Supplementary material to article by M. S. Sommer et al. et al. "Effect of postsurgical rehabilitation programmes in patients operated for lung cancer: a systematic review and meta-analysis"

Appendix SI. Matrix of the search strategy for MEDLINE via PubMed

"NSCLC"			AND	"Rehabilitation"
Carcinoma, Non-Small-Cell Lung[Mesh] OR nsclc[ti/ab] OR				Motor Activity[Mesh] OR physical activit*[ti/ab] OR motor activit*[ti/ab] OR locomotor activit*[ti/ab] OR exercis*[ti/ab] OR training[ti/ab] OR physical conditioning[ti/ab] OR Rehabilitation[Mesh] OR rehabilitation[ti/ab] OR Sports[Mesh] OR sport*[ti/ab] OR fitness[ti/ab] OR endurance[ti/ab] OR aerobic*[ti/ab] OR Exercise Movement Techniques[Mesh]
non small cell*[ti/ab] OR nonsmall cell*[ti/ab]	AND	lung cancer*[ti/ab] OR lung neoplasm*[ti/ab] OR lung carcinoma*[ti/ab] OR lung tumor*[ti/ab] OR lung tumour*[ti/ab]		
OR Pneumonectomy[Mesh] OR Pneumonectom*[ti/ab] OR Lobectom*[ti/ab] OR lung resection*[ti/ab]				

MeSH: Medical Subject Headings; ti/ab: title/abstract; NSCLC: non-small cell lung cancer.

Appendix SII. Excluded studies

Study	Reason for exclusion
Abdelaziz 2011 (1)	Not RCT
Abdelaziz 2011 (2)	Not RCT
Andersen 2011 (3)	Not RCT
Andrea 1957 (4)	Not in English, Danish, Swedish, Norwegian or German
Anonymous 1988 (5)	Not in English, Danish, Swedish, Norwegian or German
Anonymous 2006 (6)	Not in English, Danish, Swedish, Norwegian or German
Arbane 2014 (7)	Missing data – unsuccessful attempt to obtain postoperative surgical measurements of incremental shuttle walk distance
Arbane 2011 (8)	Second publication for included study (a dissertation/ thesis)
Arbane 2009 (9)	Conference abstract of an included study
Arbane 2012 (10)	Conference abstract of an included study
Bespalova 1973 (11)	Not in English, Danish, Swedish, Norwegian or German
Cavalheri 2015 (12)	Not RCT
Celli 2003 (13)	Not RCT
Cesario 2009 (14)	Not RCT
Cesario 2007 (15)	Not RCT
Cesario 2007 (16)	Not RCT
Cusumano 2010 (17)	Not RCT
Denehy 2014 (18)	Not RCT
Du-Jin 2013 (19)	Not RCT
Edvardsen 2013 (20)	Conference abstract of an included study
Erschbamer 2014 (21)	Not RCT
Ferri 2008 (22)	Not RCT
Feuereisl 1967 (23)	Not RCT
Fryjordet 1971 (24)	Not RCT
Glattki 2012 (25)	Not RCT
Granger 2013 (26)	Not >50% patients with resectable NSCLC
Grochans 2010 (27)	Not in English, Danish, Swedish, Norwegian or German
Gu 2014 (28)	Not in English, Danish, Swedish, Norwegian or German
Hartman 2012 (29)	Not patients with resectable NSCLC
Hoffman 2014 (30)	Not RCT
Hoffman 2015 (31)	Not postoperative exercise intervention
Hwang 2012 (32)	Not patients with resectable NSCLC
Jakobsen 2013 (33)	Missing data – Unsuccessful attempt to obtain data from a conference abstract due to a high number of missing data.
Jones 2011 (34)	Not RCT
Kapeliovich 1962 (35)	Not in English, Danish, Swedish, Norwegian or German
Kim 2014 (36)	Not in English, Danish, Swedish, Norwegian or German
Kim 2015 (37)	Not RCT
Kiss 2013 (38)	Not RCT
Kiziltas 2006 (39)	Not 2 postoperative baseline measurements
Koga 1961 (40)	Not in English, Danish, Swedish, Norwegian or German
Lubbe 2001 (41)	Not RCT
McIntyre 2014 (42)	Not RCT
Meerbeeck 2013 (43)	Conference abstract of an included study (Salhi et al. 2015)
Milman 2006 (44)	Not postoperative exercise intervention
Molasiotis 2014 (45)	Not patients with resectable NSCLC
Molassiotis 2015 (46)	Not patients with resectable NSCLC
Morano 2014 (47)	Not postoperative exercise intervention
Morano 2013 (48)	Not postoperative exercise intervention
Murza 1966 (49)	Not in English, Danish, Swedish, Norwegian or German
Ntoumenopoulos 2013 (50)	Not RCT
Reeve 2010 (51)	Not patients with resectable NSCLC
Pasciuto 2012 (52)	Not eligible for comparator group
Pereira 2013 (53)	Not eligible for comparator group
Saleh 2008 (54)	Not RCT
Shannon 2011 (55)	Not RCT
Sorrentini 1964 (56)	Not in English, Danish, Swedish, Norwegian or German
Stefanelli 2013 (57)	Not postoperative exercise intervention
Sterzi 2013 (58)	Not RCT
Stigt 2013 (59)	Missing data – author unable to provide the data
Surmont 2013	Not patients with resectable NSCLC
Taiana 1960 (60)	Not in English, Danish, Swedish, Norwegian or German
Weber 1958 (61)	Not RCT

RCT: randomized controlled trial; NSCLC: non-small cell lung cancer.

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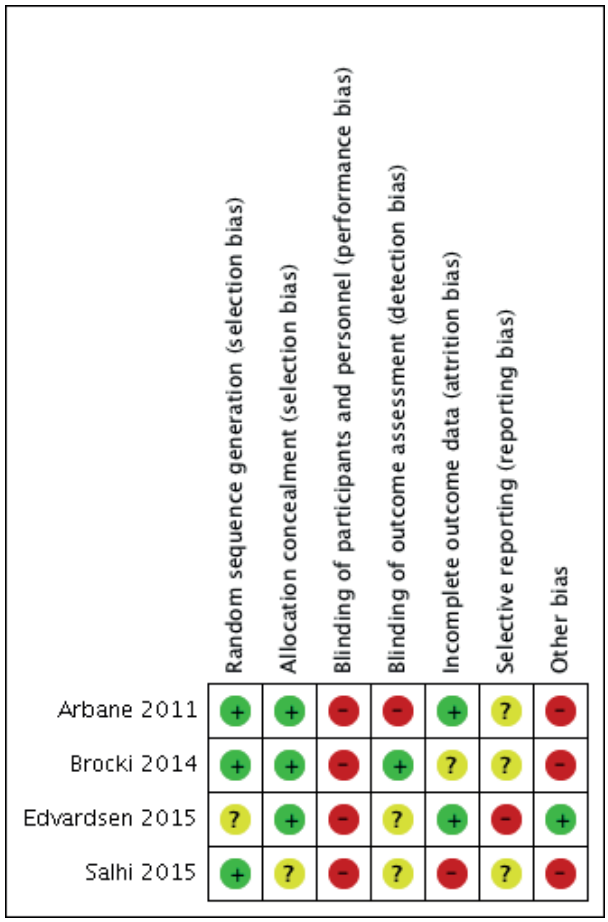
Appendix SIII. Risk of bias summary: review authors' assessment of each risk of bias item for each included study



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Appendix SIV. Summary of included studies

Study details	Summary of study
Arbane 2011	
Methods	Randomized controlled trial
	Setting: St George's Hospital, London, UK
	Study duration: 5 days (in-patient) + 12 weeks of home-based intervention. Assessments were performed preoperatively, 5 days postoperatively and after 12 weeks of intervention following discharge.
Participants	67 participants with non-small cell lung cancer (NSCLC) referred for lung resection via open thoracotomy or video-assisted thoracoscopic surgery (VATS) were screened. 53 agreed to participate in the study and were randomized before any formal testing. Two were excluded. 51 participants (median age 63 [32–87] years in the control group; 65 [47–82] years in the exercise group) completed the study. No information on additional treatment is available.
	Adherence: 44 out of 53 patients (83%) performed the assessment after the intervention (12 weeks post-operative assessment).
Interventions	Control ($n = 26$): Pain medication as relevant via patient-controlled analgesia on day one postoperatively, thereafter orally as needed. Usual care comprising routine in-patient physiotherapy treatment (airway clearance techniques, mobilisation as able and upper limb activities) once daily from day 1 post-surgery to discharge and monthly phone calls after discharge.
	Exercise ($n = 27$): Same as control group plus twice daily additional strength and mobility training (60–80%) from day 1 to day 5 post-surgery as well as 12 weeks of home-based non-supervised exercise programme (walking + home-adapted strengthening exercises) including 3 home visits.
Outcomes	Exercise capacity (6-minute walk distance (6MWD)) and health-related quality of life (HRQoL) (EORTC QLQ-CL13 version 2.0). Assessment of 6MWD and quadriceps strength done 5 days postoperatively (T2). Full assessments of all outcomes were performed 12 weeks postoperatively (T3).
Notes	Control group – stage I ($n = 10$), stage II ($n = 6$), stage IV ($n = 4$) and 4 participants described as "other".
	Exercise group – stage I ($n = 15$), stage II ($n = 6$), stage III ($n = 2$) and data unavailable for 3 participants.

Risk of bias		
Bias	Authors' assessment	Support for assessment
Random sequence generation (selection bias)	Low risk	Quote: "… performed using computer generated tables …"
Allocation concealment (selection bias)	Low risk	Quote: "… Randomisation codes were kept by an independent member of the team and released after consent …"
		Comment: Investigator enrolling participants could not foresee assignment.
Blinding of participants and personnel (Performance bias) All outcomes	High risk	Quote: "… Study was single blinded with the therapist performing assessments unaware of the randomisation …"
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "… Study was single blinded with the therapist performing assessments unaware of the randomisation although weekend treatments meant that in about 10 participants the same therapist performed the assessment and treatment …" Comment: Partial blinding of outcome assessment.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Comment: Numbers for each outcome were reported. Missing outcome data was balanced in numbers across intervention groups and similar reasons for missing data across groups reported.
Selective reporting (reporting bias)	Unclear risk	Comment: No protocol available. Insufficient information to permit assessment of low risk or high risk.
Other bias	High risk	Comment: The control group had 5 participants categorized at stage IV, whereas the exercise group had none.

Brocki 2014	
Methods	Randomized controlled trial. *Setting*: Outpatient clinic, Aalborg University Hospital, Denmark *Study duration*: Three months of intervention. Assessments were performed before and after intervention period.
Participants	78 participants with lung cancer were included (46 male, 32 female) and randomized to either the control group (mean age 65 ± 9 years) or the exercise group (mean age 64 ± 10 years). Adherence: 67 out of 78 patients (86%) were available for analysis after the intervention.
Interventions	*Control ($n = 37$)*: Usual care and 1 individual instruction session on exercise. *Exercise ($n = 41$)*: Aerobic exercise, resistance training and dyspnoea management once a week. Patients also encouraged to do home exercise (aerobic + strength) at least twice a week. Target intensity was set at 60–80% of participant's peak work capacity. Exercise programme initiated following the assessments, which took place 3 weeks after discharge. Participants were encouraged to exercise at least twice a week on their own (aerobic + strength).
Outcomes	Exercise capacity (6MWD) and HRQoL (SF-36).
Notes	None

Risk of bias		
Bias	Authors' assessment	Support for assessment
Random sequence generation (selection bias)	Low risk	Quote: "Computer-generated randomisation tables, stratified for pneumonectomy (expected low performance status) were used."
Allocation concealment (selection bias)	Low risk	Quote: "Individual allocations were placed by an external person in consecutively numbered and sealed opaque envelopes." Comment: Allocation was not predictable.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "An assessor-blinded …" Comment: No blinding of participants.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Assessors were blinded to the patient's group allocation."

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Quote: *Control group:* "… Did not receive allocated intervention n=1 (withdrew consent) … Lost to follow-up $n=1$ (deceased)." – at 4 months. "Lost to follow-up n=4 (deceased $n=1$, withdrew consent $n=3$)" at 1 year. *Exercise group:* "Did not receive allocated intervention $n=2$ (withdrew consent) … Lost to follow-up $n=7$ (deceased $n=2$; withdrew consent $n=5$)." – at 4 months. "Lost to follow-up $n=4$ (deceased $n=1$, withdrew consent $n=3$)" at 1 year. Comment: Imbalance in numbers of missing data across intervention groups, and insufficient information about missing cases. Intention-to-treat analysis was done in all outcomes.
Selective reporting (reporting bias)	Unclear risk	Comment: No study protocol available. Insufficient information to permit assessment of low risk or high risk due to absence of a protocol.
Other bias	High risk	Comment: Low recruitment rate. n=92 of 171 eligible participants were unwilling to participate.

Edvardsen 2015

Methods	Randomised controlled trial.
	Setting: Outpatient fitness centres, University of Oslo, Norway
	Study duration: 20 weeks of intervention. Assessments were performed preoperatively, 4–6 weeks postoperatively and immediately after the intervention period.
Participants	106 were screened for participation, and 69 participants with resectable NSCLC, 80 years, able to perform a maximal exercise test, signed consent pre-surgery. After surgery 66 consented, but 61 were randomized and baseline evaluated postoperatively ($n=2$ recognized metastasis, $n=2$ withdrew consent and $n=1$ had an accident); $n=31$ (16 females) for the control group (mean age 65.9±8.5) and $n=30$ (17 females) for the exercise group (mean age 64.4±9.3).
	Adherence: 54 out of 66 patients (82%) completed the post-intervention evaluation.
Interventions	*Control* ($n=31$): No exercise advice beyond general information from the hospital.
	Exercise ($n=30$): Exercise at local fitness centres, starting within 1 week after randomization (5–7 weeks after surgery). 60 min each session 3× per week. One hour per week exercising in groups. Participants exercised at 80–95% of their maximum heart rate by walking uphill on a treadmill and progressive resistance training in 3 series of 6–12 repetition max (RM). The exercise programme also included daily inspiratory muscle training.
	If the participants undergoing chemotherapy were unable to exercise, the time away from training was added after the completion of chemotherapy.
	The adherence rate during the 20 weeks of exercise was 88±29%.
Outcomes	Exercise capacity (VO_{2peak}) and HRQoL (SF-36).
Notes	Quality of life data not published. The data for the analysis were informed by the first author. A high number of participants did not complete SF-36 at baseline, which is why only $n=16$ in the control group and $n=14$ in the exercise group were evaluated on that outcome measure.

Risk of bias

Bias	Authors' assessment	Support for assessment
Random sequence generation (selection bias)	Unclear risk	Comment: Insufficient information to permit assessment of low risk or high risk. Management of allocations was not described.
Allocation concealment (selection bias)	Low risk	Quote: "The randomization was done in blocks with varying block size (4–6 subjects) and put into sealed opaque envelopes generated by an external statistician."
Blinding of participants and personnel (Performance bias) All outcomes	High risk	Comment: No information about blinding of participants and personnel is stated, but blinding of participants is considered not possible.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "… we cannot rule out the possibility that the technicians were not blinded during the last data collection."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Comment: Missing outcome data in exercise capacity is reasonably balanced in numbers across the groups, with similar reasons for missing data. Intention-to-treat analysis also done.
Selective reporting (reporting bias)	High risk	Quote: "A methodological limitation to the study was a low response rate to the QoL questionnaire."
		Comment: The trial registration of the study (clinicaltrials.gov/ct2/show/NCT01748981) was reviewed and not all of the pre-specified outcomes were reported in the published paper: SF-36.
Other bias	Low risk	12 eligible participants did not wish to participate in the study, resulting in a somewhat selected sample. This is considered a low number of participants, however.
Selective reporting (reporting bias)	High risk	Quote: "A methodological limitation to the study was a low response rate to the QoL questionnaire."
		Comment: The trial registration of the study (clinicaltrials.gov/ct2/show/NCT01748981) was reviewed and not all of the pre-specified outcomes were reported in the published paper: SF-36.
Other bias	Low risk	12 eligible participants did not wish to participate in the study, resulting in a somewhat selected sample. This is considered a low number of participants, however.

Salhi 2015

Methods	Randomized controlled trial. *Setting:* Outpatient, Ghent University Hospital, Belgium *Study duration:* 12 weeks of intervention. Assessments were performed before (To) and after (T1) surgery. T1 assessment and randomisation were conducted within 8 weeks of surgery. T2 was conducted after the 12 weeks of intervention.
Participants	121 participants with stage I–III lung cancer or mesothelioma, candidates for treatment with curative intent, 18–80 years of age and a haemoglobin level of at least 8g/dl were recruited and completed T0 assessment. 86 participants completed assessment after surgery T1. Before randomization, 16 participants dropped out. 70 participants were included and randomized to either the control group (CON) (median age 64 [51–79] years), the conventional resistance training group (CRT) (median age 63 [29–76] years or the whole body vibration training (WBVT) (median age 60 [38–77] years). Of these, 21, 20 and 17, respectively, completed the intervention. Adherence: 58 out of 70 patients (83%) completed the study.

Interventions	Control ($n=24$): Discouraged to improve their exercise tolerance with professional help. Exercise (CRT) ($n=24$): Aerobic training on bike and treadmill at 70% of the maximum workload and resistance training on multi gym equipment starting with 3 sets of 8 repetitions at 50% of 1 RM 3× a week for 12 weeks. Exercise (WBVT) ($n=22$): Same aerobic training intervention as CRT plus exercise on a vibration platform starting with 3 sets of 30 s for each exercise at 27 Hz 3× a week for 12 weeks.
Outcomes	Exercise capacity (VO2peak and 6MWD) and HRQoL (EORTC QLQ-C30 and FACT-F).
Notes	Participants were excluded if their postoperative quadriceps force was >70% of the predicted normal value ($n=6$).

Risk of bias

Bias	Authors' assessment	Support for assessment
Random sequence generation (selection bias)	Low risk	Quote: "Patient randomization was conducted by a blinded, web-based platform using a minimization technique with surgery, COPD and centre as stratification variables and with random allocation to either …"
Allocation concealment (selection bias)	Unclear risk	Comment: Insufficient information to permit assessment of low risk or high risk.
Blinding of participants and personnel (Performance bias) All outcomes	High risk	Quote: "The investigator was unblinded for the intervention and its evaluation."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Comment: Insufficient information to permit assessment of low risk or high risk.
Incomplete outcome data (attrition bias) All outcomes	High risk	Comment: Numbers of missing data for each outcome was not reported. Missing outcome data were balanced in numbers across intervention groups ($n=3$, 4 and 5) but with different reasons for missing data across groups. The primary outcome (6MWD) was analysed by performing intention-to-treat analysis, but not HRQoL.
Selective reporting (reporting bias)	Unclear risk	Comment: No protocol available. Insufficient information to permit assessment of low risk or high risk.
Other bias	High risk	Comment: High number of participants drop out of the study before randomisation ($n=51$), of whom $n=19$ are due to loss of motivation.

Supplementary material to article by M. S. Sommer et al. et al. "Effect of postsurgical rehabilitation programmes in patients operated for lung cancer: a systematic review and meta-analysis"

Appendix SV. Search strategies

MEDLINE (via PubMed) search strategy
[17 February 2016; 1,641 hits]
MeSH = Medical Subject Headings

1. Carcinoma, Non-Small-Cell Lung[Mesh]
2. nsclc[Title/Abstract]
3. non small cell*[Title/Abstract]
4. nonsmall cell*[Title/Abstract]
5. lung cancer*[Title/Abstract]
6. lung neoplasm*[Title/Abstract]
7. lung carcinoma*[Title/Abstract]
8. lung tumor*[Title/Abstract]
9. lung tumour*[Title/Abstract]
10. (#3 OR #4) AND (#5 OR #6 OR #7 OR #8 OR #9)
11. Pneumonectomy[Mesh]
12. Pneumonectom*[Title/Abstract]
13. Lobectom*[Title/Abstract]
14. lung resection*[Title/Abstract]
15. #1 OR #2 OR #10 OR #11 OR #12 OR #13 OR #14
16. Motor Activity[Mesh]
17. physical activit*[Title/Abstract]
18. motor activit*[Title/Abstract]
19. locomotor activit*[Title/Abstract]
20. exercis*[Title/Abstract]
21. training[Title/Abstract]
22. physical conditioning[Title/Abstract]
23. Rehabilitation[Mesh]
24. rehabilitation[Title/Abstract]
25. Sports[Mesh]
26. sport*[Title/Abstract]
27. fitness[Title/Abstract]
28. endurance[Title/Abstract]
29. aerobic*[Title/Abstract]
30. Exercise Movement Techniques[Mesh]
31. #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30
32. #15 AND #31

Embase (via Ovid) search strategy
[17 February 2016; 3,291 hits]
exp = 'explode' (all references indexed to that subject heading or any narrower subject heading)
mp = keyword

1. exp non small cell lung cancer
2. mp nsclc
3. mp non small cell*
4. mp nonsmall cell*
5. mp lung cancer*
6. mp lung neoplasm*
7. mp lung carcinoma*
8. mp lung tumor*
9. mp lung tumour*
10. (#3 OR #4) AND (#5 OR #6 OR #7 OR #8 OR #9)
11. exp lung resection
12. mp lung resection*
13. exp lung lobectomy
14. mp lung lobectom*
15. mp pneumonectom*
16. #1 OR #2 OR 310 OR #11 OR #12 OR #13 OR #14 OR #15
17. exp physical activity
18. mp physical activit*
19. exp locomotion
20. mp locomotor activit*
21. exp exercise
22. mp exercis*
23. exp training
24. mp training
25. exp fitness
26. mp fitness
27. exp rehabilitation
28. mp rehabilitation
29. exp sport
30. mp sport*
31. exp kinesiotherapy
32. mp endurance
33. mp aerobic*
34. #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33
35. #16 AND #34

CENTRAL – Cochrane Central Register of Controlled Trials search strategy
[17 February 2016; 270 hits]

1. MeSH = Medical Subject Headings
2. Ti,ab,kw = title, abstract, keywords (word variations also searched for)
3. MeSH: [Carcinoma, Non-Small-Cell Lung] explode all trees
4. nsclc : ti,ab,kw
5. non small cell* : ti,ab,kw
6. nonsmall cell* : ti,ab,kw
7. lung cancer* : ti,ab,kw
8. lung carcinoma* : ti,ab,kw
9. lung neoplasm* : ti,ab,kw
10. lung tumor* : ti,ab,kw
11. lung tumour* : ti,ab,kw
12. (#3 OR #4) AND (#5 OR #6 OR #7 OR #8 OR #9)
13. MeSH : [Pneumonectomy] explode all trees
14. pneumonectom* : ti,ab,kw
15. lobectom* : ti,ab,kw
16. lung resection* : ti,ab,kw
17. #1 OR #2 OR #10 OR #11 OR #12 OR #13 OR #14
18. MeSH: [Motor Activity] 1 tree(s) exploded
19. motor activit* : ti,ab,kw
20. physical activit* : ti,ab,kw
21. locomotor activit* : ti,ab,kw
22. exercis* : ti,ab,kw
23. training : ti,ab,kw
24. physical conditioning : ti,ab,kw
25. MeSH: [Rehabilitation] explode all trees
26. Rehabilitation : ti,ab,kw
27. MeSH: [Sports] explode all trees
28. sport* : ti,ab,kw
29. fitness : ti,ab,kw
30. aerobic* : ti,ab,kw
31. endurance : ti,ab,kw
32. MeSH: [Exercise Movement Techniques] explode all trees
33. #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30
34. #15 AND #31

CINAHL search strategy
[17 February 2016; 970 hits]
MH = Subject Heading, + = 'explode', TI = title, AB = abstract

1. MH Carcinoma, Non-Small-Cell Lung
2. TI AB nsclc
3. TI AB non small cell*
4. TI AB nonsmall cell*
5. TI AB lung cancer*
6. TI AB lung carcinoma*
7. TI AB lung neoplasm*
8. TI AB lung tumor*
9. TI AB lung tumour*
10. (#3 OR #4) AND (#5 OR #6 OR #7 OR #8 OR #9)
11. MH Pneumonectomy
12. TI AB pneumonectom*
13. TI AB lobectom*
14. TI AB lung resection*
15. #1 OR #2 OR #10 OR #11 OR #12 OR #13 OR #14
16. MH Human Activities+
17. TI AB physical activit*
18. TI AB motor activit*
19. TI AB locomotor activit*
20. TI AB exercis*
21. TI AB training

22. TI AB physical conditioning
23. MH Rehabilitation+
24. TI AB rehabilitation
25. TI AB sport*
26. TI AB fitness
27. MH Physical Endurance+
28. TI AB endurance
29. TI AB aerobic*
30. #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28
31. #15 AND #29

PEDro search strategy

[17 February 2016]

non small cell lung cancer; 19 hits