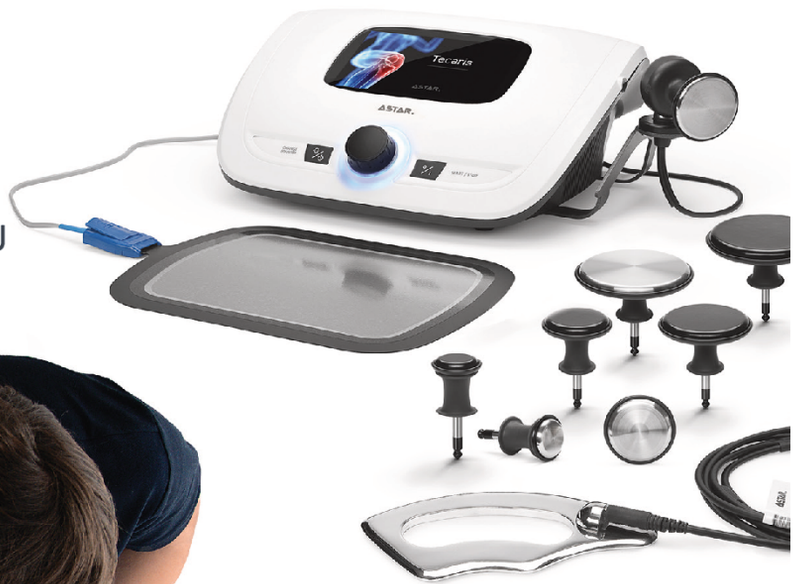

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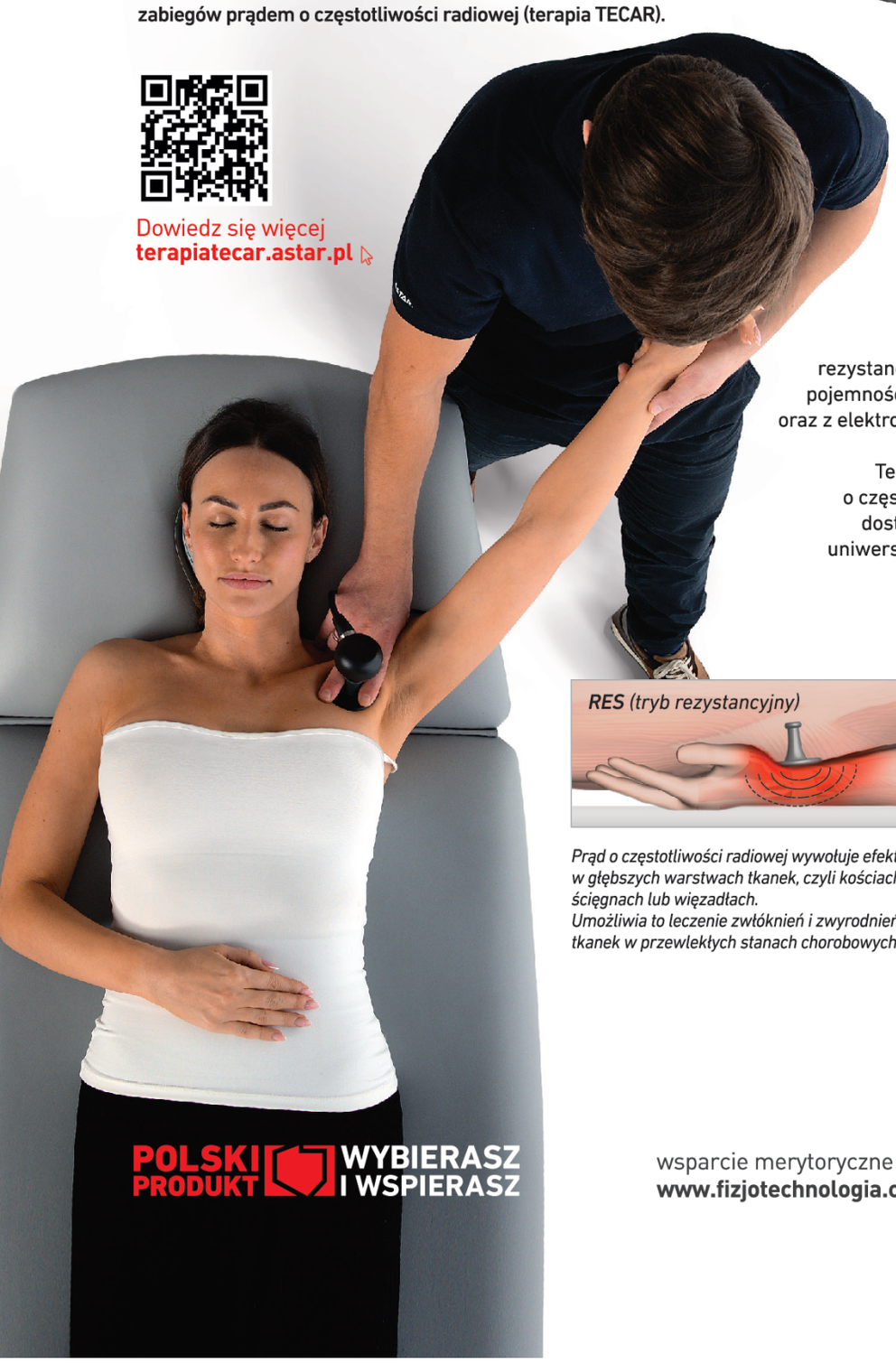

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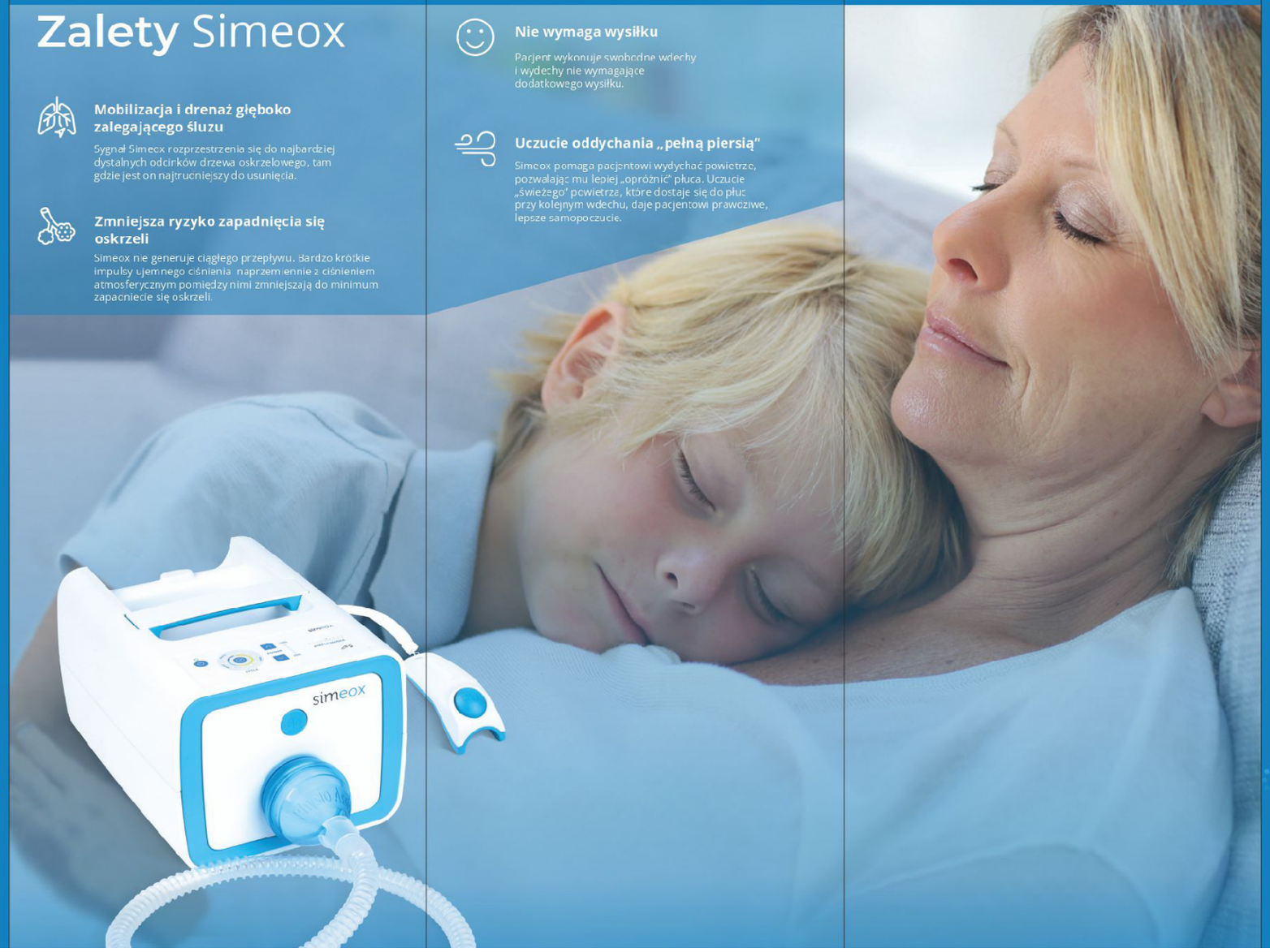

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The differences of the multistage fitness test and multistage shuttle swim test on swimmer's aerobic ability

Różnice między wieloetapowym testem sprawności fizycznej a wieloetapowym testem pływackim w zakresie zdolności tlenowej pływaka

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Abstract

Study Purpose. Discuss the differences between the multistage fitness test and the multistage shuttle swim test in assessing the aerobic ability of swimmers.
Materials and Methods. This research is descriptive. The survey method was used. Data collection techniques include tests and measurements.
Results. The analysis shows that the t-value is 0.001 < t, and the significance value is 0.999 > 0.005.
Conclusion. There was no significant difference in the aerobic ability of swimmers when assessed using the multistage fitness test compared to the multistage shuttle swim test.

Keywords

multistage fitness test, multistage shuttle swim test, swimming

Streszczenie

Cel badania. Omówienie różnic między wieloetapowym testem sprawności fizycznej a wieloetapowym testem pływackim w ocenie zdolności tlenowej pływaków.
Materiał i metody. Badanie ma charakter opisowy. Wykorzystano metodę ankietową. Techniki zbierania danych obejmują testy i pomiary.
Wyniki. Analiza pokazuje, że wartość t wynosi 0,001 < t, a wartość istotności to 0,999 > 0,005.
Wnioski. Nie stwierdzono istotnej różnicy w zdolności tlenowej pływaków ocenianej za pomocą wieloetapowego testu sprawności fizycznej w porównaniu z wieloetapowym testem pływackim.

Słowa kluczowe

wieloetapowy test sprawności fizycznej, wieloetapowy test pływacki, pływanie

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Introduction

Physical tests serve as benchmarks for athletes and coaches to monitor the success of implemented training programs [1]. Several endurance sports tests have been developed and tried in Indonesia, such as the multistage test, the Harvard test, and the Balke test [2]. Current physical tests are more relevant for land sports, exemplified by the multistage fitness test, which involves running back and forth to a rhythm [3, 4]. However, these tests differ significantly when applied to aquatic sports where water is the primary medium for training and competition. While a swimming coach might want an athlete to undergo the multistage fitness test, it's debatable whether this test truly reflects the athlete's actual condition in the water [5, 6, 7]. Factors such as breathing regulation, energy systems, body mass resistance in land versus water, and predominant movement patterns significantly vary between running and swimming [8]. While swimming has evolved to incorporate physical exercises from both land and water disciplines [9], specific tests closely mirroring multistage tests have not been developed in Indonesia [11]. The researchers noted discrepancies between physical tests often applied to muscle exertion in swimming [12]. Hence, this study aims to determine the contribution of the multistage fitness test and the multistage shuttle swim test to VO_{2max} in swimmers [13]. If the multistage shuttle swim test offers a comparable contribution to the multistage fitness test, future physical testing for swimmers might adopt the multistage shuttle swim test.

Materials and methods

Population and sample

The population and sample in this study consisted of DIY swimming athletes, both males and females, actively participating in water polo, totaling 14 athletes.

Exercise protocol

This research will utilize the Multistage Fitness Test and Multistage Shuttle Swim Test. Data collection will span two days to prevent participants from experiencing undue fatigue. The aerobic capabilities of swimmers were assessed using both aforementioned tests. Data collected were then converted into the VO_{2Max} table.

The Multistage Fitness Test measurement

The test begins with athletes standing behind the starting line. With a musical tone playing, athletes run in sync with the rhythm. They must reach the finish line before the next rhythm starts. If they haven't reached the finish line by the time the new rhythm plays, they must increase their pace. Athletes are considered to have completed the test if they fail to match the rhythm twice or thrice. Once done, they should jog slowly as a cooldown. Final results are then recorded.

The Multistage Shuttle Swim Test measurement

Similarly, swimmers begin behind a starting line, swimming to the rhythm of a musical tone. They should reach the finish line before the next tone plays. If they don't, they need to speed up. Athletes who can't keep up with the rhythm two or three times are considered to have finished the test. They should then swim slowly to cool down, with their final results being recorded.

Statistical analysis

Data in this study will be subjected to normality and homogeneity testing. Before proceeding with the t-test, it's imperative for the data to be normally distributed. Hence, normality and homogeneity tests are necessary.

Hypotheses will be tested using the Independent Sample T-test. If $t_{count} \geq t_{table}$ and $p < 0.05$, then H_a is accepted and H_0 is rejected, suggesting a difference in the aerobic abilities of swimmers between the two tests. Conversely, if $t_{count} < t_{table}$ and $p > 0.05$, then H_0 is accepted and Ha is rejected, indicating no significant difference between the two tests.

Result

When displayed in the form of a frequency distribution, the data on the results of the aerobic ability of swimmers using the multistage fitness test and the multistage shuttle swim test results can be seen in the table as follows:

Table 1. Frequency Distribution of Swimmer Aerobic Ability Using The Multistage Fitness Test and Multistage Shuttle Swim Test

No	Interval	The Multistage Fitness Test		Multistage Shuttle Swim Test	
		F	%	F	%
1	≥ 52.84	2	14.29%	2	14.29%
2	47.18 – 52.83	1	7.14%	1	7.14%
3	41.52 – 47.17	3	21.43%	4	28.57%
4	35.86 – 41.51	4	28.57%	2	14.29%
5	≤ 35.85	4	28.57%	5	35.71%
Total		**14**	**100%**	***14***	**100%**

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Table 2. Swimmer's Aerobic Capability Test Using The Multistage Fitness Test and Multistage Shuttle Swim Test

Group	Mean	t-test for Equality of means			
		t ht	Ttb	Sig.	Difference
The Multistage Fitness Test	41.3571	0.001	2.16	0.999	0.00071
Multistage Shuttle Swim Test	41.3564				

t ht = t count; ttb = t table; Sig = Significantly

From the results of the t-test, it can be seen that the t count is 0.001 and the t table is 2.16 (df = 13) with a significance value of p at 0.999. Because the t count of 0.001 is less than the t table value of 2.16, and the significance value of 0.999 is greater than 0.05, these results indicate no significant difference.

Discussion

The hypothesis posits that there's no significant difference between the multistage fitness test and the multistage shuttle swim test concerning aerobic ability. This is attributed to several influencing factors. For instance, the number of shuttles in the multistage shuttle swim test has been adjusted based on the level and shuttle determination procedures, leading to equalization. The multistage fitness test level 1 comprises 8 shuttles, whereas the multistage shuttle swim test level 1 has 5 shuttles. Another factor is the initial speed at the test's commencement: the multistage shuttle swim test begins at 0.09 m/s, while the multistage fitness test initiates at 8.5 km/hr. Additionally, the designated distance between the two tests differs, with the multistage shuttle swim test using a 10m distance and the multistage fitness test applying a 20 m span. Moreover, the distinction in resistance between water and air affects the outcomes of both tests.

The multistage test measures the body's capacity to intake oxygen (VO_{2max}) [3]. It encompasses the multistage fitness test (for running) and the multistage shuttle swim test (for swimming). The multistage fitness test is a straightforward field test, yet it provides a relatively precise estimation of maximum oxygen consumption for various applications. This test is deemed the most cost-effective for gauging an athlete's aerobic capacity since it doesn't require an expansive testing ground. Essentially, the multistage test is direct, involving athletes running back and forth on a pre-measured 20-meter track [4]. Athletes start running at a slow pace, which incrementally increases in speed as they listen to a sequence of rhythmic beeps from a recording. An athlete is deemed unsuccessful if they can't match the rhythm and if both feet don't cross the dividing line as the running signal initiates. This signifies that the athlete's maximum oxygen consumption level is at the point where the shuttle is declared a failure [5, 6]. Conversely, the multistage shuttle swim test is a modification of the pre-existing physical test, transitioning from multi-stage running to multi-stage swimming.

Conclusion

Drawing from the data analysis, description, research result evaluation, and discussion, it's concluded that there's no significant difference between the multistage fitness test and the multistage shuttle swim test in terms of swimmers' aerobic capacity. This is substantiated by the t count value of 0.001 being less than the t table value of 2.16 and a significance value of 0.999 exceeding 0.05. In future physical testing for swimmers, the multistage shuttle swim test can be adopted.

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