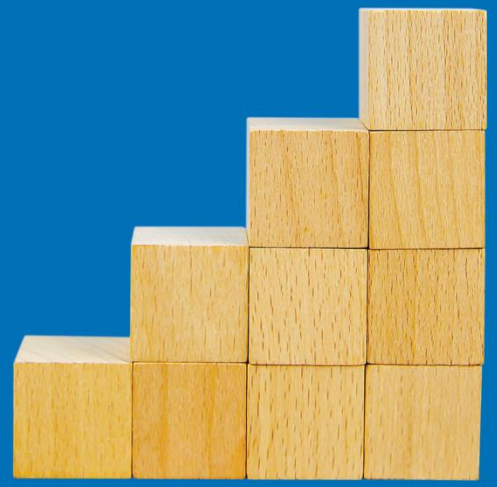
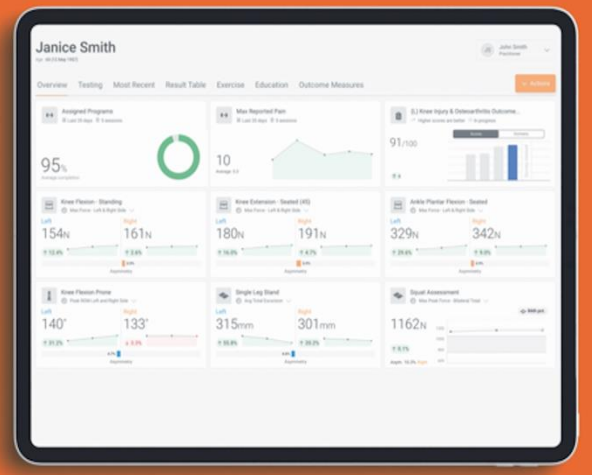
Return to Sport After Concussion - Physiotherapy Management

Swiss Olympic Medical Day

Manuel Hangarter (M.Sc. Sportphysiotherapie | Z-Health Neuroathletiktrainer | WIN4 Winterthur)





Goals of physiotherapy

PROTECT THE ATHLETE

TREAT SYMPTOMS

ENSURE A SAFE RETURN TO SPORT

AVOID PERSISTING SYMPTOMS

Selbstverantwortung einen vermeintlichen Rückschritt einzugestehen und sich so vor bleibenden Hirnschädigungen und –defiziten zu schützen.

Name: ______________________ Geburtsdatum: ______________________

Datum Hirnerschütterung: ______________________ Anzahl Hirnerschütterungen: ______________________

STAGE 1	***REST, NO SPORTS, "BRAIN RESET"*** Until complete disappearance of all symptoms. Ideally rest and sleep, no mental work or strain whatsoever. 'Switch off and reset' the brain. No school attendance either, refrain from driving a vehicle. Consult a doctor if symptoms increase. **Only once completely symptom-free, proceed to Stage 2 the following day!**	Stufe bestanden am: Visum:
STAGE 2	***Light, short AEROBIC TRAINING*** Light cardiovascular exercise: e.g., 15 minutes on a stationary bike with a pulse up to 125 per minute. Preferably no jogging due to the shaking movement for the head. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated. **Only once completely symptom-free, proceed to Stage 3 the following day!**	Stufe bestanden am: Visum:
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medbase

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16 YEARS OLD

Complication

6 DAYS IS NOT (ENOUGH) PROTECTION

ABSOLUTE REST SLOWS RECOVERY

ATHLETE REPORTS ALONE IS NOT ENOUGH

WE DON'T ASSESS NERVOUS SYSTEM FUNCTION

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	Relative Rest	
	Aerobic Training	
	Sport-Specific Training	
	Restricted Team Training	
	Team Training	
	Match	

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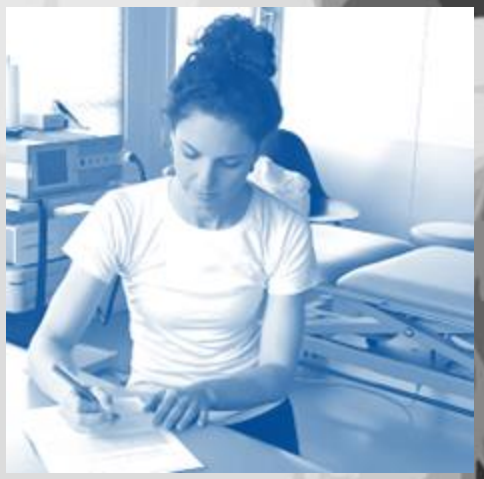
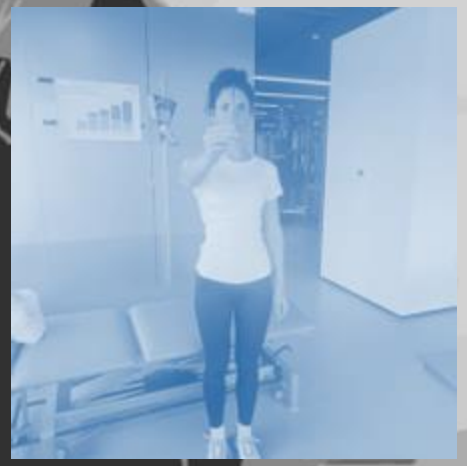
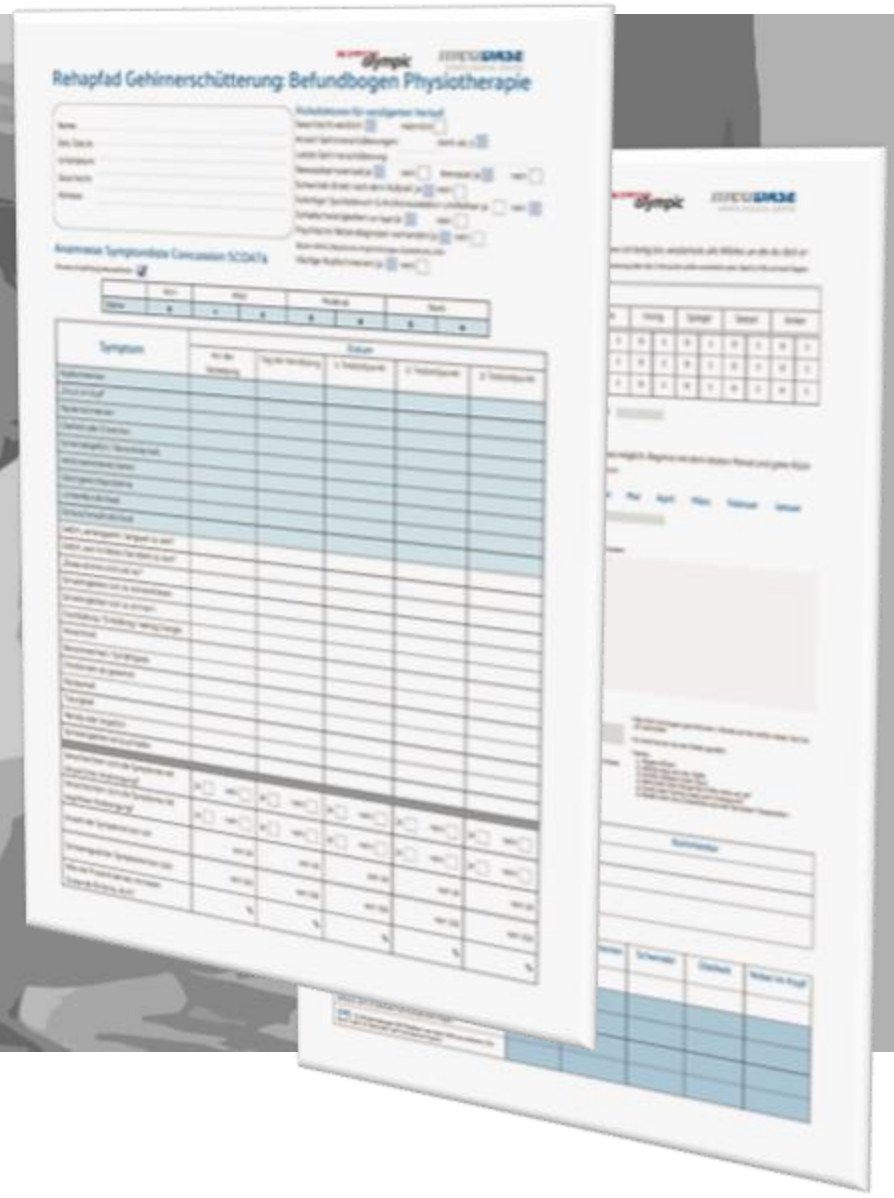
PHASE 1 - PHYSIOTHERAPY ASSESSMENT







EVIDENCE: PATIENT EDUCATION & ASSESSMENT

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Review

Western diet aggravates neuronal insult in post-traumatic brain injury: Proposed pathways for interplay

Abdullah Shaito[a], Hiba Hasan[b,1], Karl John Habashy[c,1], Walaa Fakih[d,1], Samar Abdelhady[e], Fatimah Ahmad[f], Kazem Zibara[g], Ali H. Eid[d,h], Ahmed F. El-Yazbi[d,i,*], Firas H. Kobeissy[f,**]

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[g] Biology Department, Faculty of Sciences-I, Lebanese University, Beirut, Lebanon
[h] Department of Biomedical Sciences, College of Health Sciences, Doha, Qatar
[i] Department of Pharmacology and Toxicology, Faculty of Pharmacy, Alexandria University, Egypt

Systematic review

Rest and exercise early after sport-related concussion: a systematic review and meta-analysis

John J Leddy ,[1] Joel S Burma ,[2] Clodagh M Toomey,[3] Alix Hayden,[4] Gavin A Davis ,[5] Franz E Babl ,[6] Isabelle Gagnon,[7,8] Christopher C Giza,[9,10] Brad G Kurowski,[11] Noah D Silverberg ,[12] Barry Willer,[13] Paul E Ronksley,[14] Kathryn J Schneider [15]

Physical Therapy Evaluation and Treatment After Concussion/ Mild Traumatic Brain Injury

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2020;50(4):CPG1-CPG73. doi:10.2519/jospt.2020.0301

Sleep and the athlete: narrative review and 2021 expert consensus recommendations

Neil P Walsh ,[1] Shona L Halson,[2] Charli Sargent,[3] Gregory D Roach,[3] Mathieu Nédélec,[4] Luke Gupta,[5] Jonathan Leeder,[6] Hugh H Fullagar,[7] Aaron J Coutts,[7] Ben J Edwards,[1] Samuel A Pullinger ,[1,8] Colin M Robertson,[9] Jatin G Burniston,[1] Michele Lastella,[3] Yann Le Meur,[4] Christophe Hausswirth,[10] Amy M Bender,[11] Michael A Grandner,[12] Charles H Samuels[13]

American Medical Society for Sports Medicine position statement on concussion in sport

Kimberly G Harmon,[1] James R Clugston,[2] Katherine Dec,[3] Brian Hainline,[4] Stanley Herring,[5] Shawn F Kane,[6] Anthony P Kontos,[7] John J Leddy,[8] Michael McCrea,[9] Sourav K Poddar,[10] Margot Putukian,[11,12] Julie C Wilson,[13] William O Roberts[14]

Consensus statement

Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022

Jon S Patricios ,[1] Kathryn J Schneider ,[2] Jiri Dvorak ,[3] Osman Hassan Ahmed ,[4,5] Cheri Blauwet ,[6,7] Robert C Cantu,[8,9] Gavin A Davis ,[10,11] Ruben J Echemendia ,[12,13] Michael Makdissi,[14,15] Michael McNamee,[16,17] Steven Broglio ,[18] Carolyn A Emery ,[2] Nina Feddermann-Demont,[19,20] Gordon Ward Fuller ,[21] Christopher C Giza,[22,23] Kevin M Guskiewicz,[24] Brian Hainline ,[25] Grant L Iverson ,[26,27] Jeffrey S Kutcher,[28] John J Leddy ,[29] David Maddocks,[30] Geoff Manley ,[31] Michael McCrea ,[32] Laura K Purcell,[33] Margot Putukian ,[34] Haruhiko Sato ,[35] Markku P Tuominen,[36] Michael Turner ,[37,38] Keith Owen Yeates ,[39] Stanley A Herring,[40,41] Willem Meeuwisse[42]

RESEARCH ARTICLE Open Access

Clinical examination factors that predict delayed recovery in individuals with concussion

Corina Martinez[1*], Zachary Christopherson[1], Ashley Lake[1], Heather Myers[1], Jeffrey R. Bytomski[2], Robert J. Butler[3,4] and Chad E. Cook[4]

Rehapfad Gehirnerschütterung

Verhaltensempfehlungen nach einer Gehirnerschütterung

Direkt nach einer Gehirnerschütterung

- Bei Verschlechterung der Symptome wie **Übelkeit, Erbrechen oder starke Zunahme von Kopfschmerzen umgehend die Notaufnahme** aufsuchen!
- Ruhiger & dunkler Raum für die ersten 24-48 Stunden
- Kein Handy, Fernsehen oder Lesen für die ersten 24-48 Stunden
- Ausreichend schlafen
- Sonnenbrille bei Lichtempfindlichkeit & Ohrstöpsel bei Geräuschempfindlichkeit nutzen
- Ab 24 Stunden kurze Spaziergänge

Artzkonsultation
Eine Arztkonsultation bei einem Facharzt sollte innerhalb von 72 Stunden nach einer Gehirnerschütterung stattfinden!

Nach 48 Stunden bis zur vollständigen Erholung

- Maximale Symptomverschlechterung von 2/10 Punkten bei allen Aktivitäten
- Langsame Rückkehr zur Alltagsaktivitäten & Arbeit / Schule
- Regelmässige Spaziergänge
- Regelmässiges Ausdauertraining in Absprache mit einem Therapeuten
- Bildschirmzeit und Lesen langsam steigern
- Schlafhygiene (mindestens 7-9 Stunden, regelmäßiger Schlafrhythmus)
- Geregelter Tagesablauf
- Gesunde Ernährung, verzicht von Alkohol und Drogen

Rückkehr in die Schule / Arbeit

- Erfolgt meist innerhalb von zehn Tagen nach einer Gehirnerschütterung
- Eventuell Belastung anpassen durch teilweise Reintegration, mehr Pausen und mehr Einzelarbeit
- Rückkehr in die Schule / Arbeit hat Priorität und erfolgt vor der Rückkehr in den Sport

Rückker in den Sport

- Rückkehr in den Sport meist nach zwei bis vier Wochen
- Eine frühere Rückkehr in den Sport ist oft unrealisitisch und potenziell gefährlich
- Kinder und Jugendliche sollten mindestens 28 Tagen warten
- Die Freigabe erfolgt in Absprache mit dem behandelnden Arzt oder Therapeuten

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Relative Rest

- Mild symptoms are okay.
- Early walking and light daily activities are encouraged.
- Good education is key

Stage 2 after 48 hours.

Aerobic Training

Sport-Specific Training

Restricted Team Training

Team Training

Match

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REST, NO SPORTS, "BRAIN RESET"

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STAGE 6

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PHASE 2 –
BUFFALO CONCUSSION TREADMILL TEST

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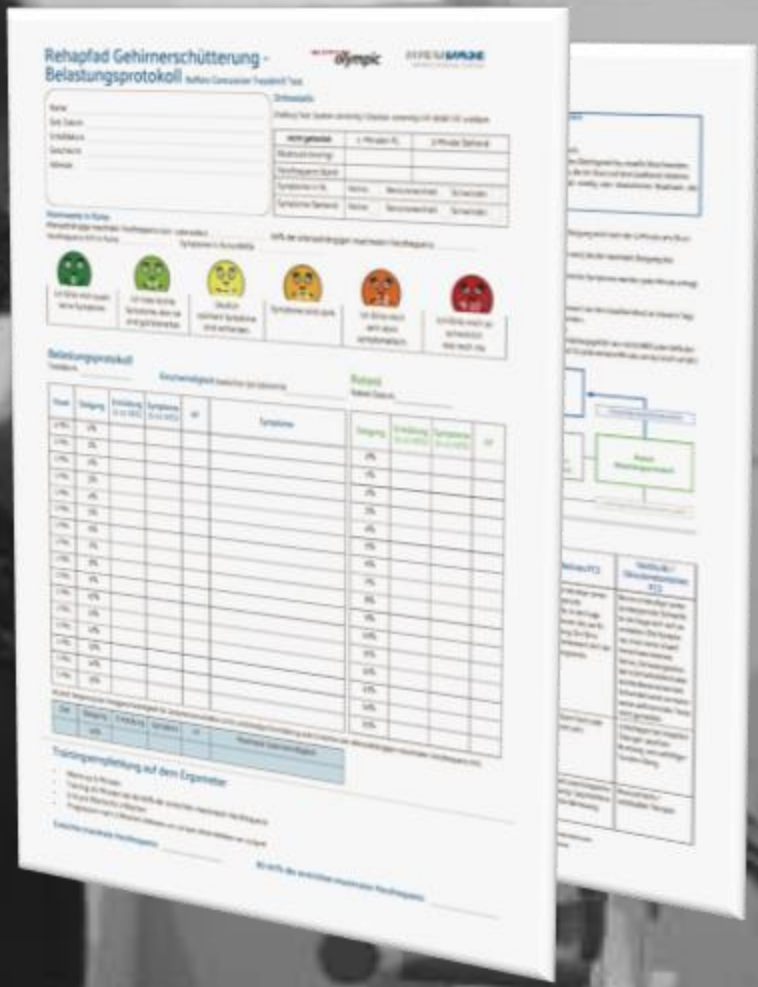

PHASE 2 – EARLY INITIATION OF VESTIBULAR, CERVICOGENIC, AND VISUAL REHABILITATION

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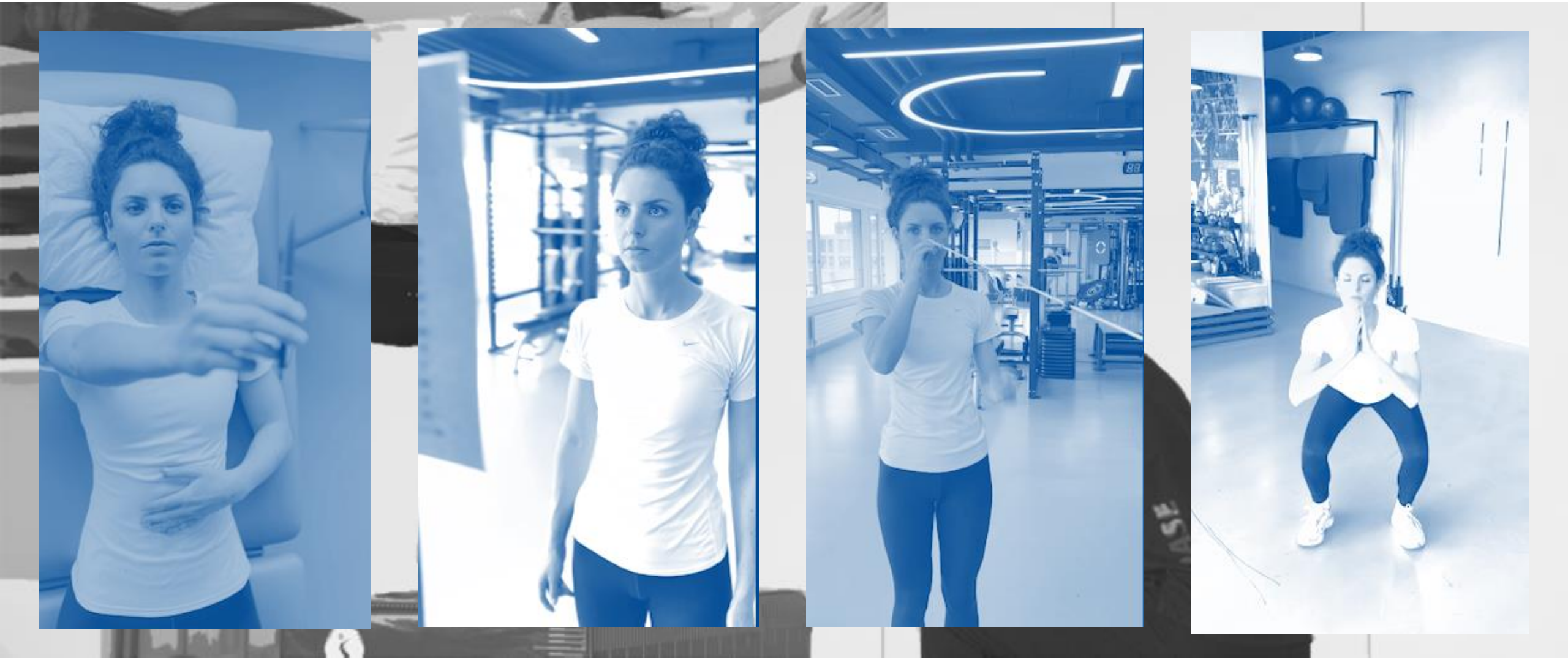

EVIDENCE - CARDIOVASCULAR TRAINING & VESTIBULAR, CERVICOGENIC, AND VISUAL REHABILITATION

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American Academy of Pediatrics

Vision and Concussion: Symptoms, Signs, Evaluation, and Treatment

Effect of Aerobic Exercise on Symptom Burden and Quality of Life in Adults With Persisting Post-concussive Symptoms: The ACTBI Randomized Controlled Trial

Leah J. Mercier, PhD [a,b] · Samantha J. McIntosh, BHSc [a,b] · Chloe Boucher, BSc [a,b] · ... · Sean P. Dukelow, MD, PhD [a,b] · Ashley D. Harris, PhD [b,c,f] · Chantel T. Debert, MD, MSc [a,b,f] ... Show more

Affiliations & Notes · Article Info

Cerebrovascular Neuroprotection after Acute Concussion in Adolescents

Stacey E. Aaron PhD, Jason W. Hamner BS, Erin D. Ozturk BS, Danielle L. Hunt MS, Mary Alexis Iaccarino MD, William P. Meehan III MD, David R. Howell PhD, Can Ozan Tan PhD

First published: 14 April 2021 | https://doi.org/10.1002/ana.26082 | Citations: 6

Multi-Disciplinary Management of Athletes with Post-Concussion Syndrome: An Evolving Pathophysiological Approach

Michael J. Ellis[1*], John Leddy[2] and Barry Willer[2]

[1]Pan Am Concussion Program, Section of Neurosurgery, Department of Surgery, Pediatrics and Child Health, University of Manitoba, Children's Hospital Research Institute of Manitoba, Canada North Concussion Network, Winnipeg, MB, Canada, [2]UBMD Department of Orthopaedics and Sports Medicine, State University of New York at Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY, USA, [3]Department of Psychiatry, State University of New York at Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY, USA

A Physiological Approach to Prolonged Recovery From Sport-Related Concussion

John Leddy, MD, FACSM, FACP*; John G. Baker, PhD*†; Mohammad Nadir Haider, MBBS§; Andrea Hinds, PhD*; Barry Willer, PhD‡

*UBMD Department of Orthopaedics and Sports Medicine, †Department of Nuclear Medicine, and ‡Department of Psychiatry, §Jacobs School of Medicine and Biomedical Sciences, The State University of New York at Buffalo

[CLINICAL COMMENTARY]

JULIA TRELEAVEN, PhD, BPhty[1]

Dizziness, Unsteadiness, Visual Disturbances, and Sensorimotor Control in Traumatic Neck Pain

Review of Vestibular and Oculomotor Screening and Concussion Rehabilitation

Anthony P. Kontos, PhD*; Jamie McAllister Deitrick, PhD*; Michael W. Collins, PhD*; Anne Mucha, DPT†

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Physical examination of dizziness in athletes after a concussion: A descriptive study

Jennifer C. Reneker[a,b,c,e], Vinay K. Cheruvu[a], Jingzhen Yang[d], Mark A. James[a], Chad E. Cook[c]

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[e] Division of Physical Therapy, Department of Orthopaedics, Duke University, Durham, NC, United States

Early Subthreshold Aerobic Exercise for Sport-Related Concussion

A Randomized Clinical Trial

John J Leddy [1,✉], Mohammad N Haider [1,2], Michael J Ellis [3,4,5], Rebekah Mannix [6], Scott R Darling [1], Michael S Freitas [1], Heidi N Suffoletto [1], Jeff Leiter [7], Dean M Cordingley [7], Barry Willer [8]

Author information · Article notes · Copyright and License information

PMCID: PMC6450274 PMID: 30715132

Current and Emerging Rehabilitation for Concussion: A Review of the Evidence

Steven P. Broglio, PhD, ATC[a,b,*], Michael W. Collins, PhD[c], Richelle M. Williams, MS, ATC[a], Anne Mucha, DPT[c,d], Anthony P. Kontos, PhD[c]

J Head Trauma Rehabil
Vol. 31, No. 3, pp. 215–224
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Cerebral Blood Flow During Treadmill Exercise Is a Marker of Physiological Postconcussion Syndrome in Female Athletes

Mary Clausen, MS; David R. Pendergast, EdD; Barry Willer, PhD; John Leddy, MD

Original article

Cervicovestibular rehabilitation in sport-related concussion: a randomised controlled trial

Kathryn J Schneider,[1,2] Willem H Meeuwisse,[1,3] Alberto Nettel-Aguirre,[2,3,4] Karen Barlow,[2] Lara Boyd,[5] Jian Kang,[1] Carolyn A Emery[1,2,3]

Clin Physiol Funct Imaging (2011) **31**, pp85–93 doi: 10.1111/j.1475-097X.2010.00990.x

REVIEW ARTICLE

Cerebrovascular pathophysiology following mild traumatic brain injury

T. K. Len and J. P. Neary

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Summary

Mild traumatic brain injury (mTBI) or sport-induced concussion has recently become a prominent concern not only in the athletic setting (i.e. sports venue) but also in the general population. The majority of research to date has aimed at understanding the neurological and neuropsychological outcomes of injury as well as return-to-play guidelines. Remaining relatively unexamined has been the pathophysiological aspect of mTBI. Recent technological advances including

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Accepted for publication
Received 15 April 2010;

Systematic review

Rest and exercise early after sport-related concussion: a systematic review and meta-analysis

John J Leddy [1], Joel S Burma [2], Clodagh M Toomey,[3] Alix Hayden,[4] Gavin A Davis [5], Franz E Babl [6], Isabelle Gagnon,[7,8] Christopher C Giza,[9,10] Brad G Kurowski,[11] Noah D Silverberg [12], Barry Willer,[13] Paul E Ronksley,[14] Kathryn J Schneider [15]

Use of Graded Exercise Testing in Concussion and Return-to-Activity Management

John J. Leddy, MD, FACSM FACP[1] and Barry Willer, PhD[2]

Exercise is Medicine for Concussion

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Michael Ellis, M.D. FRCSC, and
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Barry S. Willer, Ph.D.
University at Buffalo Department of Psychiatry, State University of New York at Buffalo, Buffalo, NY –

Relative Rest

- Mild symptoms are okay.
- Early walking and light daily activities are encouraged.

Stage 2 after 48 hours.

Aerobic Training

- Regular endurance training 5–7 times per week
- Ensure maximum cardiovascular capacity
- Early initiation of vestibular, cervicogenic, and visual rehabilitation

Stage 3 when full cardiovascular capacity is ensured.

Sport-Specific Training

Restricted Team Training

Team Training

Match

STAGE 1	**REST, NO SPORTS, "BRAIN RESET"** Until complete disappearance of all symptoms. Ideally rest and sleep, no mental work or strain whatsoever. 'Switch off and reset' the brain. No school attendance either, refrain from driving a vehicle. Consult a doctor if symptoms increase. **Only once completely symptom-free, proceed to Stage 2 the following day!**
STAGE 2	**Light, short AEROBIC TRAINING** Light cardiovascular exercise: e.g., 15 minutes on a stationary bike with a pulse up to 125 per minute. Preferably no jogging due to the shaking movement for the head. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated. **Only once completely symptom-free, proceed to Stage 3 the following day!**
STAGE 3	**Sport-specific interval training** Initial attempt at interval training for circulation and head. Warm up and, under supervision, complete a 'Hürtmann' (line sprint). In addition, technical training and strength training (strength endurance) are allowed. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated. Only once completely symptom-free, proceed to Stage 4 the following day!
STAGE 4	**Team training WITHOUT physical contact** Participation in regular team training, but without any physical contact! (Wearing a 'yellow' bib as a warning signal for teammates). If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated. Only once completely symptom-free, proceed to Stage 5 the following day!
STAGE 5	**Regular team training** Participation in regular team training, possibly with additional interval or skills sessions with the coach at the end. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated. Only once completely symptom-free, proceed to Stage 6 the following day!"
STAGE 6	**Match** Match possible, but clearly declared as the final stage of the build-up program. In case of symptoms or overload, stop immediately. So, from the day of the accident, at least 6 days must pass before being match-fit! This is the minimum time required for the recovery of the nerve cells...

Relative Rest

- Mild symptoms are okay.
- Early walking and light daily activities are encouraged.

Stage 2 after 48 hours.

Aerobic Training

- Regular endurance training 5–7 times per week
- Ensure maximum cardiovascular capacity
- Early initiation of vestibular, cervicogenic, and visual rehabilitation

Stage 3 when full cardiovascular capacity is ensured.

Sport-Specific Training

Restricted Team Training

Team Training

Match

STAGE 1

REST, NO SPORTS, "BRAIN RESET"

Until complete disappearance of all symptoms. Ideally rest and sleep, no mental work or strain whatsoever. 'Switch off and reset' the brain. No school attendance either, refrain from driving a vehicle. Consult a doctor if symptoms increase.

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Light, short AEROBIC TRAINING

Light cardiovascular exercise: e.g., 15 minutes on a stationary bike with a pulse up to 125 per minute. Preferably no jogging due to the shaking movement for the head. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated.

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Team training WITHOUT physical contact

Participation in regular team training, but without any physical contact! (Wearing a 'yellow' bib as a warning signal for teammates). If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated.

Only once completely symptom-free, proceed to Stage 5 the following day!

STAGE 5

Regular team training

Participation in regular team training, possibly with additional interval or skills sessions with the coach at the end. If symptoms reoccur, remain at this stage also on the following day. Try again until the stage is well tolerated.

Only once completely symptom-free, proceed to Stage 6 the following day!"

STAGE 6

Match

Match possible, but clearly declared as the final stage of the build-up program. In case of symptoms or overload, stop immediately.

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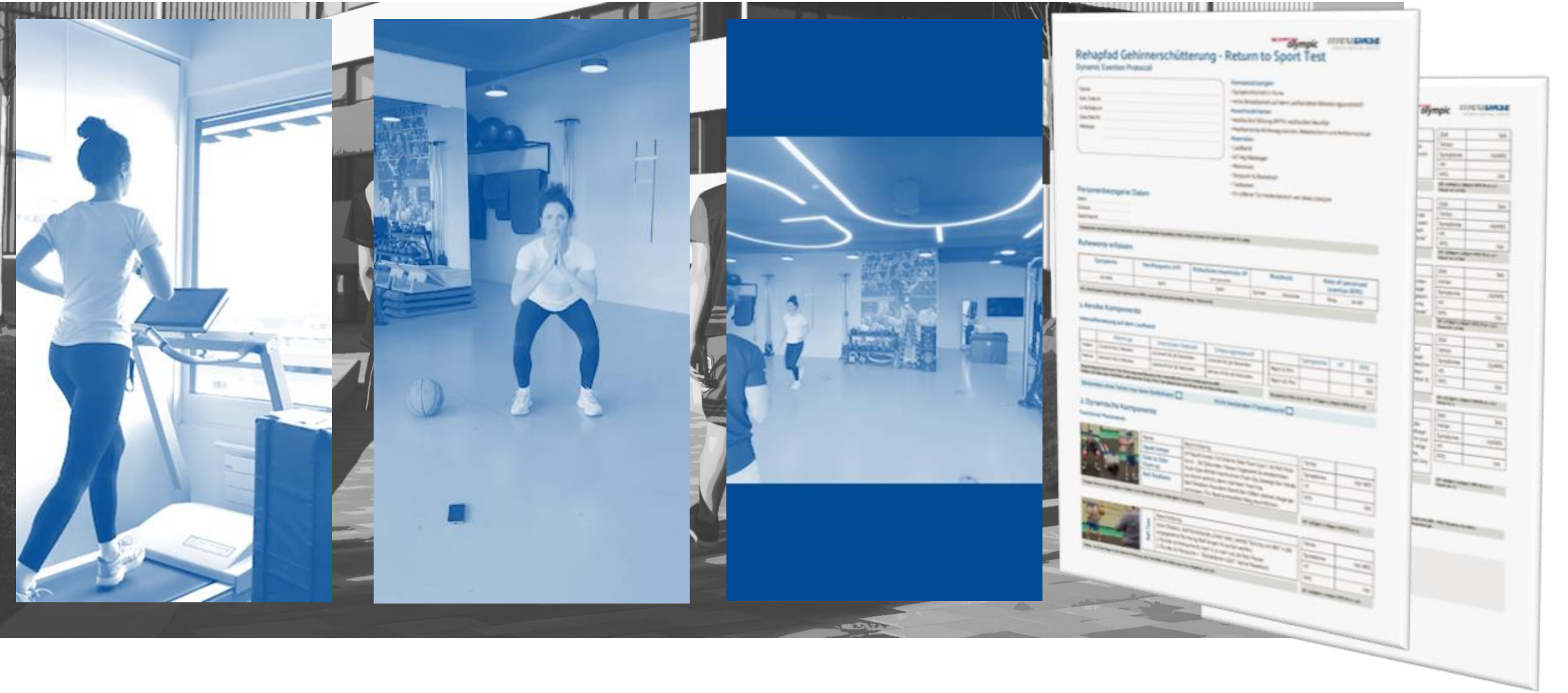
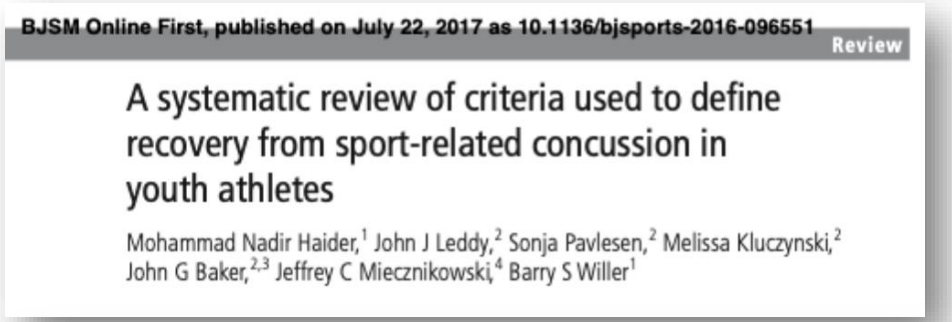
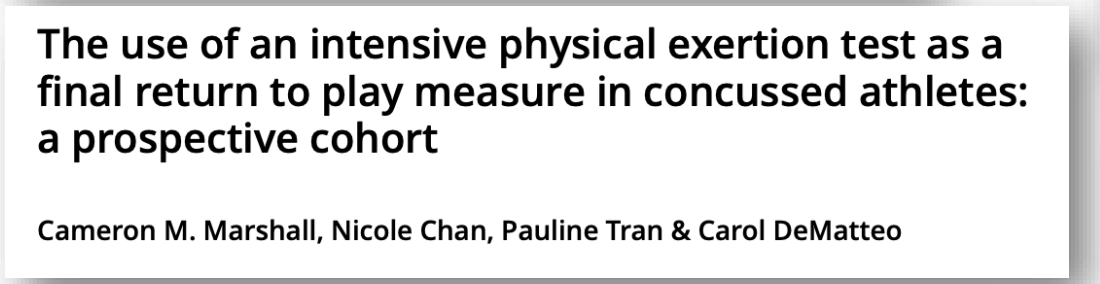
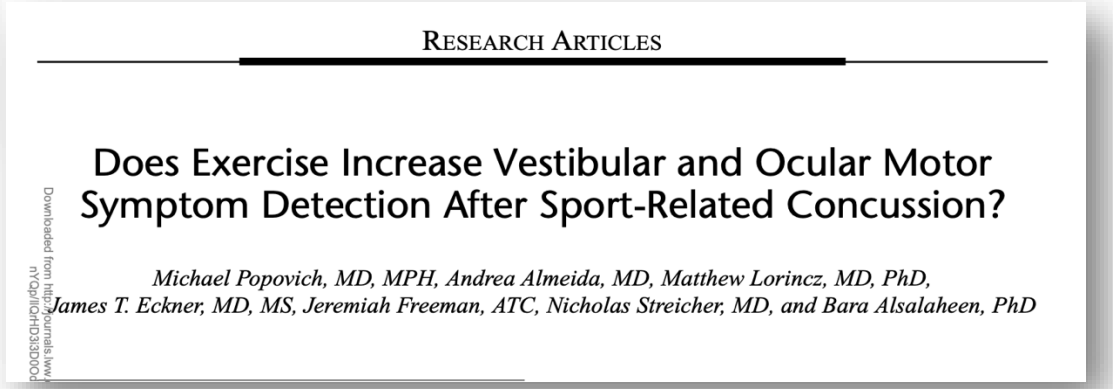
PHASE 3 – RETURN TO SPORT TESTING



EVIDENCE - RETURN TO SPORT TESTING







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Sport-Specific Training

- Strength training allowed
- Training away from the team allowed (psychologically important).

Stage 4 upon passing the return-to-sport test and no symptom provoation during 24 hours.

Restricted Team Training

Team Training

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Restricted Team Training

Refer to Stage 4 (old schema)

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CLEAR CRITERIA TO BE MET

PROTECT THE ATHLETE

EARLY VESTIBULAR, VISUAL, AND CERVICOGENIC REHABILITATION

TREAT SYMPTOMS

RETURN TO SPORT TEST

SAFE RETURN TO SPORT

RELATIVE REST INSTEAD OF ABSOLUTE REST

AVOID PERSISTING SYMPTOMS

Merci beaucoup, vielen Dank!