# **Supplementary Table S1. Search strategy and results, July 24th 2018**

| **Database** |  | **Search string** | | **Records** |
| --- | --- | --- | --- | --- |
| CINAHL |  | ID Query Hits  #S1 cancer 194433  #S2 neoplasm 235813  #S3 oncol\* 48563  #S4 S1 OR S2 OR S3 307699  #S5 genetic 72301  #S6 single nucleotide 3991  #S7 genes 55241  #S8 genotype 16707  #S9 allele 8292  #S10 S5 OR S6 OR S7 OR S8 OR S9 107418  #S11 cognition 45549  #S12 cognitive impairment 12210  #S13 neuropsych\* 26107  #S14 S11 OR S12 OR S13 65585  #S15 S4 AND S10 AND S14 147 | | 147 |
| Cochrane |  | ID Search Hits  #1 ("Cancer"):ti,ab,kw 109607  #2 MeSH descriptor: [Neoplasms] explode all trees 67073  #3 (oncol\*):ti,ab,kw 20684  #4 #1 OR #2 OR #3 39696  #5 (genetic):ti,ab,kw 15570  #6 ("Single nucleotide"):ti,ab,kw 2844  #7 MeSH descriptor: [Polymorphism, Single Nucleotide] explode all trees 1299  #8 MeSH descriptor: [Genes] explode all trees 1604  #9 MeSH descriptor: [Genotype] explode all trees 4429  #10 MeSH descriptor: [Alleles] explode all trees 696  #11 #5 OR #6 OR #7 OR #8 OR #9 OR #10 18465  #12 ("cognitive impairment"):ti,ab,kw 5433  #13 MeSH descriptor: [Cognition] explode all trees 9187  #14 (neuropsych\*):ti,ab,kw 11972  #15 #12 OR #13 OR #14 23010  #16 #4 AND #11 AND #15 135 | | 135 |
| PubMED |  | ((((("cancer") OR "neoplasm") OR "oncol")) AND ((((((("genetic") OR "single nucleotide") OR "polymorphism") OR "genes") OR "genotype") OR "alleles") OR "genomics")) AND ((("cognitive impairment") OR "cognition") OR "neuropsych") | | 420 |
|  | | | | |
| Web of Science | Set | Results | Search string | 468 |
| # 17 | [468](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=18&SID=D4aoZOzs5gZrkJVJTaj&search_mode=CombineSearches&update_back2search_link_param=yes) | #16 AND #12 AND #3  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 16 | [267467](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=17&SID=D4aoZOzs5gZrkJVJTaj&search_mode=CombineSearches&update_back2search_link_param=yes) | #15 OR #14 OR #13  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 15 | [96648](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=16&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (neuropsych\*)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 14 | [131142](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=15&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (cognition)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 13 | [72249](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=14&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: ("cognitive impairment")  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 12 | [2231333](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=13&SID=D4aoZOzs5gZrkJVJTaj&search_mode=CombineSearches&update_back2search_link_param=yes) | #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 11 | [61407](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=12&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (genomics)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 10 | [231042](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=11&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (alleles)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 9 | [354641](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=10&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (genotype)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 8 | [992950](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=9&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: ("genes")  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 7 | [270499](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=8&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: ("polymorphism")  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 6 | [90388](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=7&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: ("single nucleotide")  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 5 | 1082418 | TOPIC: (genetic)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 3 | [2309314](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=4&SID=D4aoZOzs5gZrkJVJTaj&search_mode=CombineSearches&update_back2search_link_param=yes) | #2 OR #1  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |
| # 2 | [165000](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=2&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (neoplasm) |
| # 1 | [2164537](http://apps.webofknowledge.com/summary.do?product=WOS&doc=1&qid=1&SID=D4aoZOzs5gZrkJVJTaj&search_mode=GeneralSearch&update_back2search_link_param=yes) | TOPIC: (cancer)  *Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years* |

# **Supplementary Table S2. Records excluded during full-text review with reason for exclusion**

|  |  |
| --- | --- |
| **Study** | **Reason for exclusion** |
| Ah et al. 2012 [1] | Genes not selected because they were potential risk genes for cognitive impairment |
| Andrykowsky et al. 2010 [2] | No genotype data or neuropsychological assessment |
| Barratt et al. 2015 [3] | Genes not selected because they were potential risk genes for cognitive impairment |
| Caselli et al. 2018 [4] | Review – not original data |
| Cole et al. 2015 [5] | Pediatric population |
| Correa et al. 2007 [6] | CNS-cancer patients |
| Ganz et al. 2013 [7] | No genotype data |
| Hansen et al. 2012 [8] | Study protocol – no results |
| Heflin et al. 2005 [9] | No genotype data |
| Koleck et al. 2016 [10] | Dissertation (Grey literature) |
| Krull et al. 2013 [11] | Pediatric population |
| Kurita et al. 2016 [12] | Genes not selected because they were potential risk genes for cognitive impairment |
| Lengacher et al. 2015 [13] | Self-reported cognitive functioning only |
| McDonald et al. 2013 [14] | Self-reported cognitive functioning only |
| Merriman et al. 2014 [15] | Self-reported cognitive functioning only |
| Merriman et al. 2015 [16] | Self-reported cognitive functioning only |
| Miaskowski et al. 2017 [17] | No neuropsychological assessment |
| Myers et al. 2017 [18] | Self-reported cognitive functioning only |
| Park et al. 2014 [19] | Conference abstract (Grey literature) |
| Newhouse et al. 2013 [20] | Not cancer patients |

**Reference list for Table S2.**

[1] Ah DV, Skaar T, Unverzagt F et al. Evaluating the Role of Serotonin on Neuropsychological Function After Breast Cancer Using Acute Tryptophan Depletion. Biol Res for Nursing 2012;14:5-15.

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[4] Caselli RJ. Does an Alzheimer's disease susceptibility gene influence the cognitive effects of cancer therapy? Pediatr Blood Cancer 2014;61:1739-42.

[5] Cole PD. Does genetic susceptibility increase risk for neurocognitive decline among patients with acute lymphoblastic leukemia? Fu. Oncol. 2015;11:1855-8.

[6] Correa DD, Ahles TA. Cognitive adverse effects of chemotherapy in breast cancer patients. Curr Opin Support Palliat Care 2007;1:57-62.

[7] Ganz PA, Bower JE, Kwan L et al. Does tumor necrosis factor-alpha (TNF-α) play a role in post-chemotherapy cerebral dysfunction? Brain Behav Immun 2013;30:99–108.

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[9] Heflin LH, Meyerowitz BE, Hall P et al. Cancer as a risk factor for long-term cognitive deficits and dementia. J Natl Cancer Inst 2005;97:854-6.

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[12] Kurita GP, Ekholm O, Kaasa S et al. Genetic variation and cognitive dysfunction in opioid-treated patients with cancer. Brain Behav 2016;6:e00471.

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[14] McDonald BC, Conroy SK, Smith DJ et al. Frontal gray matter reduction after breast cancer chemotherapy and association with executive symptoms: A replication and extension study. Brain Behav Immun 2013;30:S117-S25.

[15] Merriman JD, Aouizerat BE, Langford DJ et al. Preliminary Evidence of an Association Between an Interleukin 6 Promoter Polymorphism and Self-Reported Attentional Function in Oncology Patients and Their Family Caregivers. Biol Res for Nursing 2014;16:152-9.

[16] Merriman JD, Aouizerat BE, Cataldo JK et al. Associations between catecholaminergic, GABAergic, and serotonergic genes and self-reported attentional function in oncology patients and their family caregivers. Europ J of Oncol Nursing 2015;19:251-9.

[17] Miaskowski C, Conley YP, Mastick J et al. Cytokine Gene Polymorphisms Associated With Symptom Clusters in Oncology Patients Undergoing Radiation Therapy. J of Pain and Sympt Manag 2017;54.

[18] Myers JS, Koleck TA, Sereika SM et al. Perceived cognitive function for breast cancer survivors: association of genetic and behaviorally related variables for inflammation. Supp Care Cancer 2017;25:2475-84.

[19] Park J, Lengacher C, Reich R et al. Genetic Variations Moderate Mindfulness-Based Stress Reduction for Breast Cancer-Based Reduction in Post-Chemotherapy Cognitive Impairment. Psycho-Oncology 2014;23.

[20] Newhouse P, Albert K, Astur R, et al.. Tamoxifen Improves Cholinergically Modulated Cognitive Performance in Postmenopausal Women. Neuropsychopharmacology 2013;38:2632-43.

# **Supplementary Table S3. Study Quality Assessment.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ahles et al. 2003 [1] | Ahles et al. 2014 [2] | Amidi et al. 2016 [3] | Bender et al. 2018 [4] | Chae et al. 2016 [5] | Cheng et al. 2016 [6] | Gonzalez et al. 2016 [7] | Koleck et al. 2014 [8] | Koleck et al. 2016 [9] | Koleck et al. 2017 [10] | Mandelblatt et al. 2014 [11] | Ng et al. 2016 [12] | Peila et al. 2016 [13] | Small et al. 2011 [14] | Vardy et al. 2014 [15] | Vardy et al. 2015 [16] | Vardy et al. 2017 [17] |
| 1. Was the research question or objective clearly stated? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 2. Was the study population clearly specified / defined? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 3. Was the participation rate of eligible persons > 50%? | ⚫ | ⚫ | ⚫ | NR | NR | NR | ⚫ | ⚫ | NR | NR | ⚫ | NR | NR | NR | NR | NR | NR |
| 4. Were all subjects recruited from the same population in the same time period? Were inclusion and exclusion criteria prespecified and applied uniformly? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 5. Was a sample size justification, power description, or variance and effect estimates provided? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 6. Were the exposure(s) of interest measured prior to the outcome(s) being measured? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | NR | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 8. For exposures that can vary in amount or level, did the study examine different levels of the exposure? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 9. Were the exposure measures clearly defined, valid, reliable, and implemented consistently? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 10. Was the exposure(s) assessed more than once over time? | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 11. Were the outcome measures clearly defined, valid, reliable, and implemented consistently? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| 12. Were the outcome assessors blinded to the exposure status of participants? | ⚫ | NR | NR | NR | NR | NR | NR | ⚫ | ⚫ | ⚫ | NR | ⚫ | ⚫ | NR | NR | NR | NR |
| 13. Was the loss to follow-up after baseline 20% or less? | NA | ⚫ | ⚫ | NR | NR | NR | ⚫ | NR | NA | NA | NA | NR | NA | NA | NA | ⚫ | NA |
| 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)? | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ | ⚫ |
| **Total prorated score** | 9 | 10 | 12 | 10 | 8 | 8 | 10 | 10 | 8 | 6 | 8 | 9 | 6 | 8 | 8 | 10 | 7 |

⚫ = yes, ⚫ = partly, ⚫ = no, NA = not applicable, NR = not reported.

Study quality was evaluated using the National institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-sectional Studies [18]. To quantitatively evaluate the study quality judgements, item scores (yes/partly/no) was scored with points, i.e., 1/0.5/0, respectively, and summed to get a total study quality score. Hereafter, a total prorated quality score was calculated for each study by 1) dividing the total study quality score with the number of applicable items for the given study, i.e., to get a mean score for each applicable item, and 2) multiplying the resulting item mean score with 14, i.e., the total number of items on the quality scale. Studies with total prorated quality scores > 9 were judged to be of good quality, and studies with total prorated quality scores between 9 and 5 were judged to be of fair quality. No studies’ total prorated quality scores were below 5 corresponding to low quality.

**Reference list for Table S3.**

[1] Ahles TA, Saykin AJ, Noll WW, et al. The relationship of APOE genotype to neuropsychological performance in long-term cancer survivors treated with standard dose chemotherapy. Psychooncology 2003;12(6):612-9.

[2] Ahles TA, Li Y, McDonald BC, et al. Longitudinal assessment of cognitive changes associated with adjuvant treatment for breast cancer: the impact of APOE and smoking. Psychooncology 2014;23(12):1382-90.

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[6] Cheng HD, Li W, Gan C, et al. The COMT (rs165599) gene polymorphism contributes to chemotherapy-induced cognitive impairment in breast cancer patients. Am J of Transl Res 2016;8(11):5087-97.

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[8] Koleck TA, Bender CM, Sereika SM, Ahrendt G, Jankowitz RC, McGuire KP, et al. Apolipoprotein E genotype and cognitive function in postmenopausal women with early-stage breast cancer. Oncol Nurs Forum 2014;41(6):313-25.

[9] Koleck TA, Bender CM, Sereika SM, et al. Polymorphisms in DNA repair and oxidative stress genes associated with pre-treatment cognitive function in breast cancer survivors: an exploratory study. Springerplus 2016;5.

[10] Koleck TA, Bender CM, Clark BZ, et al. An exploratory study of host polymorphisms in genes that clinically characterize breast cancer tumors and pretreatment cognitive performance in breast cancer survivors. Breast Canc (Dove Med. Press) 2017;9:95-110.

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[15] Vardy J, Dhillon HM, Pond GR, et al. Cognitive function and fatigue after diagnosis of colorectal cancer. Ann Oncol 2014;25(12):2404-12.

[16] Vardy JL, Dhillon HM, Pond GR, et al. Cognitive Function in Patients With Colorectal Cancer Who Do and Do Not Receive Chemotherapy: A Prospective, Longitudinal, Controlled Study. J Clin Oncol 2015;33(34):4085-92.

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