Meeting 5

Cancer-Primary Prevention

Chair: Anne McTiernan

Members: Peter Katzmarzyk, Ken Powell

Experts and Consultants

- Consultant:
  - Christine M. Friedenreich, PhD, Alberta Health Services & University of Calgary
- ICF Staff:
  - Bethany Tennant, PhD
- HHS Staff:
  - Alison Vaux-Bjerke, MPH

Subcommittee Questions

1. What is the relationship between physical activity and specific cancer incidence?
   - Is there a dose-response relationship? If yes, what is the shape of the relationship?
   - Does the relationship vary by age, sex, race/ethnicity, socio-economic status, or weight status?
   - Does the relationship vary by specific cancer subtypes?
   - Is the relationship present in persons at high risk, such as those with familial predisposition to cancer?
2. What is the relationship between sedentary behavior and cancer incidence?
   - Note: Conclusions covered by Sedentary SC

Question #1

- What is the relationship between physical activity and specific cancer incidence?
- Sources of evidence to answer question:
  - Systematic reviews
  - Meta-analyses
  - Pooled analyses
  - High-quality reports

Analytical Framework

Systematic Review Question

What is the relationship between physical activity and specific cancer incidence?

Target Population

Adults, 18 years and older

Exposure

All types and intensities of physical activity, including lifestyle activities/leisure activities

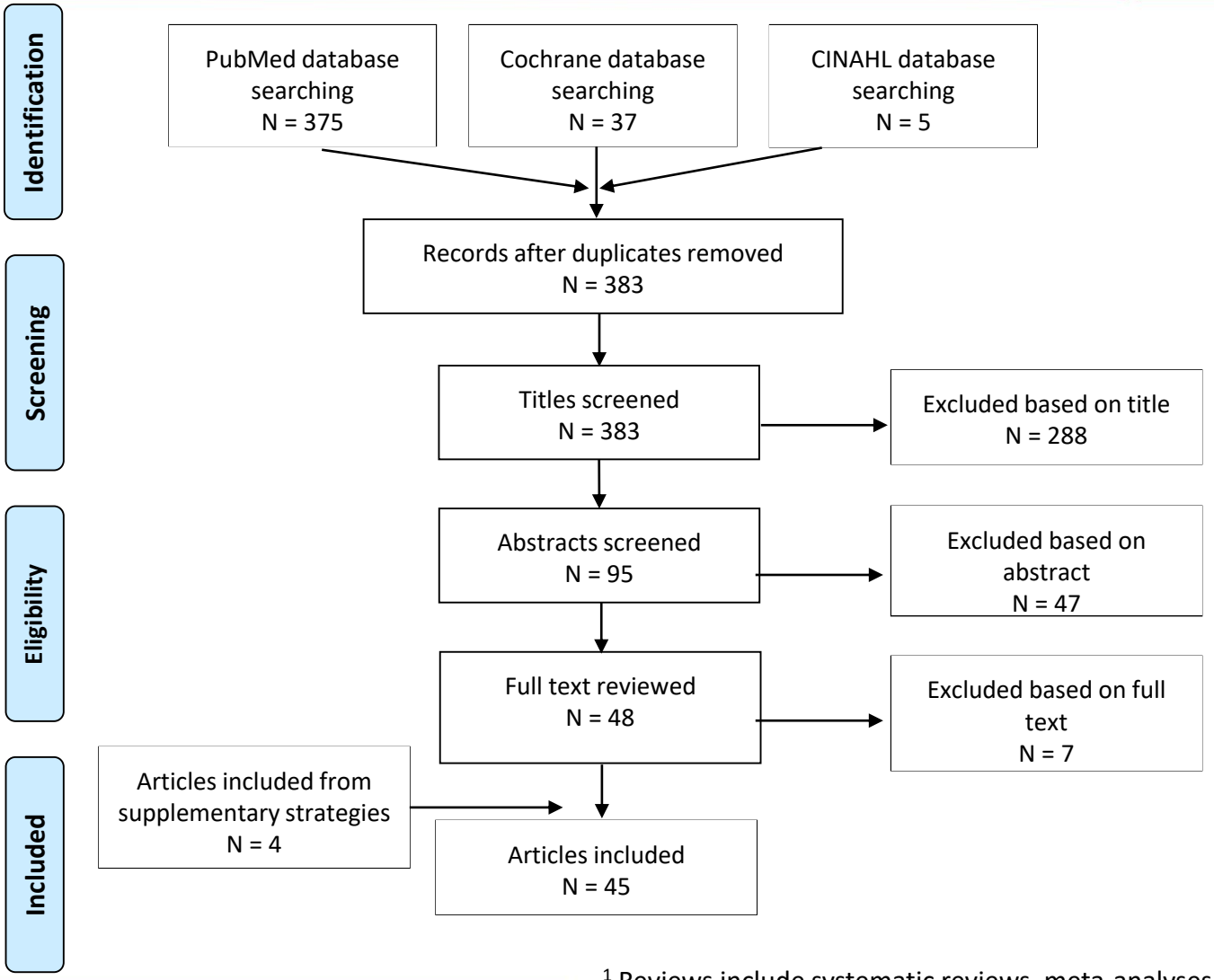
Comparison

Adults who participate in varying levels of physical activity

Endpoint Health Outcome

Incidence of cancer

Search Results (All Cancers): High-Quality Reviews[1] and Reports



[1] Reviews include systematic reviews, meta-analyses, and pooled analyses.

Evidence: Cancers, *Draft* Grades

Cancer	Grade
Physical activity protects:	
Bladder, Breast, Colon, Endometrium, Esophagus (adenocarcinoma), Renal*, Stomach	Strong
Lung	Moderate
Blood & lymphatics, Head & Neck, Ovary, Pancreas, Prostate	Limited
Brain	Not assignable (changed from Limited)
No effect of physical activity:	
Thyroid	Limited (changed from Moderate)
Rectal*	Limited

*Conclusions being presented at PAGAC Meeting 5. Others were previously presented at PAGAC Meetings 3 & 4.

Draft conclusion - PA effect by socioeconomic status grade

- Insufficient evidence across all cancer sites
- PAGAC Grade: Not assignable for all cancers reviewed

Draft Key Findings – Rectal

- 9 cohort studies in largest meta-analysis (Liu, 2015)
- "Highest" vs. "lowest" odds ratio:
  - Total PA (RR=1.07, 95% CI: 0.93-1.24)
  - Dose-response not assessed in meta-analyses
  - No dose-response effect in pooled analysis (Moore 2016)
- Sex:
  - Inconsistent
- Race/ethnicity:
  - No PA association in either Asians or Caucasians
  - No other data
- Cancer subtypes:
  - Not applicable
- High risk persons
  - No information

Draft Conclusion Statement - Rectal

PA Parameter	Effect on Risk	Grade
"highest" vs. "lowest" PA	No effect	Limited
Dose-response	Insufficient evidence	Not assignable
Sex	Insufficient evidence	Not assignable
Age	Insufficient evidence	Not assignable
Race/ethnicity	Insufficient evidence	Not assignable
Weight status	Insufficient evidence	Not assignable
High risk persons	Insufficient evidence	Not assignable
Cancer subtype	Insufficient evidence	Not assignable

Draft Key Findings – Renal

- 1 meta-analysis (11 cohort, 8 case-control studies) [Behrens, 2013]
  - Highest vs. lowest PA: RR=0.88; 95% CI: 0.79-0.97
- 1 pooled analysis (11 cohort studies) [Moore, 2016]
  - Dose-response: significant linear relationship ($P_{overall} < 0.0001$)
- Sex:
  - Similar PA effect in men and women
- Race/ethnicity:
  - No PA association in Asians
- Weight:
  - No variation by BMI
- Cancer subtypes, high risk persons
  - No information

Draft Conclusion Statement - Renal

PA Parameter	Effect on Risk	Grade
“highest” vs. “lowest” PA	↓	Strong
Dose-response	↓	Limited
Sex	↓ in men & women	Limited
Age	Insufficient evidence	Not assignable
Race/ethnicity	Insufficient evidence	Not assignable
Weight status	↓ in all BMI	Limited
High risk persons	Insufficient evidence	Not assignable
Cancer subtype	Insufficient evidence	Not assignable

Draft Conclusion Statement - Breast subquestions

PA Parameter	Effect on Risk	Grade
"highest" vs. "lowest" PA	↓	Strong
Dose-response	↓	Strong
Sex	Not reviewed	Not reviewed
Age	Insufficient evidence	Not assignable
Race/ethnicity	↓ all groups	Limited
Weight status	↓ in all BMI	Moderate
High risk persons	↓ + family history Lower PA effect in HRT users	Limited
Cancer subtype	Varies	Limited

Draft Conclusion Statement – Colon subquestions

PA Parameter	Effect on Risk	Grade
"highest" vs. "lowest" PA	↓	Strong
Dose-response	↓	Strong
Age	Insufficient evidence	Not assignable
Sex	↓ men & women	Strong
Race/ethnicity	Insufficient evidence	Not assignable
Weight status	↓ in all BMI	Moderate
High risk persons	Insufficient evidence	Not assignable
Cancer subtype	↓ proximal & distal	Strong

Draft Conclusion Statement - Changed Grades

Cancer	PA Parameter	Old Grade	New Grade
Blood & Lymphatics	Sex Cancer subtype	Limited Limited	Not assignable Not assignable
Brain	Overall ↓glioma ↓meningioma	Limited Not assignable	Not assignable Limited
Esophagus Squamous	No dose-response effect	Not assignable	Limited
Esophagus Adenocarcinoma	Dose-response present	Not assignable	Limited
Head & Neck	No effect sex, age, weight, smoking status, cancer subtype	Mixed	Limited

Changed Grades continued

Cancer	PA Parameter	Old Grade	New Grade
Lung	Smokers	Limited	Moderate
Ovary	Dose-response absent	Not assignable	Limited
Pancreas	Dose-response present Sex	Not assignable Limited	Limited Not assignable
Prostate	No effect age, weight, smoking status, cancer subtype	Limited	Not assignable
Stomach	Sex	No grade	Not assignable
Thyroid	Overall	Moderate	Limited

Draft Research Recommendations

- Conduct epidemiologic studies on cancer risk:
  - effects of physical activity in specific race, ethnic, and socio-economic groups, especially in African-American and Hispanic populations
  - effect modification by age and weight status
  - effects of specific types of physical activity
  - more precisely determine dose-response effect of physical activity
  - effect of physical activity in persons at high risk (such as high genetic risk, persons with precursor conditions, persons with risk factors)

- Conduct randomized controlled clinical trials to determine the effect on physical activity on cancer incidence

Committee Discussion

- What is the relationship between physical activity and specific cancer incidence?
  - Is there a dose-response relationship? If yes, what is the shape of the relationship?
  - Does the relationship vary by age, sex, race/ethnicity, socio-economic status, or weight status?
  - Does the relationship vary by specific cancer subtypes?
  - Is the relationship present in persons at high risk, such as those with familial predisposition to cancer?

Next Steps

- All draft sections on specific cancers have been written and sent for editing review
- Draft remaining sections of cancer chapter of PAGAC report: introduction, methods, cancers not graded, research recommendations, tables, and figures