

# **Evidence-Based Nutrition Practice**

## **Decision-Making for Individuals and Populations**

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**NutriRECS**

# Clinical Scenario



# Clinical Scenario

- 38-year-old man who has a family history of cancer.
- Enquiring about potential nutritional strategies for cancer prevention after his father was diagnosed with colorectal cancer.
- Doesn't consider a plate of food as a meal without meat!
- With respect to environmental issues related to red meat, he mostly consumes locally sourced beef.

# Presentation Objectives

- Define Evidence-Based Practice and Principles
  - GRADE methods
- Using our clinical scenario to explore the magnitude and certainty of effect related to decreased red meat intake & cancer
  - EBP at odds within scientific community and public perception
- Define and explore value and preference sensitive decision-making

# My Disclosures

- 2019 start-up funding from Texas A&M AgriLife Research to evaluate saturated and polyunsaturated fat. Grant was from Texas A&M AgriLife institutional funds from interest and investment earnings, not a sponsoring organization, industry, or company
- 2016 funding from the International Life Sciences Institute to assess the methodological quality of guidelines on sugar using GRADE and AGREE standards
- Don't accept speaker fees or travel re-imbursement from industry or their affiliates
- NutriRECS and GRADE Working Group member (methods)
- Eat without restrictions (approx. 1-2 servings of both red meat and processed meat per week)

# What is Evidence-Based Practice?

## 1) Best available evidence

- Hierarchies of evidence

## 2) Clinical (or real world) experience

## 3) Values and preferences of client/patient (clinical practice) and populations (guidelines)



Figure 1. Levels of evidence

- Guyatt GH. Evidence-Based Medicine. *ACP Journal Club* 1991
- Sackett DL et al. Evidence-Based Medicine – What it is and what it isn't. *BMJ* 1996
- Johnston BC et al. Evidence-Based Principles and Practice in Nutrition *Mayo Clinic Proceed* 2019

# A. Principles of Evidence-Based Practice

- 1) understanding hierarchies of evidence and causal inference
- 2) understanding hierarchies of outcomes
- 3) framing answerable questions
- 4) searching literature for best evidence
- 5) assessing study quality and/or risk of bias (RoB)
- 6) interpreting magnitude and precision of the estimate of effect
- 7) interpreting certainty of evidence for each outcome
- 8) applying results based on values and preferences



Ghosh N et al. Abstract Presentation: ASN Nutrition Conference 2022

Ghosh N et al. Evidence-Based Practice in the field of Nutrition. Prospero 2022

Bala MM et al. What are the effects of teaching Evidence-Based Practice. PLoS One 2021



# Evidence-Based Practice – Quality of Reviews

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Original Research Communications

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## Characteristics and quality of systematic reviews and meta-analyses of observational nutritional epidemiology: a cross-sectional study

*Dena Zeraatkar,<sup>1,2</sup> Artti Bhasin,<sup>1</sup> Rita E Morassut,<sup>3</sup> Isabella Churchill,<sup>1</sup> Arnav Gupta,<sup>4</sup> Daeria O Lawson,<sup>1</sup> Anna Miroshnychenko,<sup>1</sup> Emily Sirotich,<sup>1</sup> Komal Aryal,<sup>1</sup> David Mikhail,<sup>5</sup> Tauseef A Khan,<sup>6,7</sup> Vanessa Ha,<sup>8</sup> John L Sievenpiper,<sup>6,7</sup> Steven E Hanna,<sup>1</sup> Joseph Beyene,<sup>1</sup> and Russell J de Souza<sup>1,7,9</sup>*

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# Evidence-Based Practice – Quality of Reviews

Randomized survey of 150 nutrition systematic reviews:

- 20.0% reported preregistration of a study protocol
- 28.0% did not report a reproducible search strategy
- 26.1% inappropriately selected meta-analytic model based on statistical indicators of heterogeneity
- 10.7% reviews used an established system to evaluate the certainty of evidence (e.g. GRADE, NutriGrade)
- 3.5% reported absolute estimates of effect (Alonso-Coello P, JCE 2016)



NutriRECS

*"Trusted Nutritional Recommendations"*

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# Evidence-Based Practice – High Quality Reviews

NutriRECS research question

## Systematic Review of Red and Processed Meat

### A. Design:

- RCTs (all sample sizes), cohort studies (1000 or more participants);
- → Prelude: 1.4 servings/wk (RCTs), 3.0 servings/wk (cohorts) and dietary patterns (cohorts)

**B. Population:** Adults with or without pre-existing cardiometabolic conditions

**C. Exposure/Comparator:** Diets lower vs. higher in red meat and/or processed meat intake

# Evidence-Based Practice – High Quality Review

NutriRECS research question

## Systematic Review of Red and Processed Meat

### D. Outcomes:

1. Cancer incidence and mortality (major male and female)
2. All-cause mortality
3. Cardiovascular mortality
4. Stroke (fatal and non-fatal)
5. Myocardial infarction (fatal and non-fatal)
6. Cardiovascular disease (both fatal and non-fatal)
7. Non-fatal coronary heart disease
8. Type II diabetes
9. Quality of life
10. Satisfaction with diet
11. Weight in Kilograms
12. Body Mass Index (BMI)
13. Systolic blood pressure
14. Diastolic blood pressure
15. High Density Lipoproteins (HDL)
16. Low Density Lipoproteins (LDL)
17. Total cholesterol
18. Triglycerides
19. Hemoglobin

# Evidence-Based Practice

NutriRECS protocols freely available

Johnston et al. *BMC Medical Research Methodology* (2018) 18:162  
<https://doi.org/10.1186/s12874-018-0621-8>

BMC Medical Research  
Methodology

STUDY PROTOCOL

Open Access



## Methods for trustworthy nutritional recommendations NutriRECS (Nutritional Recommendations and accessible Evidence summaries Composed of Systematic reviews): a protocol

Bradley C. Johnston<sup>1,2\*</sup>, Pablo Alonso-Coello<sup>2,3,4</sup>, Malgorzata M. Bala<sup>5</sup>, Dena Zeraatkar<sup>2</sup>, Montserrat Rabassa<sup>3</sup>, Claudia Valli<sup>3</sup>, Catherine Marshall<sup>6</sup>, Regina El Dib<sup>1,7</sup>, Robin W. M. Vernooij<sup>1,8</sup>, Per O. Vandvik<sup>9,10</sup> and Gordon H. Guyatt<sup>2,11</sup>

# Evidence-Based Practice

NutriRECS outputs: 1 guideline and 5 systematic reviews



CLINICAL GUIDELINE

Annals of Internal Medicine

## Unprocessed Red Meat and Processed Meat Consumption: Dietary Guideline Recommendations From the Nutritional Recommendations (NutriRECS) Consortium

Bradley C. Johnston, PhD; Dena Zeraatkar, MSc; Mi Ah Han, PhD; Robin W.M. Vernooij, PhD; Claudia Valli, MSc; Regina El Dib, PhD; Catherine Marshall; Patrick J. Stover, PhD; Susan Fairweather-Tait, PhD; Grzegorz Wójcik, PhD; Faiz Bhatia, PEng; Russell de Souza, ScD; Carlos Brotons, MD, PhD; Joerg J. Meerpohl, MD; Chirag J. Patel, PhD; Benjamin Djulbegovic, MD, PhD; Pablo Alonso-Coello, MD, PhD; Malgorzata M. Bala, MD, PhD; and Gordon H. Guyatt, MD

**Description:** Dietary guideline recommendations require consideration of the certainty in the evidence, the magnitude of potential benefits and harms, and explicit consideration of people's values and preferences. A set of recommendations on red meat and processed meat consumption was developed on the basis of 5 de novo systematic reviews that considered all of these issues.

**Methods:** The recommendations were developed by using the Nutritional Recommendations (NutriRECS) guideline development process, which includes rigorous systematic review methodology, and GRADE methods to rate the certainty of evidence for each outcome and to move from evidence to recommendations. A panel of 14 members, including 3 community members, from 7 countries voted on the final recommendations. Strict criteria limited the conflicts of interest among panel members. Considerations of environmental impact or animal welfare did

not bear on the recommendations. Four systematic reviews addressed the health effects associated with red meat and processed meat consumption, and 1 systematic review addressed people's health-related values and preferences regarding meat consumption.

**Recommendations:** The panel suggests that adults continue current unprocessed red meat consumption (weak recommendation, low-certainty evidence). Similarly, the panel suggests adults continue current processed meat consumption (weak recommendation, low-certainty evidence).

**Primary Funding Source:** None. (PROSPERO 2017: CRD42017074074; PROSPERO 2018: CRD42018088854)

*Ann Intern Med.* 2019;171:756-764. doi:10.7326/M19-1621

Annals.org

For author affiliations, see end of text.

This article was published at Annals.org on 1 October 2019.

# Evidence-Based Practice

5 systematic reviews (n=329 studies)

1 systematic review of randomized trials

Cardiometabolic, Cancer, QoL, and surrogates  
(n=12)

3 systematic reviews of observational studies

Intake (lower vs higher): Cardiometabolic (n=60)

Intake (lower vs higher): Cancer (n=99)

Dietary Patterns: Cardiometabolic & Cancer (n=110)

1 systematic review of values and preferences

Meat consumption (n=48)

# Evidence-Based Practice – WHO Review

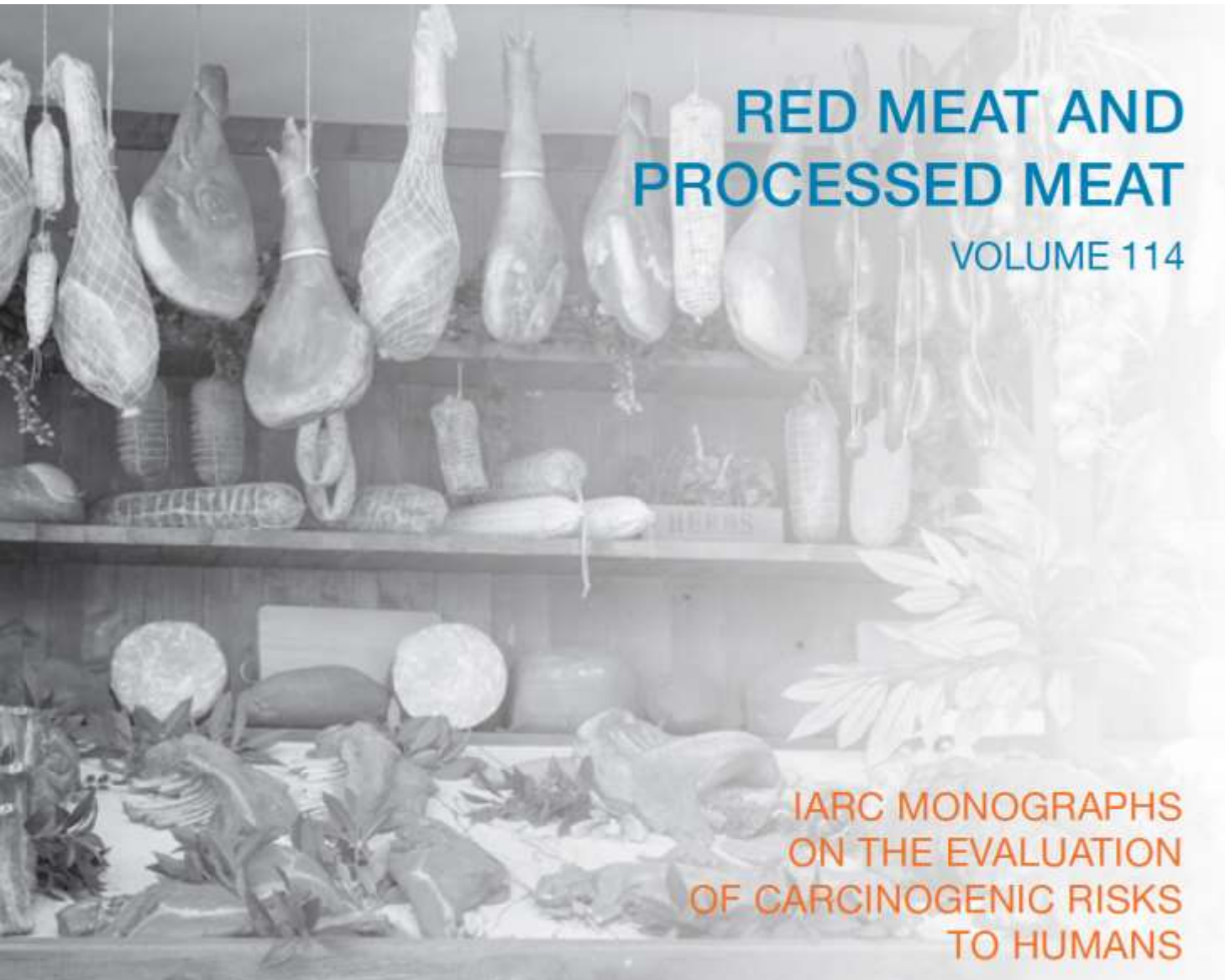
Red meat and colorectal cancer?

Interpreting the magnitude of effect based on study results

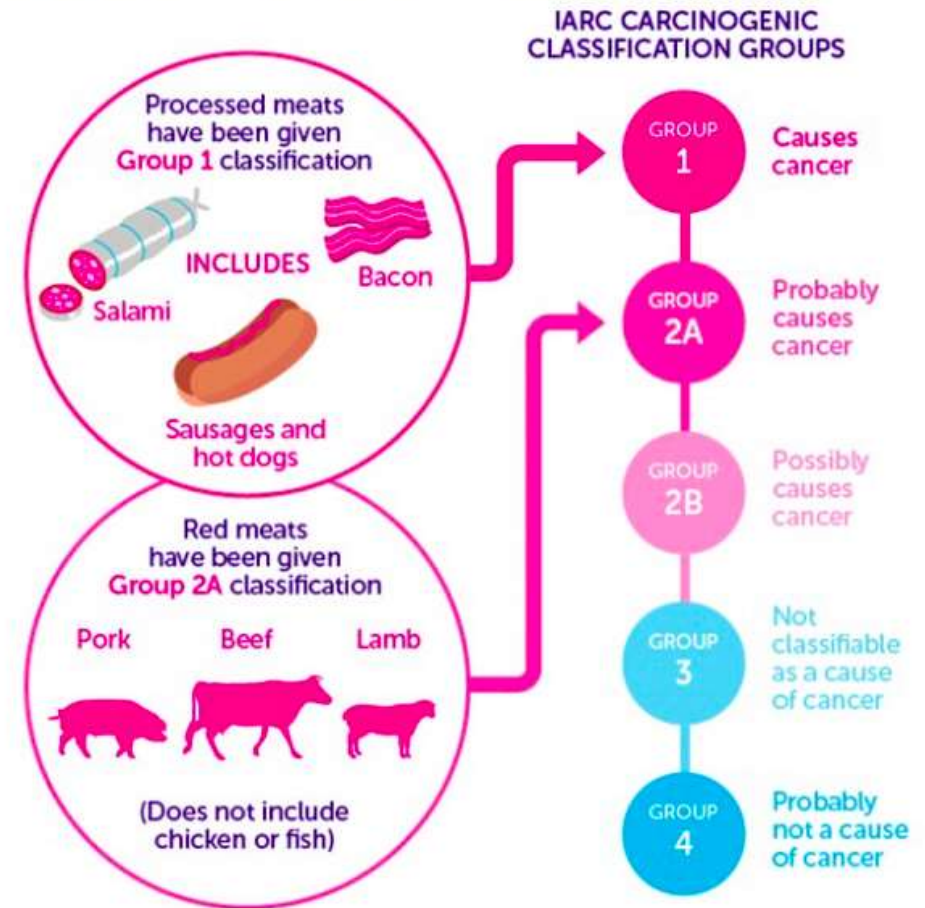
- **WHO/IARC**
- Reviewed >800 studies
- Per **100 grs red meat eaten daily** increased risk of colorectal cancer by **17% Relative Risk Reduction**
  - Colorectal estimate based on 10 cohort studies
  - Mechanistic evidence considered ‘strong’ (eg, oxidative stress)

# Evidence-Based Practice – WHO Review

Interpreting certainty of evidence for the effect



## MEAT AND CANCER HOW STRONG IS THE EVIDENCE?



These categories represent how likely something is to cause cancer in humans, not how many cancers it causes.

# Evidence-Based Practice – NutriRECS Reviews

## GRADE & Interpreting the magnitude and certainty of effect

### Certainty of evidence rating

- We are NOT assessing our certainty in point estimates of effects, but rather our *certainty in where effects lie relative to MID thresholds (rather than Null effect)*
- Guidelines – net benefit and net harm – “GRADE fully contextualized approach”

### Fatal outcomes:

≤10 events per 1000 – trivial

11-25 per 1000 - small but important effect

26-40 per 1000 - moderate.

### Non-fatal outcomes:

≤20 per 1000 – trivial

21-40 per 1000 - small but important

41-60 per 1000 - moderate.

Zeng L, et al. Targets of GRADE certainty of evidence. JCE 2021

Hultcrantz M, et al. The construct of certainty of evidence. JCE 2017

# Evidence-Based Practice – NutriRECS Reviews

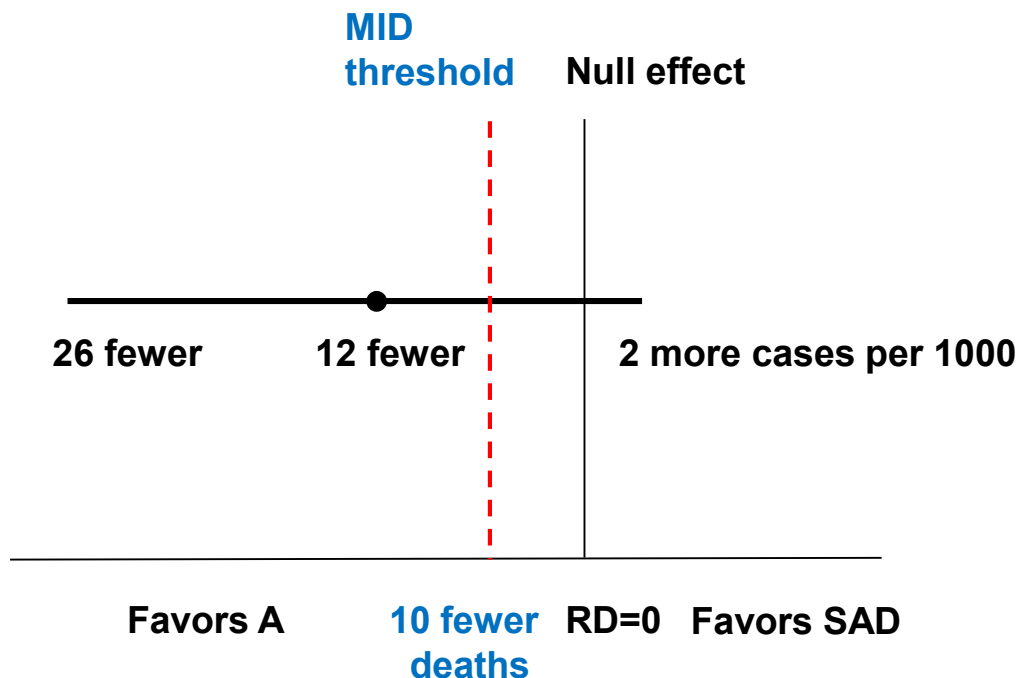
## GRADE & Minimal Important Difference

*We need to decide about the target of certainty rating.*

Intervention A vs. SAD, Total cancer mortality

Intervention/exposure A **improves** cancer risk when compared to standard diet  
Threshold: null effect

There is an **important difference** between intervention/exposure A and SAD for improving cancer risk  
MID Threshold: small but important effect



# Evidence-Based Practice – NutriRECS reviews

Interpreting certainty of evidence



Figure 1. Levels of evidence

- Historically, the question, “What is the best evidence?” was answered with the *hierarchy of evidence*

# Certainty/quality/confidence of evidence (for each outcome) based on GRADE

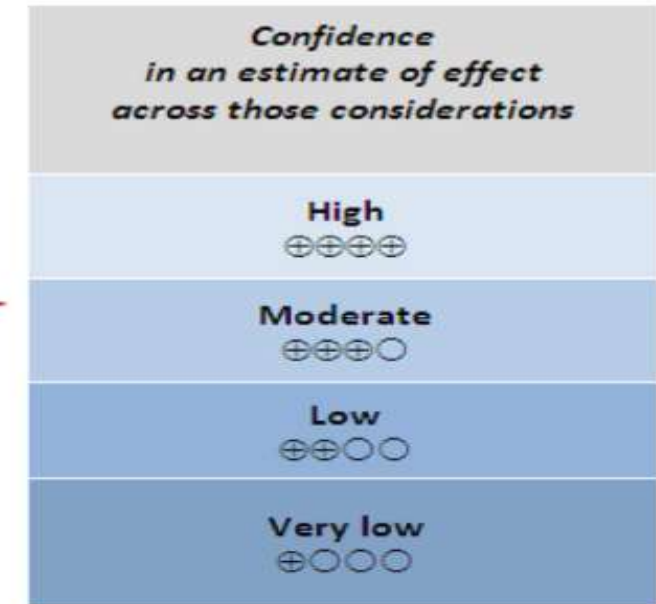
## 1. Establish initial level of confidence



## 2. Consider lowering or raising level of confidence



## 3. Final level of confidence rating



# SRMA of RCTs – 1.4 fewer red meat servings/week

## Interpreting magnitude and certainty of effect

**Supplement Table 3.** Summary of findings from RCTs for lower intake of red meat and cancer

Outcome	No of studies (follow-up period) (no of participants)	Hazard ratio (95% CI)	Population risk over 10.8 years for cardiometabolic outcomes, and over a lifetime for cancer	Risk difference (95%CI)	Certainty of evidence (GRADE)
Total cancer mortality	1 (Up to: 12.3 years) (48,835 participants)	HR 0.95 (0.89 to 1.01)	105/1000 (10.5%)	12 fewer per 1,000 (from 26 fewer to 2 more)	VERY LOW
Colorectal incidence	1 (12.3 years follow-up) (48,835 participants)	HR 1.04 (0.90 to 1.20)	20/1000 (2.0%)	3 more per 1,000 (from 7 fewer to 18 more)	VERY LOW

# SRMA of cohort studies – 3 fewer red meat servings/wk

Interpreting magnitude and certainty of effect

**Supplement Table 6.** Summary of findings from cohort studies for reduction of unprocessed red meat intake (3 servings/week)

Outcome	No of studies (follow-up period) (no of participants)	Relative risk (95% CI)	Population risk over lifetime*	Risk difference (95% CI)	Certainty of evidence (GRADE)
Overall cancer mortality	7 (5 to 28 years follow-up) (875,291 participants)	RR 0.93 (0.91 to 0.94)	105 per 1,000	7 fewer per 1,000 (9 fewer to 6 fewer)	LOW
Overall cancer incidence	2 (5 to 9 years follow-up) (71,858 participants)	RR 0.93 (0.83 to 1.04)	185 per 1,000	13 fewer per 1,000 (31 fewer to 7 more)	VERY LOW
Colorectal cancer incidence	5 (3 to 15 years follow-up) (322,502 participants)	RR 1.00 (0.92 to 1.09)	20 per 1,000	0 fewer per 1,000 (2 fewer to 2 more)	LOW

# SRMA of cohorts on dietary patterns & red meat

## Interpreting magnitude and certainty of effect

**Supplement Table 9.** Summary of findings from cohort studies for lower adherence to dietary patterns rich in red and processed meat

Outcome	No of studies (follow-up period) (no of participants)	Relative risk (95% CI)	Population risk over a lifetime*	Risk difference (95% CI)	Certainty of evidence (GRADE)
→ Overall cancer mortality	18 (6 to 34 years follow-up) (467,452 participants)	0.89 (0.83 to 0.96)	105/1000	12 fewer per 1,000 (from 18 fewer to 4 fewer)	VERY LOW II
Colorectal cancer incidence	16 (5 to 26 years follow-up) (840,980 participants)	0.94 (0.85 to 1.05)	20/1000	1 fewer per 1,000 (from 3 fewer to 1 more)	VERY LOW ‡
Colorectal cancer mortality	7 (6 to 34 years follow-up) (152,527 participants)	0.96 (0.76 to 1.21)	9/1000	0 fewer per 1,000 (from 2 fewer to 2 more)	LOW

# SRMA of cohorts studies & red meat

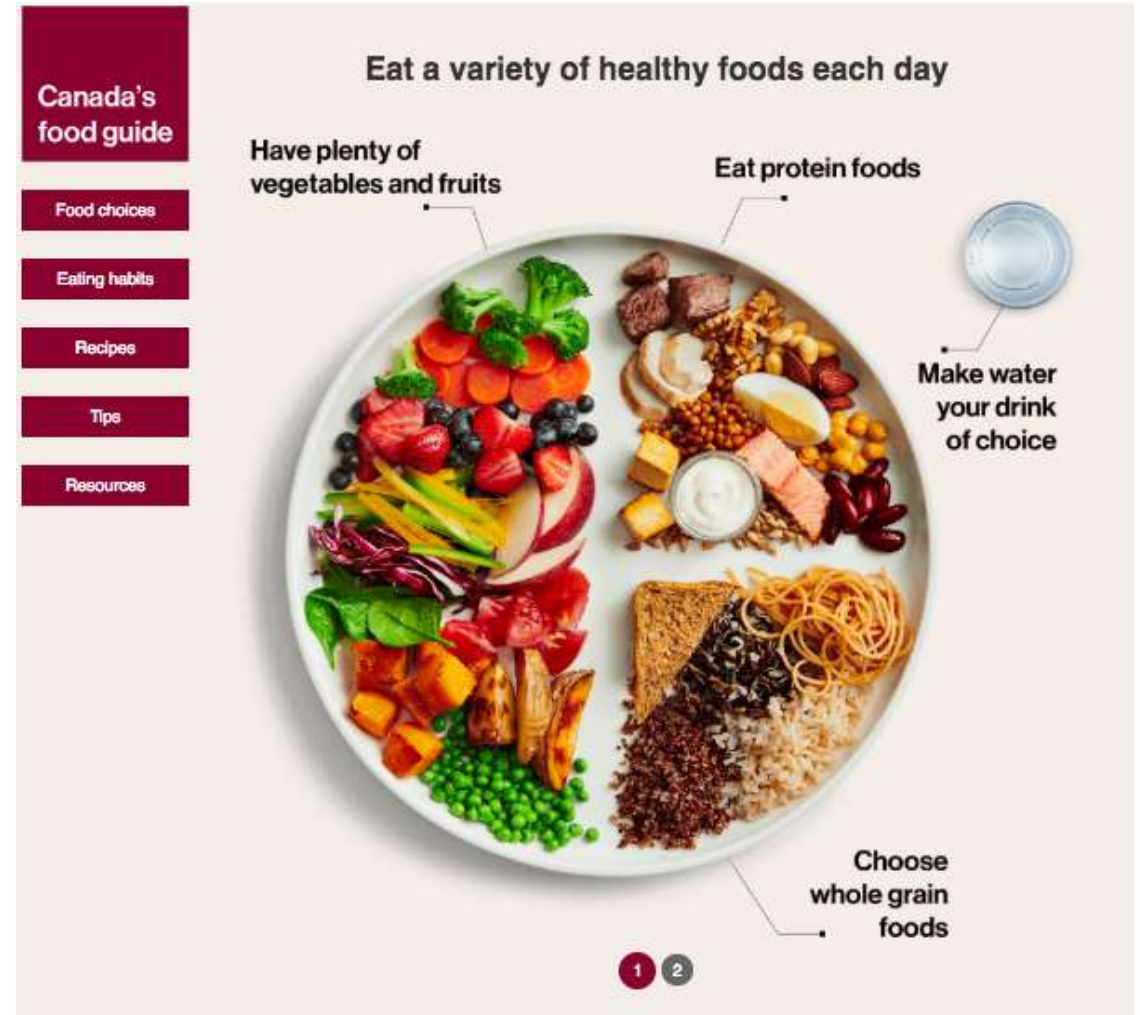
Interpreting magnitude and certainty of effect

	Red meat intake (3 fewer servings)		Dietary patterns (lower vs higher)	
Outcome	Absolute effect	Certainty	Absolute effect	Certainty
Overall cancer mortality	7 fewer per 1000 (from 10 fewer to 5 fewer) over lifetime	⊕⊕○○ LOW	12 fewer per 1,000 (from 18 fewer to 4 fewer) over lifetime	⊕○○○ VERY LOW

# Evidence-Based Practice

Values and preferences – GRADE methods

- Patients, clients (clinical)
- General public (public health)



# Evidence-Based Practice

Applying study results based on client values and preferences

- **Value:** relative worth, merit or importance **of outcomes**
  - risk of cancer **vs** dietary satisfaction
- **Preference:** a greater liking for one alternative over another (or others) based on **magnitude of effects and certainty of evidence for effects** (for valued outcome[s])



# Evidence-Based Practice– NutriRECS review

## Values and Preferences

REVIEW

Annals of Internal Medicine

## Health-Related Values and Preferences Regarding Meat Consumption

### A Mixed-Methods Systematic Review

Claudia Valli, MSc; Montserrat Rabassa, PhD; Bradley C. Johnston, PhD; Ruben Kuijpers, MSc; Anna Prokop-Dorner, PhD; Joanna Zajac, PhD; Dawid Storman, MD; Monika Storman, MD; Malgorzata M. Bala, MD, PhD; Ivan Solà, MSc; Dena Zeraatkar, MSc; Mi Ah Han, MD, PhD; Robin W.M. Vernooij, PhD; Gordon H. Guyatt, MD; and Pablo Alonso-Coello, MD, PhD; for the NutriRECS Working Group\*

# Evidence-Based Practice – NutriRECS review

## Values and preferences

### *“Willingness to change meat consumption”*

Study design & country	Number of studies (participants)	Certainty	Plain language summary
<p><b>Qualitative studies</b> (1 focus-group, 1 interview, 1 mixed-method)</p> <p><u>Countries:</u> Portugal, Scotland, Australia</p>	<p>3 (N= 156)</p> <p><b>Omnivores</b> <b>100%</b></p>	<p>⊕⊕○○ LOW</p> <p>(<b>Risk of bias</b> – lack of reporting on investigator-participant relationship; <b>Indirectness</b> – type of meat and specificity to health outcomes)</p>	<p>Overall, most omnivores often mentioned the <b>taste</b> of meat, the perception of meat as part of a <b>healthy diet and as part of their culture/tradition, lack of food alternatives/cooking skills</b> to prepare a tasty dish without meat as barriers for reducing meat consumption.</p>

# Clinical Scenario – What advice?



## Overall Cancer Mortality



7 fewer

average  
consumption

105

per 1000

reduction of three  
weekly servings  
(120g) of  
unprocessed red  
meat

98

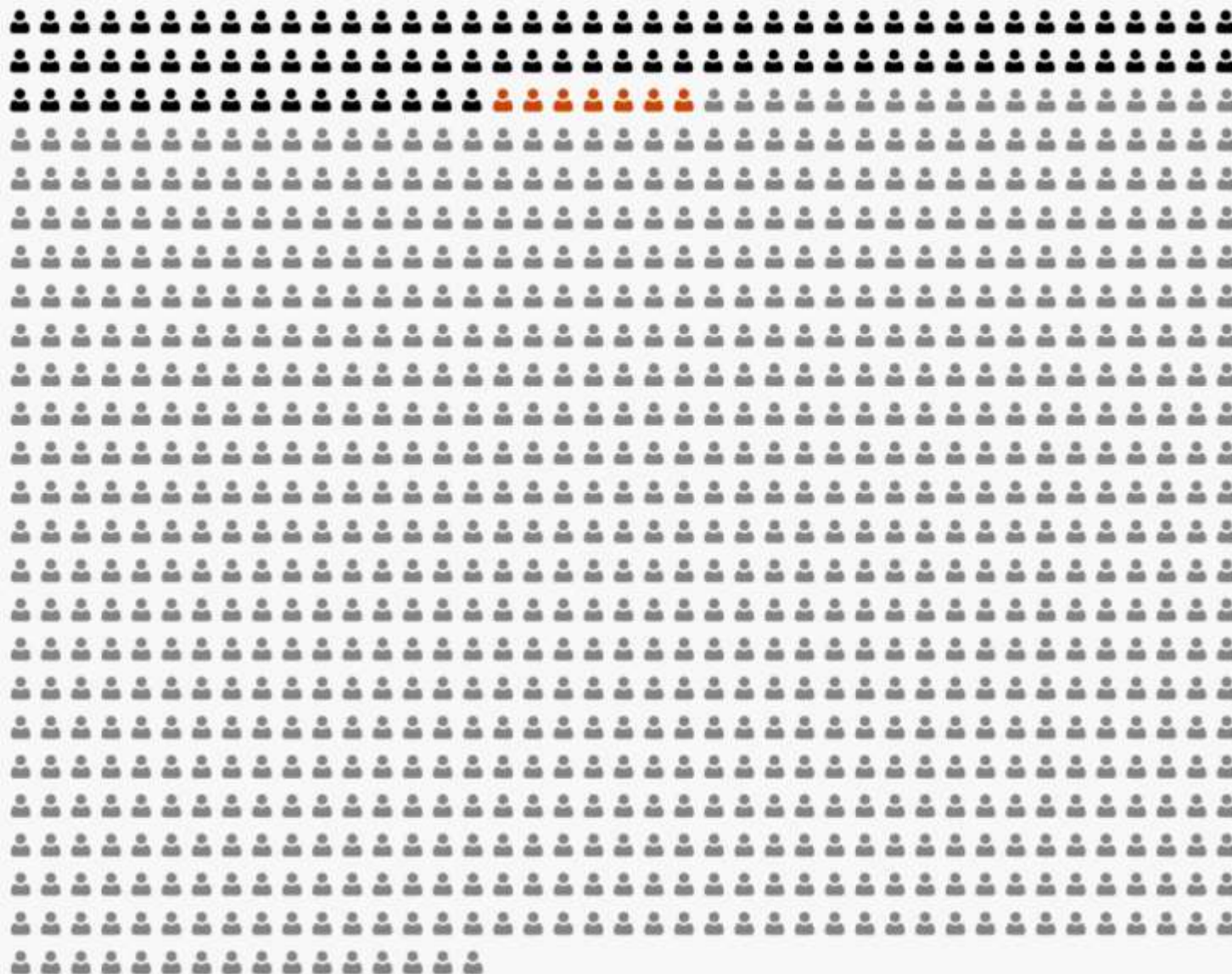
per 1000

Certainty



LOW

Among a 1000 patients like you, with reduction of three weekly servings (120g) of unprocessed red meat



895 with no event

# Evidence-Based Practice - 3 new NutriRECS studies

## Values and preferences

*“Willingness to change red or processed meat consumption”*



Article

### Values and Preferences Related to Cancer Risk among Red and Processed Meat Eaters: A Pilot Cross-Sectional Study with Semi-Structured Interviews

Victoria Howatt <sup>1</sup>, Anna Prokop-Dorner <sup>2</sup>, Claudia Valli <sup>3,4</sup>, Joanna Zajac <sup>5</sup>, Malgorzata M. Bala <sup>6</sup>, Pablo Alonso-Coello <sup>4,7</sup>, Gordon H. Guyatt <sup>8,9</sup> and Bradley C. Johnston <sup>1,10,\*</sup>



**Objectives:** Explore the dietary habits of meat eaters, their reasons for eating meat, and willingness to change their meat consumption when faced with a potential risk reduction of cancer over a lifetime based on a systematic review and dose–response meta-analysis.

**Results:** None of the participants were willing to eliminate red or processed meat from their diet. About one third were willing to reduce their consumption.

# Evidence-Based Practice

## Values and preferences

*Public Health Nutrition*: 25(8), 2084–2098

doi:10.1017/S1368980022000866

Values and preferences influencing willingness to change red and processed meat consumption in response to evidence-based information: a mixed methods study

Anna Prokop-Dorner<sup>1,\*</sup>, Aleksandra Piłat-Kobla<sup>1</sup>, Joanna Zając<sup>2</sup>, Michalina Luśtyk<sup>1</sup>, Claudia Valli<sup>3,4</sup>, Aneta Łapczuk<sup>1</sup>, Monika Brzyska<sup>1</sup>, Bradley Johnston<sup>5,6</sup>, Dena Zera<sup>7,8</sup>, Gordon Guyatt<sup>8,9</sup>, Pablo Alonso-Coello<sup>4,10</sup> and Malgorzata M Bala<sup>2</sup>

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**Conclusion:** When faced with health information about the uncertain reduction in the risk of cancer mortality and incidence, the vast majority of study participants were unwilling to introduce changes in their consumption habits.

# Evidence-Based Practice

## Values and preferences

Article

### Health Related Values and Preferences Regarding Meat Intake: A Cross-Sectional Mixed-Methods Study

Claudia Valli <sup>1,2,\*</sup>, Marilina Santero <sup>1,2</sup>, Anna Prokop-Dorner <sup>3</sup> , Victoria Howatt <sup>4,5</sup>, Bradley C. Johnston <sup>6,7</sup>,  
Joanna Zajac <sup>8</sup>, Mi-Ah Han <sup>9</sup> , Ana Pereira <sup>10,11</sup>, Fernando Kenji Nampo <sup>12</sup>, Gordon H. Guyatt <sup>13</sup>,  
Malgorzata M. Bala <sup>8</sup> , Pablo Alonso-Coello <sup>2,14</sup> and Montserrat Rabassa <sup>2</sup>



**Conclusion:** When informed about the cancer incidence and mortality risks of meat consumption, most respondents would not reduce their intake. **Public health and clinical nutrition guidelines should ensure that their recommendations are consistent with population values and preferences.**

# Additional Perspective on Political Landscape

*(Journal of American Medical Association 2020)*

## News & Analysis

### Medical News & Perspectives

## Backlash Over Meat Dietary Recommendations Raises Questions About Corporate Ties to Nutrition Scientists

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Rita Rubin, MA

# Perspective on Reconciling Contrasting Guidelines

(Helping nutrition guideline users' understand Consensus vs Evidence-Based)



Journal of Clinical Epidemiology 138 (2021) 215–218

**Journal of  
Clinical  
Epidemiology**

## COMMENTARY

### Reconciling contrasting guideline recommendations on red and processed meat for health outcomes

RWM Vernooij<sup>a,b</sup>, GH Guyatt<sup>c</sup>, D Zeraatkar<sup>c,d</sup>, MA Han<sup>e</sup>, C Valli<sup>f,g</sup>, R El Dib<sup>h</sup>,  
P Alonso-Coello<sup>f</sup>, MM Bala<sup>i</sup>, BC Johnston<sup>c,j,\*</sup>

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<sup>i</sup>Chair of Epidemiology and Preventive Medicine, Department of Hygiene and Dietetics, Jagiellonian University Medical College, Krakow, Poland

<sup>j</sup>Departments of Nutrition, Epidemiology & Biostatistics, Texas A&M University, College Station, TX, USA

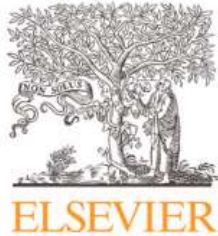
Accepted 12 July 2021; Available online 14 July 2021

# Perspective on Evidence-Based Dietary Guidelines

Video synopsis of methods and recommendations



# Methodology and Patients First!



Journal of Clinical Epidemiology 138 (2021) 219–226

Journal of  
Clinical  
Epidemiology

## COMMENTARY

### Methodology over metrics: current scientific standards are a disservice to patients and society

Ben Van Calster<sup>a,b,c,\*</sup>, Laure Wynants<sup>a,c,d</sup>, Richard D Riley<sup>e</sup>, Maarten van Smeden<sup>f</sup>,  
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<sup>a</sup>Department of Development and Regeneration, KU Leuven, Leuven, Belgium

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Accepted 25 May 2021; Available online 30 May 2021

# Acknowledgements:

NutriRECS meaty team (40+), including trainees

Dena Zeraatkar (McMaster)

Miah Han (McMaster)

Claudia Valli (Cochrane Iberoamerica)

Anna Prokop-Dorner (Cochrane Poland)

Robin Vernooij (Dalhousie)

Regina El Dib (Dalhousie)

Victoria Howatt (Dalhousie)



# Thank You!

## Discussion?



NutriRECS

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Website: [www.nutrirecs.com](http://www.nutrirecs.com)