Barmelweid-Akademie

Die verschiedenen Indikationen zur pulmonalen Rehabilitation

Kardiovaskuläre und pulmonale Rehabilitation: «State of the Art», 20. Juni 2019

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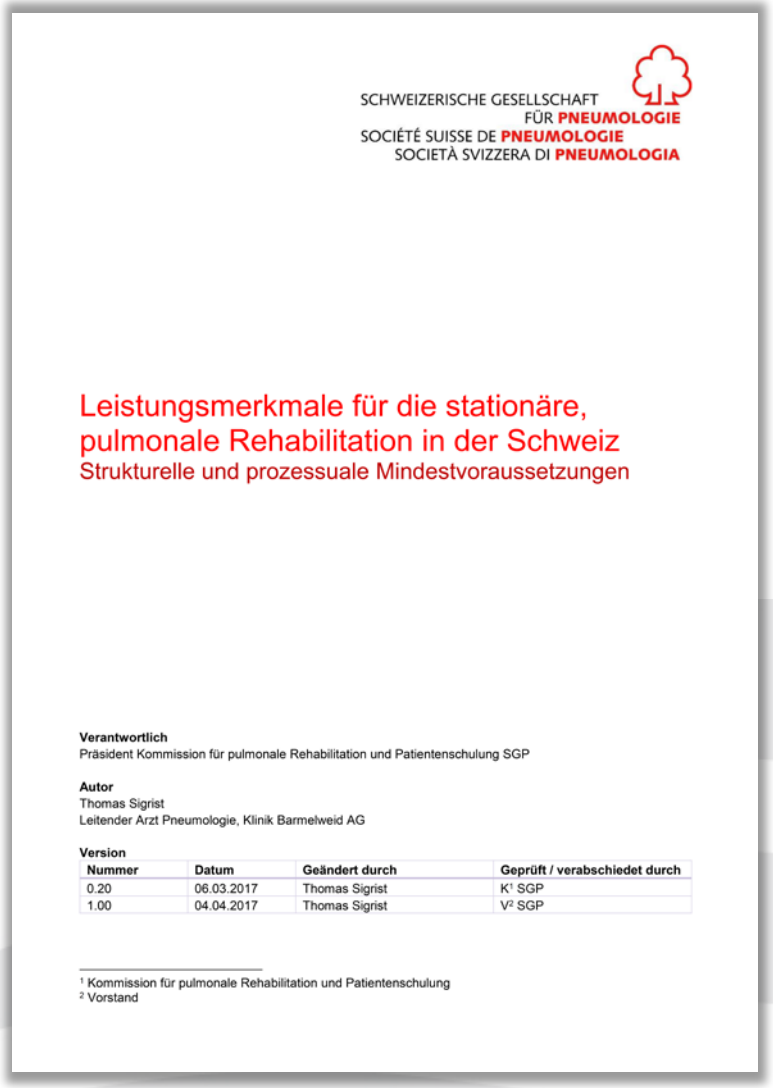
Facharzt für Pneumologie, Facharzt für Innere Medizin / MAS Managed Health Care / CAS Philosophie + Medizin

Indikationsliste SGP

Mit der Behandlung "pulmonale Rehabilitation" sollen Patienten mit Krankheiten aus unten aufgeführten Diagnosegruppen therapiert werden:

- Chronisch-obstruktive Lungenkrankheit (J40-J44)
- Cystische Fibrose (E84)
- Asthma bronchiale (J45)
- Interstitielle Lungenkrankheiten (J80-J84)
- Thoraxwand- und Atemmuskelkrankheiten (M40, M41, G71, G72)
- Andere chronische Lungenkrankheiten (J98, J99) (auch mit mechanischen Atemhilfen)
- Prä- und postoperativ bei Lungenoperationen (J95)
- St. n. Pneumonien (J09-J18)
- Respiratorische Insuffizienz (J96)
- Pulmonale Hypertonie (I27)
- Lungenembolie (I26)
- Lungenkrebs (C34), andere Tumoren mit Lungenmetastasen prä- und postoperativ
- Schlafbezogene Atemstörungen (G47.3, E66.2)
- Empyem, Chylothorax (J86)
- Mesotheliom (C45)
- Akute Infektionen (z.B. J20/J06)
- Verletzungen intrathorakaler Organe (S27/S21)



SCHWEIZERISCHE GESELLSCHAFT FÜR PNEUMOLOGIE
SOCIÉTÉ SUISSE DE PNEUMOLOGIE
SOCIETÀ SVIZZERA DI PNEUMOLOGIA

Leistungsmerkmale für die stationäre, pulmonale Rehabilitation in der Schweiz
Strukturelle und prozessuale Mindestvoraussetzungen

Verantwortlich
Präsident Kommission für pulmonale Rehabilitation und Patientenschulung SGP

Autor
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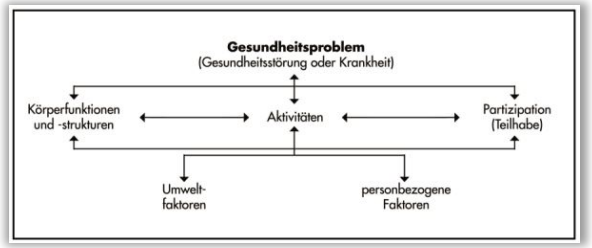
Version

Nummer	Datum	Geändert durch	Geprüft / verabschiedet durch
0.20	06.03.2017	Thomas Sigrist	K[1] SGP
1.00	04.04.2017	Thomas Sigrist	V[2] SGP

[1] Kommission für pulmonale Rehabilitation und Patientenschulung
[2] Vorstand

Chronisch-obstruktive Pneumopathie



Diagnose

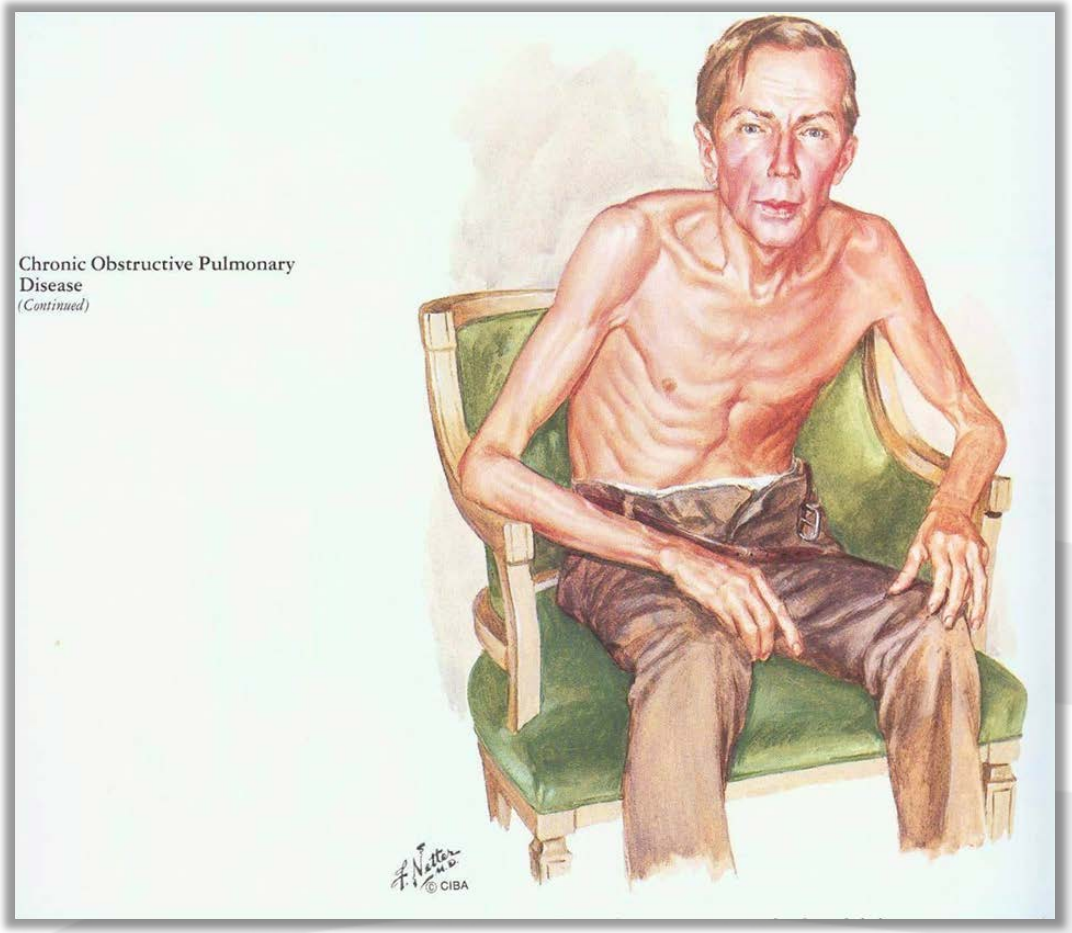
Dyspnoe
bronchitische Symptome
oxygenatorische / ventilatorische Insuffizienz
Muskel – Ernährung – Psyche
….

COPD-Einteilungen

Verschiedene Strategien die COPD einzuteilen, zu klassifizieren bzw. gruppieren

	Goal	Advantages	Shortcomings	Heterogeneity	Complexity
GOLD	Classification of COPD based on the degree of airflow obstruction (up to 2011), in combination with symptoms/ exacerbations (2011–2017), or symptoms/ exacerbations only (2017)	From an FEV1 centric view to a more extensive approach and a more prominent role of symptoms/individual measures [13]	Parameters assessing COPD severity still very limited; ignoring variability and unpredictability of symptoms/exacerbations/ hospitalisations; proposed cut-off points for symptom measures mostly expert driven	Separation of airflow limitation from clinical parameters (GOLD 2017) [9] clarifies what is being evaluated and ranked and might facilitate more precise treatment	Not addressed
Multidimensional indices	Prognostic indices to predict survival; screening instruments	As prognostic markers: useful in grouping patients in terms of clinically relevant outcomes [14]; as a screening instrument: multidimensional assessment of COPD [11, 15]	Identification of substitute groups or phenotypes only by selected variables included in the respective index; consist of a limited number of variables; have not been developed to guide future treatment [16]	Multidimensional assessment, including, for example, medical, pathophysiological, symptomatic [14] and/or psychological [15] parameters	Not addressed
Phenotypes	Grouping patients based on certain characteristics	From "blue bloater" and "pink puffer" to complex cluster analyses identifying existing and novel phenotypes	Cluster analyses only moderate reproducibility, clinical application disputable [17], considerable overlap between phenotypes for some specific attributes	As a screening instrument: differentiating between individuals by assessing/ clustering various characteristics	Not addressed
COPD control panel	Assessment of different elements of the disease	Assessing at least three dimensions (severity, activity and impact), can be customised to the need of the patient [18]	Unclear which characteristics should exactly be assessed, which methods, cut-off points, *etc.* should be used	Multidimensional assessment; might serve as a "clinical decision support system" (by selecting/classifying patients)	Not addressed
Treatable traits	Label-free, precision medicine approach	COPD management based on individual treatable characteristics (intra- and extrapulmonary treatable traits, treatable behaviour/ lifestyles (including patients' environment)) [19]	Separate assessment of treatable traits results in fragmented treatment; frequency of assessment and inter-relationships between traits unknown	Assessing heterogeneity by individual unique traits	Not addressed
Pulmonary rehabilitation	Personalised, holistic approach of treatable traits	Comprehensive intervention based on a thorough assessment taking into account the combination and interaction between the (treatment of) individual treatable traits [20]	Applicability in routine clinical practice (dependent on organisational structure, facilities, workforce, funding, *etc.*) is challenging; poor referral and compliance; not all traits are always addressed (yet); mostly non-pharmacological generic interventions	Assessing heterogeneity by individual unique traits	Assessment of complex interactions of physical, psychological, social and environmental factors by dedicated, transdisciplinary teams being able to respond flexibly as well as accept unpredictability and non-linear outcomes [21]

GOLD: Global initiative for chronic Obstructive Lung Disease; FEV1: forced expiratory volume in 1 s.

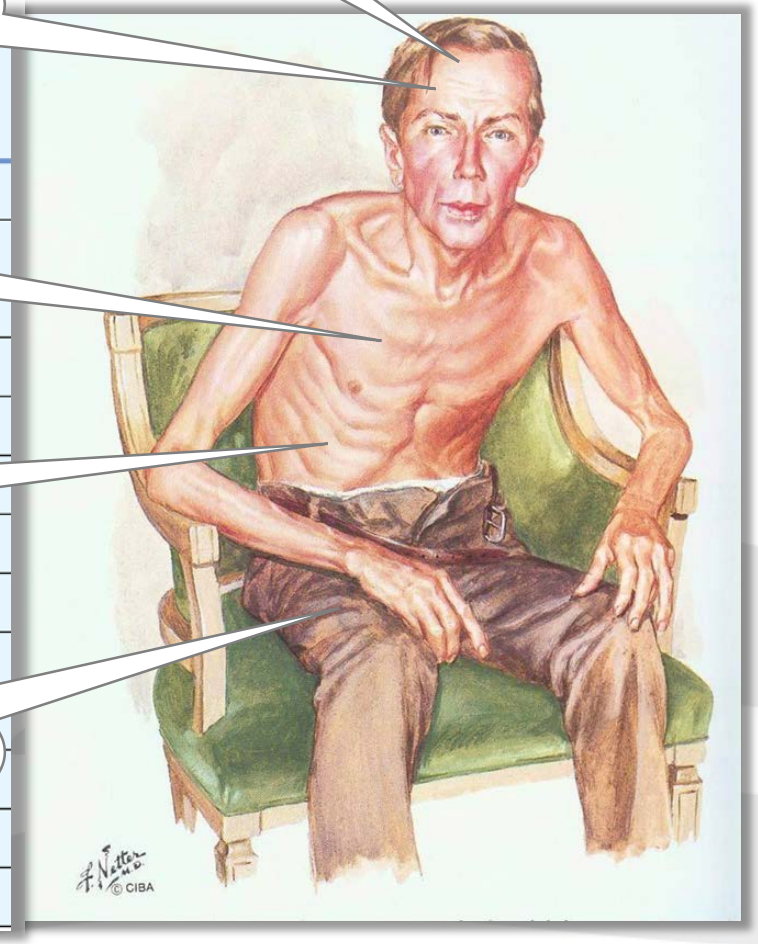


Houben, COPD stands for complex obstructive pulmonary disease, Eur Respir Rev 2018; 27: 180027

COPD-Outcome der PR: Patientensicht

Outcome	Systematischer Review	Minimaler patientenrelevanter Effekt	Differenz mit und ohne Rehabilitation Effekt (95%-KI); p-Wert
Lebensqualität (SGRQ)	Lacasse [7]	–4	–6,1 –0,00003
Symptome (SGRQ)	Lacasse [7]	–4	–
Atemnot (CRQ)	Lacasse [7]	0,5	1,06 (0, ,00001
Erschöpfung (CRQ)	Lacasse [7]	0,5	0,92 (0,71–1,13); p<0,00001
Depression	Coventry [9]	–0,2	–0,47 (– 0,16); p=0,003
Angst	Coventry [9]	–0,2	–
Emotionale Funktion (CRQ)	Lacasse [7]	0,5	0, 01
Aktivität (SGRQ)	Lacasse [7]	–4	–4,78 (–7,83––1,72); p=0,002
Körperliche Aktivität	Ng [10]	n. a.	Keine Metaanalyse
Krankheitsbewältigung (CRQ)	Lacasse [7]	0,5	0,97 (0,74
Einfluss auf den Alltag (SGRQ)	Lacasse [7]	–4	–6,27 (–1
6-Minuten-Gehtdistanz (Meter)	Lacasse [7]	30 m	48 m (32–65); p<0,00001
Maximale Leistungsfähigkeit (Watt)	Lacasse [7]	4 W	8,4 W (3,5–13,4); p=0,0009

Puhan, M. (2015). Pulmonale Rehabilitation, vom "gefährlichen" Training zum Wegbereiter des modernen COPD-Managements. Der Pneumologe, S. 200



modifiziert durch TS nach Casaburi, R. (2009). Pulmonary rehabilitation for management of chronic obstrucitve pulmonary disease. New england journal of medicine.

Klassische Programmelemente PR bei COPD

- Körperliches Training
  - Ausdauertraining: Dauertraining vs. Intervalltraining, Gehtraining vs. Fahrradtraining
  - Krafttraining
- Ernährungstherapie (BMI <18kgm^2 / >25kg/m^2 beziehungsweise < 21kg/m^2 <)
- Patientenschulung
- Atemphysiotherapie: Atemtechniken
  (Lippenbremse, Atemkontrolle zur Senkung der Atemfrequenz, Erhöhung des Atemzugvolumens, Zwerchfellatmung, aktive Exspiration)
- Sekretmobilisation
  - Husten, Huffing, Active Cycle of breathing techniques (ACBT), autogene Drainage
  - Hilfsmittel: Positive-Exspratory Pressure-Systeme, Vibrationssysteme, Bronchialtoilette
- Weichteilbehandlung der respiratorischen Muskulatur

Krankenversicherungsgesetzt: WZW ☺

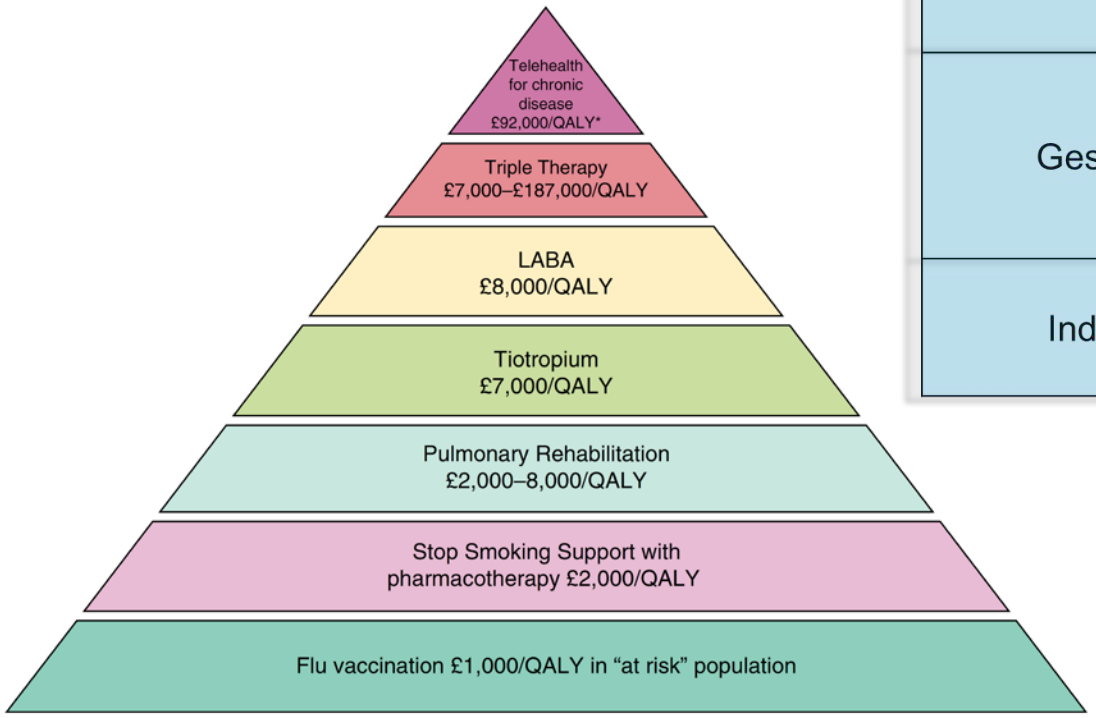


Figure 1. Cost-effectiveness of pulmonary rehabilitation relative to other treatments for chronic obstructive pulmonary disease. Reprinted from Reference 96. *Cost per quality-adjusted life year (QALY). LABA = long-acting β-agonist.

Rochester, An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation, Am J Respir Crit Care Med Vol 192, Iss 11, pp 1373–1386, Dec 1, 2015

	Kann es funktionieren?	Wie ist das Kosten-Nutzen-Verhältnis?
Gesellschaft	**Wirksamkeit** ✓ objektiv geeignet, auf den Nutzen hinzuwirken (kausale Verknüpfung von medizinischer Massnahme und medizinischem Erfolg)	**Wirtschaftlichkeit** ✓ zweckmässige Massnahme, mit der ein vergleichbarer medizinischer Nutzen kostengünstiger erreicht werden kann, als mit einer Alternative
Individuum	**Zweckmässigkeit** ✓ wirksame Massnahme, welche notwendig ist und den besten diagnostischen und therapeutischen Nutzen aufweist (= medizinische Indikation)	

Kapitel 11 der Verordnung des EDI über Leistungen in der obligatorischen Krankenpflegeversicherung (Krankenpflegeleistungsverordnung, KLV) vom 29. September 1995 (Stand am 3. August 2017)

Asthma bronchiale: gleich wie COPD und doch anders

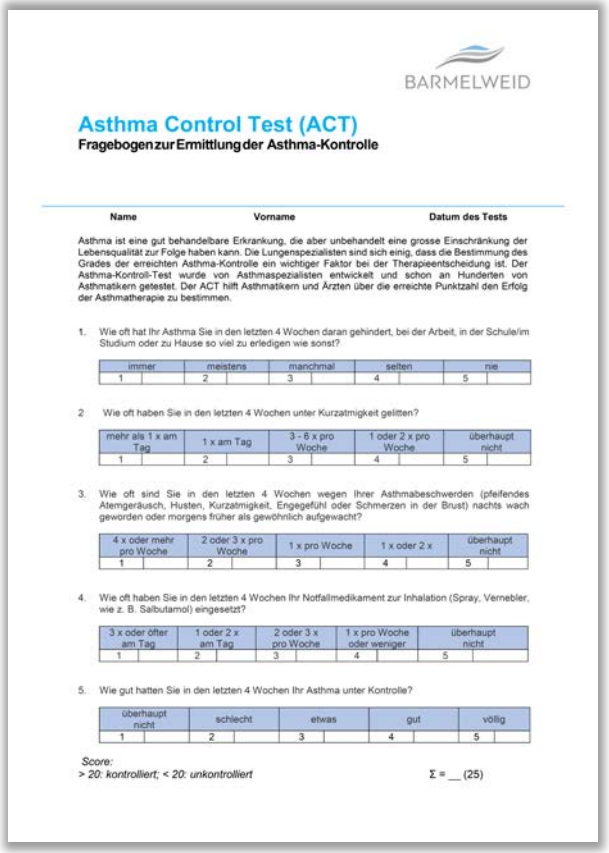
Definition gemäss GINA 2018

"Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation."

Nomenklatur des Asthma bronchiale: Kontrolle

Schweregrad / Kontrolle

- Leichtes (Therapiestufe 1 und 2) / schweres (Therapiestufe 4 und 5)
- un- / teil- / voll kontrolliertes Asthma bronchiale



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Asthma Control Test (ACT)

Fragebogen zur Ermittlung der Asthma-Kontrolle

Name | Vorname | Datum des Tests

Asthma ist eine gut behandelbare Erkrankung, die aber unbehandelt eine grosse Einschränkung der Lebensqualität zur Folge haben kann. Die Lungenspezialisten sind sich einig, dass die Bestimmung des Grades der erreichten Asthma-Kontrolle ein wichtiger Faktor bei der Therapieentscheidung ist. Der Asthma-Kontroll-Test wurde von Asthmaspezialisten entwickelt und schon an Hunderten von Asthmatikern getestet. Der ACT hilft Asthmatikern und Ärzten über die erreichte Punktzahl den Erfolg der Asthmatherapie zu bestimmen.

1. Wie oft hat Ihr Asthma Sie in den letzten 4 Wochen daran gehindert, bei der Arbeit, in der Schule/im Studium oder zu Hause so viel zu erledigen wie sonst?

immer	meistens	manchmal	selten	nie
1	2	3	4	5

2. Wie oft haben Sie in den letzten 4 Wochen unter Kurzatmigkeit gelitten?

mehr als 1 x am Tag	1 x am Tag	3 - 6 x pro Woche	1 oder 2 x pro Woche	überhaupt nicht
1	2	3	4	5

3. Wie oft sind Sie in den letzten 4 Wochen wegen Ihrer Asthmabeschwerden (pfeifendes Atemgeräusch, Husten, Kurzatmigkeit, Engegefühl oder Schmerzen in der Brust) nachts wach geworden oder morgens früher als gewöhnlich aufgewacht?

4 x oder mehr pro Woche	2 oder 3 x pro Woche	1 x pro Woche	1 x oder 2 x	überhaupt nicht
1	2	3	4	5

4. Wie oft haben Sie in den letzten 4 Wochen Ihr Notfallmedikament zur Inhalation (Spray, Vernebler, wie z. B. Salbutamol) eingesetzt?

3 x oder öfter am Tag	1 oder 2 x am Tag	2 oder 3 x pro Woche	1 x pro Woche oder weniger	überhaupt nicht
1	2	3	4	5

5. Wie gut hatten Sie in den letzten 4 Wochen Ihr Asthma unter Kontrolle?

überhaupt nicht	schlecht	etwas	gut	völlig
1	2	3	4	5

Score:
> 20: kontrolliert; < 20: unkontrolliert

Σ = __ (25)

Kontrolliertes Asthma	Tiefst mögliche Stufe suchen
Teilkontrolliertes Asthma	Empfohlen Stufe zu erhöhen
Unkontrolliertes Asthma	Stufe ist zu erhöhen
Exazerbation	Behandlung der Exazerbation

Stufe 1	**Stufe 2**	**Stufe 3**	**Stufe 4**	**Stufe 5**
Patientenschulung und Kontrolle der Umgebung				
RABA bei Bedarf				
	Wähle eines	*Wähle eines*	*Zusätzlich zu Stufe 3 zu wählen*	*Zusätzlich zu Stufe 4 zu wählen*
	Niedrig dosiert ICS	Niedrig dosiert ICS und LABA	Mittel oder hoch dosiert ICS +LABA	Orale Steroide (niedrigst dosiert)
	Leukotrien-antagonist	Mittel oder hoch dosiert ICS Niedrig dosiert ICS + Leukotrien-antagonist	Leukotrienantagonist Theophyllin	Anti-IgE Anti-IL5
		Niedrig dosiert ICS und Theophylline		

Nomenklatur des Asthma bronchiale: Ätiologie

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Attribute

- Ätiologische Attribute
  - Allergisches (extrinsisches)
  - Nicht-allergisches (intrinsisches)

- Biomarker-assoziierte Attribute (→ Therapie!)
  - T_H2-Asthma (eosinophiles Asthma)
  - non-T_H2-Asthma (neutrophiles Asthma)

Biomarker-assoziierte Attribute

Tab. 1 Pathophysiologische und klinische Charakteristika der T_H2- und Non-T_H2-Entzündung bei Asthma bronchiale. (Adaptiert nach [8, 9])

T_H2-Asthma	**Non-T_H2-Asthma**
T_H2-Zytokin-Expressionsmuster in den Atemwegen (v. a. IL-5, IL-13)	z. B. T_H17-Zytokin-Expressionsmuster in den Atemwegen (IL-17)
Eosinophilie (lokal in den Atemwegen und systemisch)	Keine Eosinophilie (neutrophile, gemischte, oder paucigranulozytäre Atemwegsentzündung)
Häufig gutes therapeutisches Ansprechen auf Steroide	Schlechteres therapeutisches Ansprechen auf Steroide
Therapeutisches Ansprechen auf Inhibitoren der Typ-2-Entzündungskaskade	Fehlendes therapeutisches Ansprechen auf Inhibitoren der Typ-2-Entzündungskaskade

Bahmer, T. (2016). Asthma bronchiale – Aktuelle Diagnostik und Therapie. Der Pneumologe, S. 428

Nomenklatur des Asthma bronchiale: Manifestation

(symptombasiert und Trigger-assoziiert)

- Kälteinduziertes Asthma bronchiale
- Nächtliches Asthma bronchiale
- Hustenvarianten Asthma (cough variant asthma)
- Sinubronchiales Syndrom
- Difficult to treat asthma
- Schweres (therapierefraktäres) Asthma bronchiale
- Anstrengungsinduziertes Asthma bronchiale (Exercise-Induced Asthma – **EIA**)

Asthma bronchiale: gleich wie COPD und doch anders

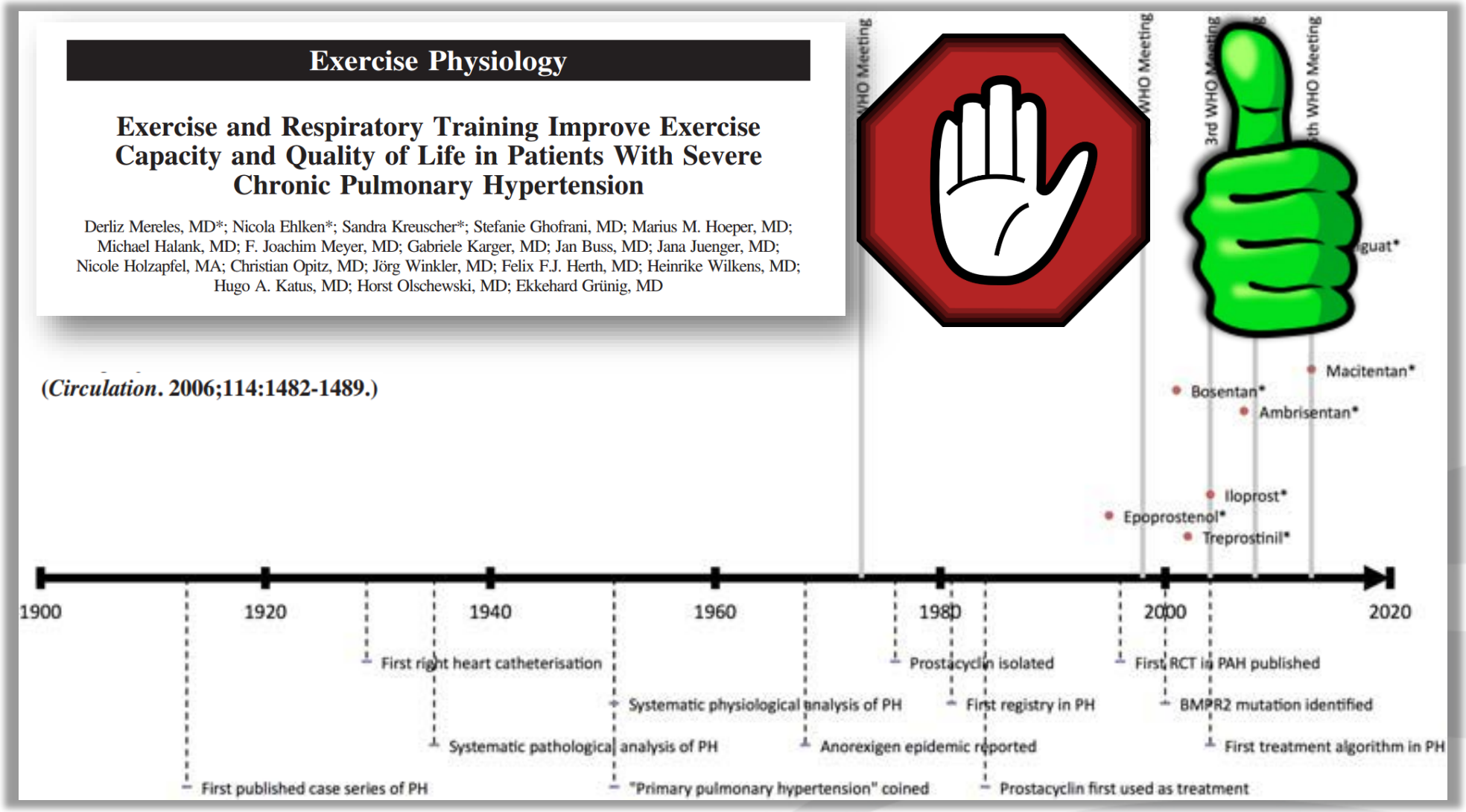
- Jüngere Patienten mit ausgeprägter bronchialer Hyperreaktivität vs. ältere Patienten mit fixierter Obstruktion
- Anstrenungsinduzierte Komponente und körperliches Training
- Allergenkarenz inkl. Arbeitsplatzexposition / Arbeitsfähigkeit
- Patientenschulung: Kompetenzförderung, Selbstkontrolle und effektives Selbstmanagement

Pulmonale Hypertonie (PH)

*„It is commonly believed that physical activity or training may have a **negative** impact on patients by contributing to the evolution and progression of PH.“*

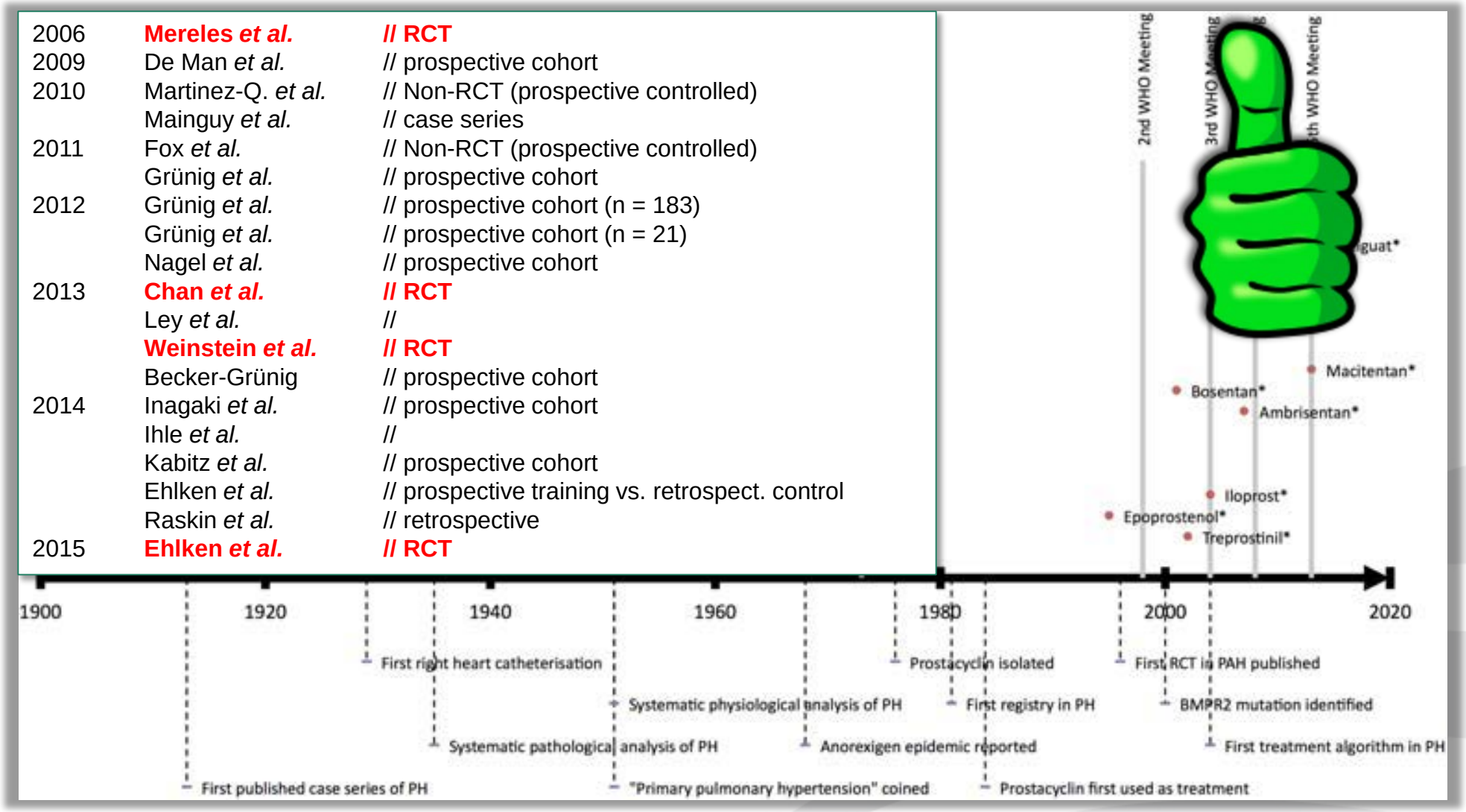
Circulation. Volume 114(14):1482-1489. October 3, 2006

Entwicklung der PR bei PH

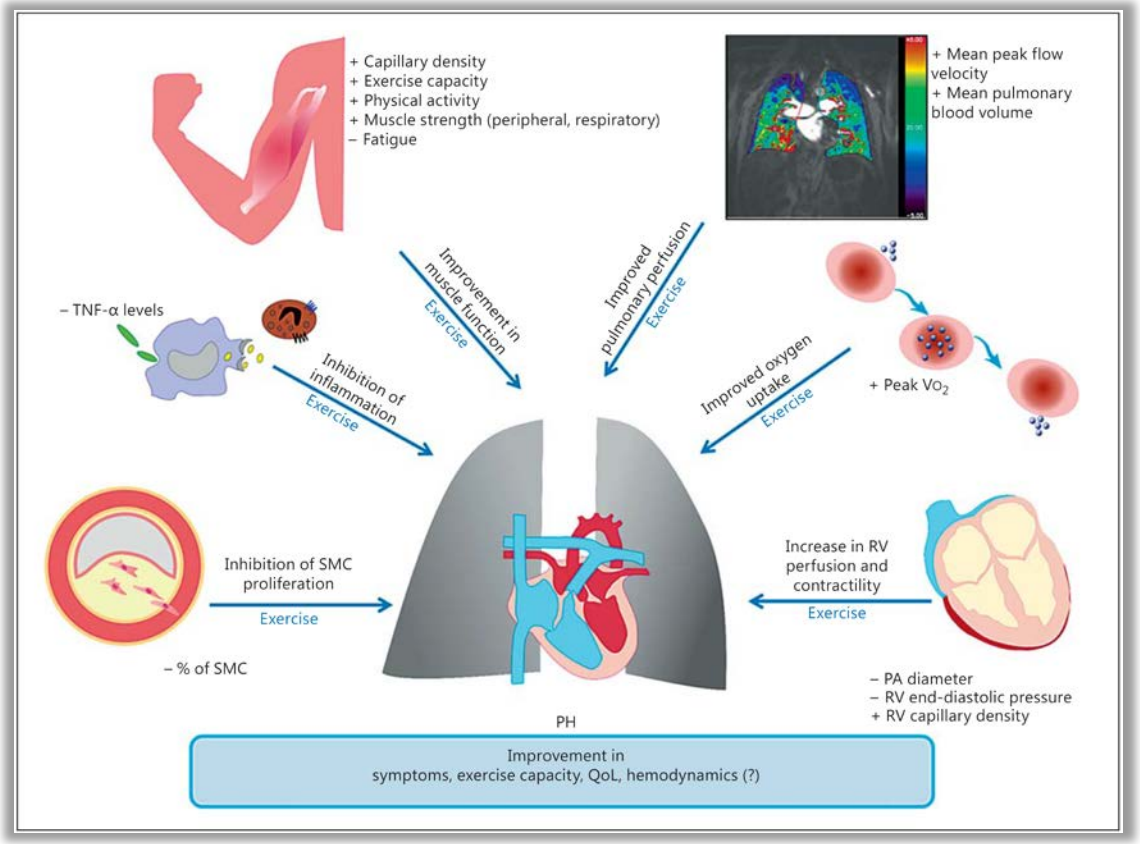


Entwicklung der PR bei PH

2006	**Mereles *et al.***	**// RCT**
2009	De Man *et al.*	// prospective cohort
2010	Martinez-Q. *et al.*	// Non-RCT (prospective controlled)
	Mainguy *et al.*	// case series
2011	Fox *et al.*	// Non-RCT (prospective controlled)
	Grünig *et al.*	// prospective cohort
2012	Grünig *et al.*	// prospective cohort (n = 183)
	Grünig *et al.*	// prospective cohort (n = 21)
	Nagel *et al.*	// prospective cohort
2013	**Chan *et al.***	**// RCT**
	Ley *et al.*	//
	Weinstein *et al.*	**// RCT**
	Becker-Grünig	// prospective cohort
2014	Inagaki *et al.*	// prospective cohort
	Ihle *et al.*	//
	Kabitz *et al.*	// prospective cohort
	Ehlken *et al.*	// prospective training vs. retrospect. control
	Raskin *et al.*	// retrospective
2015	**Ehlken *et al.***	**// RCT**



Effekte der PR bei PAH-Patienten und Empfehlungen der SSPH



Marra a., Principles of rehabilitation and reactivation: pulmonary hypertension. Respiration. 2015;89(4):265-73. doi: 10.1159/000371855. Epub 2015 Feb 13

Swiss Society for Pulmonary Hypertension SSPH
Schweizerische Gesellschaft für Pulmonale Hypertonie SGPH
Société Suisse pour l'Hypertension Pulmonaire SSHP
Società Svizzera per l'Ipertensione Polmonare SSIP

It is recommended

- **To practice physical activity** that causes only slight breathlessness without any other symptoms (chest pain, fainting, severe dyspnea) [Class of recommendation **IIa**, level of evidence **B**].
- For PAH patients with physical deconditioning to consider supervised **exercise rehabilitation in a competence centre for PAH** [**IIa, B**].
- (…)

It should be avoided

- To perform physical activity that leads to distressing symptoms [III, C].
- To use sauna, hamman or hot showers since it can lead to acute circulatory failure and sudden death [III, C].
- (…)

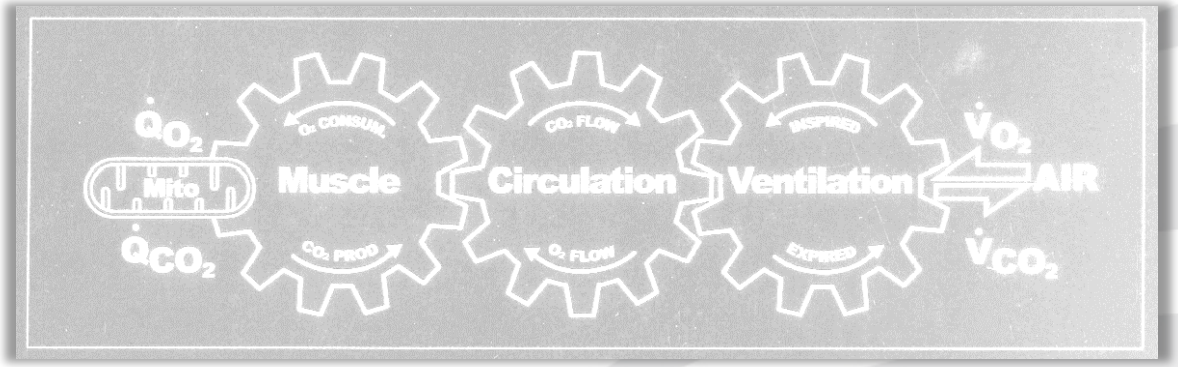
Interstitielle Pneumopathien: Erkenntnisse

Pulmonary Rehabilitation for Exercise Tolerance and Quality of Life in IPF Patients: A Systematic Review and Meta-Analysis

Xueqing Yu BioMed Research International Volume 2019, Article ID 8498603, 9 pages https://doi.org/10.1155/2019/8498603

Conclusions:

This study suggests that PR **may enhance exercise capacity** and **improve quality of life** in IPF patients. Besides, PR **may also delay the decline of lung function** of patients with IPF. However, further research should more fully assess the **efficacy** and safety of PR for IPF.



Interstitielle Pneumopathien: Erkenntnisse

Table 1: Characteristics of the studies included in the review.

Author year	Country	Study design	No. of patients (n)	Gender (M/F)	Age	Duration	Program of PR	CG group	Outcomes
Vainshelboim et al. 2016[16]	Israel	RCTs, 2arms	32 PR 15 CG 17	PR 10/5 CG 11/6	PR 68.8±6 CG 66±9	12-week	Aerobic, Resistance, Flexibility exercise, Modes and deep breathing exercises	Regular care	FVC%%, DLCO%%, 6MWD, IPAQ SGRQ scores
Vainshelboim et al. 2015[17]	Israel	RCTs, 2arms	28 PR 14 CG 14	/	PR 68.8±6 CG 66±9	11-month follow-up	Aerobic, Resistance, Flexibility exercise, Modes and deep breathing exercises	Regular care	FVC%%, DLCO%%, 6MWD, SGRQ scores, IPAQ
He et al. 2016[18]	China	RCTs, 2arms	30 PR 15 CG 15	PR 9/6 CG 8/7	PR 64.87±7.36 CG 65.33±7.74	12-week	Cycle ergometer	Regular care	FVC%%, DLCO%%, 6MWD, TLC%, ATAQ-IPF scores
Gaunaurd et al.2014[19]	America	RCTs, 2arms	21 PR 11 CG 10	/	PR 71±6 CG 66±7	12 weeks 3-month follow-up	Educational lectures, Supervised aerobic, Strengthening exercises.	Regular care	IPF-specific SGRQ scores IPAQ, FVC%, DLCO%%
Robert et al. 2014[20]	America	RCTs, 2arms	21 PR 11 CG 10	/	PR 71±6 CG 66±7	12 weeks	Educational lectures, Treadmill walking, Semi recumbent cycling, Self-administered, Flexibility exercises, Strength training	Regular care	6MWD, TLC%
Nishiyama et al. 2008[21]	Japan	RCTs, 2arms	28, PR 13 CG 15	PR 12/1 CG 9/6	PR 68.1±8.9 CG 64.5±9.1	10 weeks	Treadmill, Cycle ergometer test, Supplemental oxygen, Elastic bands, Arm raising, Knee extensions, Educational lectures	Regular care	6MWD, SGRQ scores FVC%, FEV1, TLC, BDI
Dariusz et al. 2008[22]	Poland	RCTs, 2arms	30 PR 16 CG 14	PR 10/6 CG 9/5	PR 56.5 ± 6.5 CG 56.2 ± 7.2	12 weeks	Inspiratory muscle training	Regular care	6MWD, BDI, SF-36

Abbreviations: RCTs: randomized controlled trials; PR: pulmonary rehabilitation; CG: control group; FVC%: forced vital capacity; DLCO%: diffusion capacity for carbon monoxide; 6MWD: six-minute walk; SGRQ: St. George's Respiratory Questionnaire; IPAQ: International Physical Activity Questionnaire; IPF-specific SGRQ: St. George's Respiratory Questionnaire specific for IPF; FEV1: forced expiratory volume in 1 second, test/distance, BDI, baseline dyspnea index; SF-36: social functioning-36.

Interstitielle Pneumopathien: Erkenntnisse

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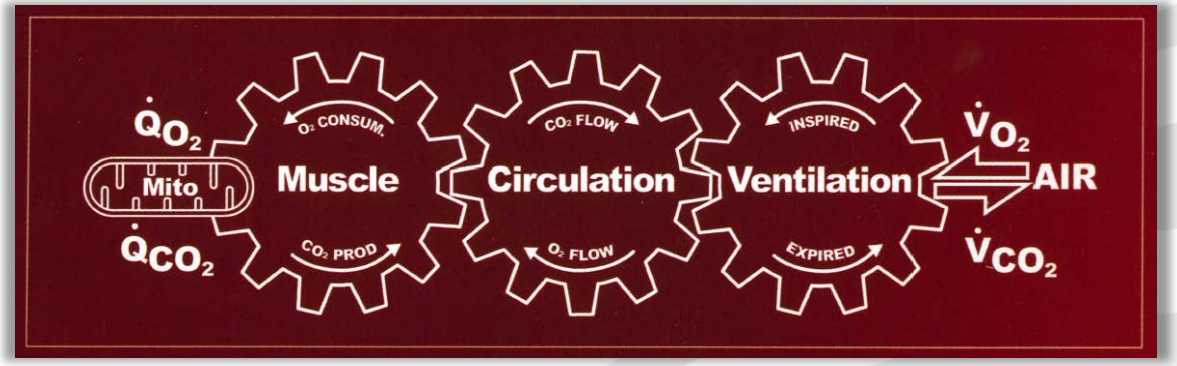
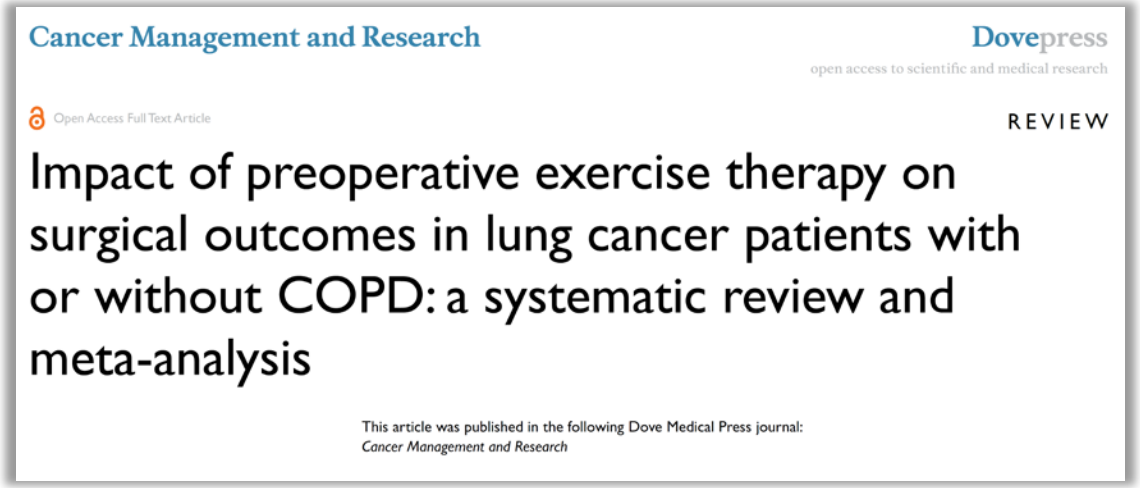


Präoperative pulmonale Rehabilitation (vor Tumorchirurgie)



Cancer Management and Research

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REVIEW

Impact of preoperative exercise therapy on surgical outcomes in lung cancer patients with or without COPD: a systematic review and meta-analysis

This article was published in the following Dove Medical Press journal:
Cancer Management and Research

Xiang Li, 2019

Studies	Participants	Characteristics	I: n (age ± SD) C: n (age ± SD)	Intervention	Outcome measurements	Comparison	Results
	n (male/female)			Treatment			
Lai et al[21]	48 (28/20)	NSCLC (stage I–IV) and COPD; open thoracotomy or VATS	I: 24 (63.13±6.26) C: 24 (64.04±8.94)	Preoperative exercise (7 days) + pharmacotherapy (atomizing terbutaline, budesonide, and infusion of ambroxol) + intense training (respiratory training and endurance training)	PPCs LOS (postoperative) Duration of antibody use	Usual care	Patients in the intervention group had lower incidence of PPCs (8.3%, 2/24 vs 20.8%, 5/24; P=0.416), had shorter postoperative LOS (6.17±2.91 days vs 8.08±2.21 days, P=0.013), and duration of antibody use (3.61±2.53 days vs 5.36±3.12 days, P=0.032)
Pehlivan et al[13]	60 (?/?)	NSCLC (stage IA–IIIB); open thoracotomy or VATS	I: 30 (54.10±8.53) C: 30 (54.76±8.45)	Preoperative exercise (three times a day), according to patient's tolerance to exercise speed and time; during the walking exercise, warm-up and cooldown included	PPCs LOS Pulmonary function	Usual care	Patients in the intervention group had lower incidence of PPCs (3.3%, 1/30 vs 16.6%, 5/30; P=0.04); hospital stay found to be significantly shortened by intensive physical therapy (P<0.001)
Morano et al[14]	24 (9/15)	NSCLC (stage I–IIIA) and COPD; open thoracotomy or VATS	I: 12 (64.8±8) C: 12 (68.8±7.3)	Strength and endurance training; control group (breathing exercises for lung expansion)	PPCs LOS Pulmonary function	Chest physical therapy; CPT – breathing exercises for lung expansion	Patients in the intervention group had lower coincidence of complications (16.7%, 2/12 vs 77%, 7/12; P=0.01) and had shorter LOS (7.8±4.8 vs 12.2±3.6 days)
Benzo et al[19]	19 (9/10) Two patients (one in each arm) were missing LOS data	NSCLC (stage I–IIIA) and COPD; open thoracotomy or VATS	I: 10 (70.2±8.61) C: 9 (72.0±6.69)	Breathing exercise through the device and sustaining that effort as long as they were able, with a goal of 15–20 minutes of daily use; ten face-to-face sessions of treatment in 1 week (twice a day)	PPCs LOS	Usual care	Patients in the intervention group had lower coincidence of complications (33%, 3/9 vs 63%, 5/8; P=0.23), and had shorter LOS (6.3±3.0 vs 11.0±6.3 days)
Sekine et al[22]	82 (76/6)	NSCLC (stage I–IV) or COPD; open thoracotomy	I: 22 (70.4±4.6) C: 60 (69.0±5.5)	Incentive spirometry, abdominal breathing and breathing exercises (with pursed lips, huffing and coughing after nebulizing for 15 minutes with a bronchodilator five times a day), pulmonary exercise for 30 minutes in the rehabilitation room and walking >5,000 steps every day for 2 weeks preoperatively	PPCs LOS	Usual care	Patients in the intervention group had lower coincidence of complications (18.2%, 4/22 vs 28.3%, 17/60), and had shorter LOS (29.0±9.0 vs 21.0±6.8 days; P=0.0003)
Karenovics et al[20] (substudy of Licker et al)	151 (91/60)	NSCLC (stage I–III); open thoracotomy or VATS	I: 74 (64±?) C: 77 (64±?)	5-minute warm-up at 50% peak work rate achieved during CPET; two 10-minute series of 15-second sprint intervals	PPCs LOS in postanesthesia care unit Death	Usual care	Patients in the intervention group had lower coincidence of PPCs (23%, 17/74 vs 44%, 34/77; P=0.018) and a shorter stay in the postanesthesia care unit (median 7 hours, IQ_{25-75} 4–10)
Stefanelli et al[24]	40 (23/17)	NSCLC and COPD; lobectomy	I: 20 (<75) C: 20 (<75)	Group R: intensive preoperative PRP; group S, lobectomy only	VO_2 peak		Peak VO_2 did not change from T0 to T1 and deteriorated significantly from T1 to T2
Karenovics et al[20]	151 (91/60)	NSCLC (stage I–III); open thoracotomy or VATS	I: 74 (64±?) C: 77 (64±?)	5-minute warm-up period at 50% of peak work rate achieved during CPET; two 10-minute series of 15-second sprint intervals	PPCs Pneumonia 6MWD	Usual care	Patients in the intervention group had lower coincidence of PPCs (23%, 27/74 vs 44%, 39/77; P=0.018).

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Abbreviations: 6MWD, 6-minute walking distance; C, control; CPT, chest physical therapy; CPET, cardiopulmonary exercise testing; I, intervention; LOS, length of stay; NSCLC, non-small-cell lung cancer; PRP, pulmonary rehabilitation programme; PPCs, postoperative pulmonary complications; VATS, video-assisted thoracoscopic surgery.

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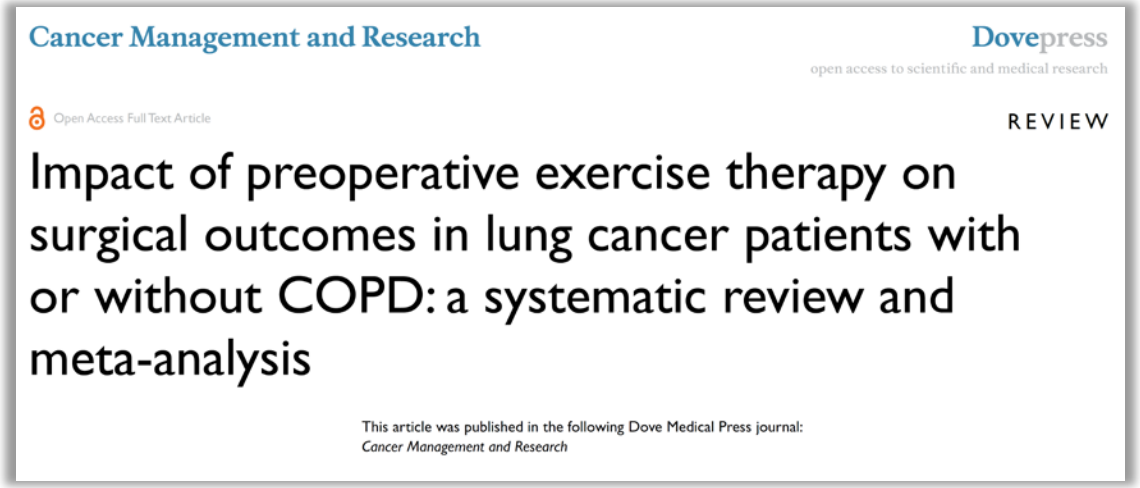
Präoperative pulmonale Rehabilitation (vor Tumorchirurgie)



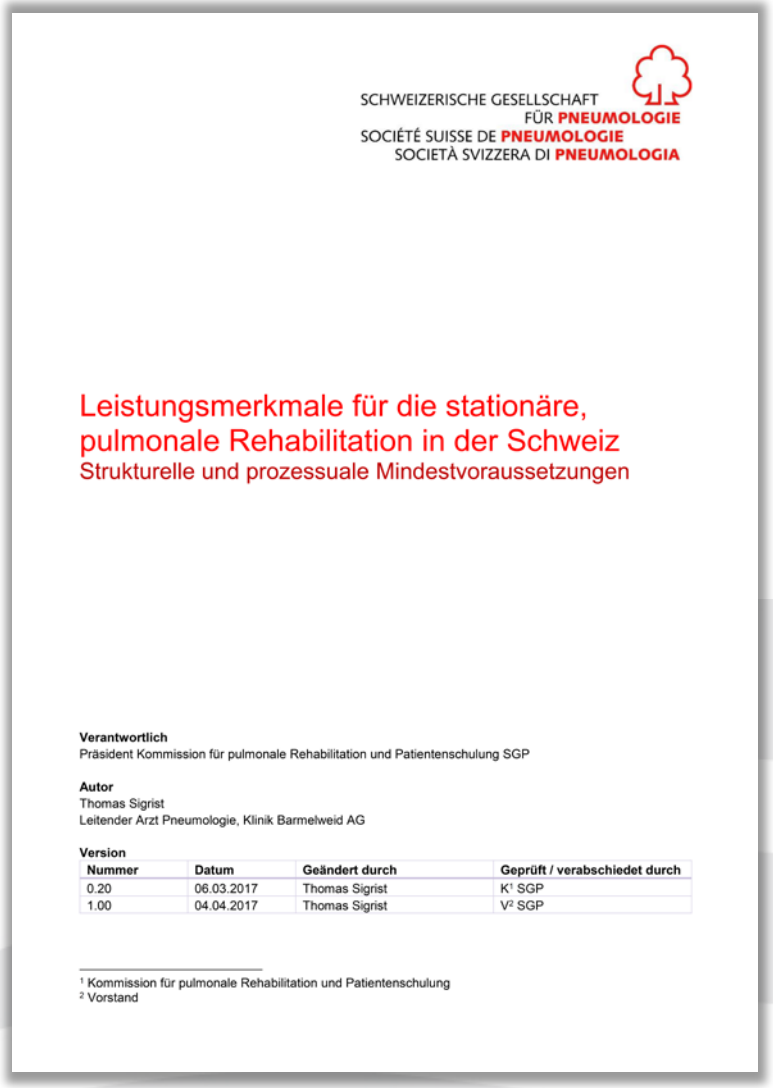
Xiang Li, 2019

- ☺ Reduktion von Komplikationen
- ☺ Raschere postoperative Rekonvaleszenz
- ☹ Dauer?
- ☹ Methodische Elemente?
- ☹ Intensität?
- ☹ Implementierung im Prozess?

Indikationsliste SGP

Mit der Behandlung "pulmonale Rehabilitation" sollen Patienten mit Krankheiten aus unten aufgeführten Diagnosegruppen therapiert werden:

- Chronisch-obstruktive Lungenkrankheit (J40-J44)
- Cystische Fibrose (E84)
- Asthma bronchiale (J45)
- Interstitielle Lungenkrankheiten (J80-J84)
- Thoraxwand- und Atemmuskelkrankheiten (M40, M41, G71, G72)
- Andere chronische Lungenkrankheiten (J98, J99) (auch mit mechanischen Atemhilfen)
- Prä- und postoperativ bei Lungenoperationen (J95)
- St. n. Pneumonien (J09-J18)
- Respiratorische Insuffizienz (J96)
- Pulmonale Hypertonie (I27)
- Lungenembolie (I26)
- Lungenkrebs (C34), andere Tumoren mit Lungenmetastasen prä- und postoperativ
- Schlafbezogene Atemstörungen (G47.3, E66.2)
- Empyem, Chylothorax (J86)
- Mesotheliom (C45)
- Akute Infektionen (z.B. J20/J06)
- Verletzungen intrathorakaler Organe (S27/S21)



SCHWEIZERISCHE GESELLSCHAFT FÜR PNEUMOLOGIE
SOCIÉTÉ SUISSE DE PNEUMOLOGIE
SOCIETÀ SVIZZERA DI PNEUMOLOGIA

Leistungsmerkmale für die stationäre, pulmonale Rehabilitation in der Schweiz
Strukturelle und prozessuale Mindestvoraussetzungen

Verantwortlich
Präsident Kommission für pulmonale Rehabilitation und Patientenschulung SGP

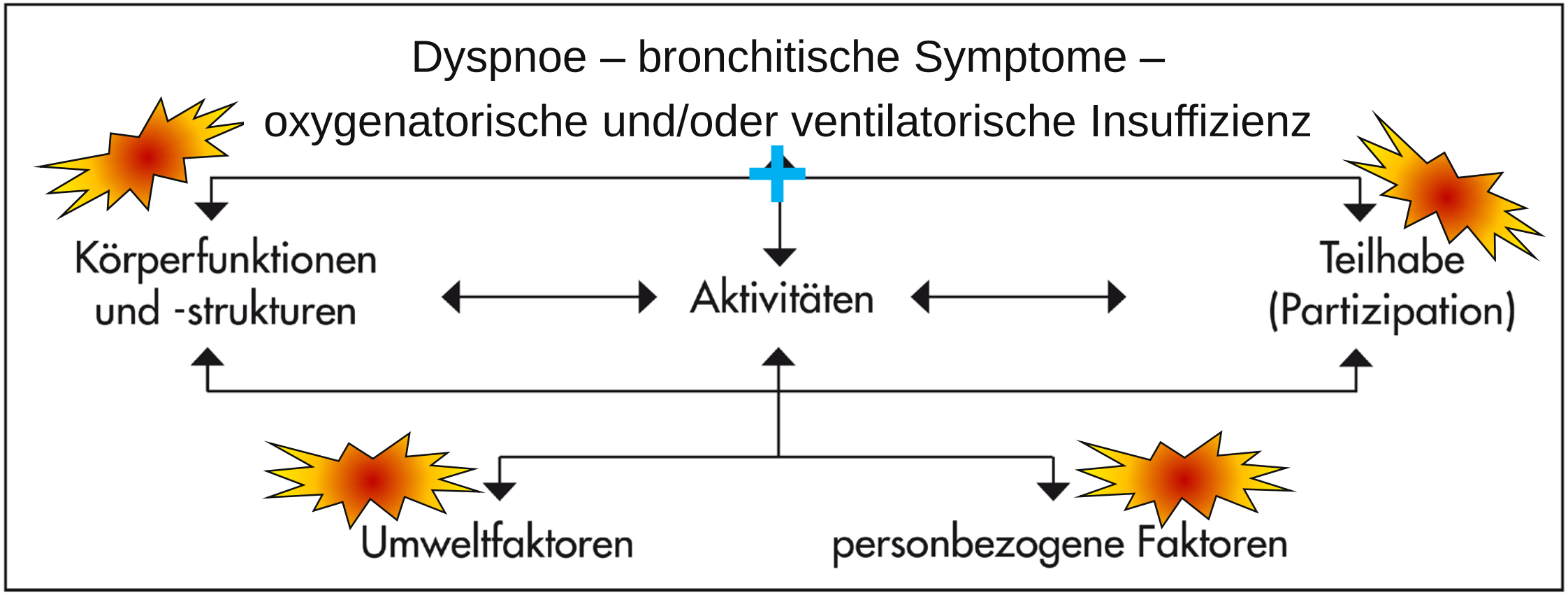
Autor
Thomas Sigrist
Leitender Arzt Pneumologie, Klinik Barmelweid AG

Version

Nummer	Datum	Geändert durch	Geprüft / verabschiedet durch
0.20	06.03.2017	Thomas Sigrist	K[1] SGP
1.00	04.04.2017	Thomas Sigrist	V[2] SGP

[1] Kommission für pulmonale Rehabilitation und Patientenschulung
[2] Vorstand

Indikation zur PR



Pulmonale Rehabilitation

Verschiedenen Indikationen zur pulmonalen Rehabilitation

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