

Embedding a programme of open research in health science

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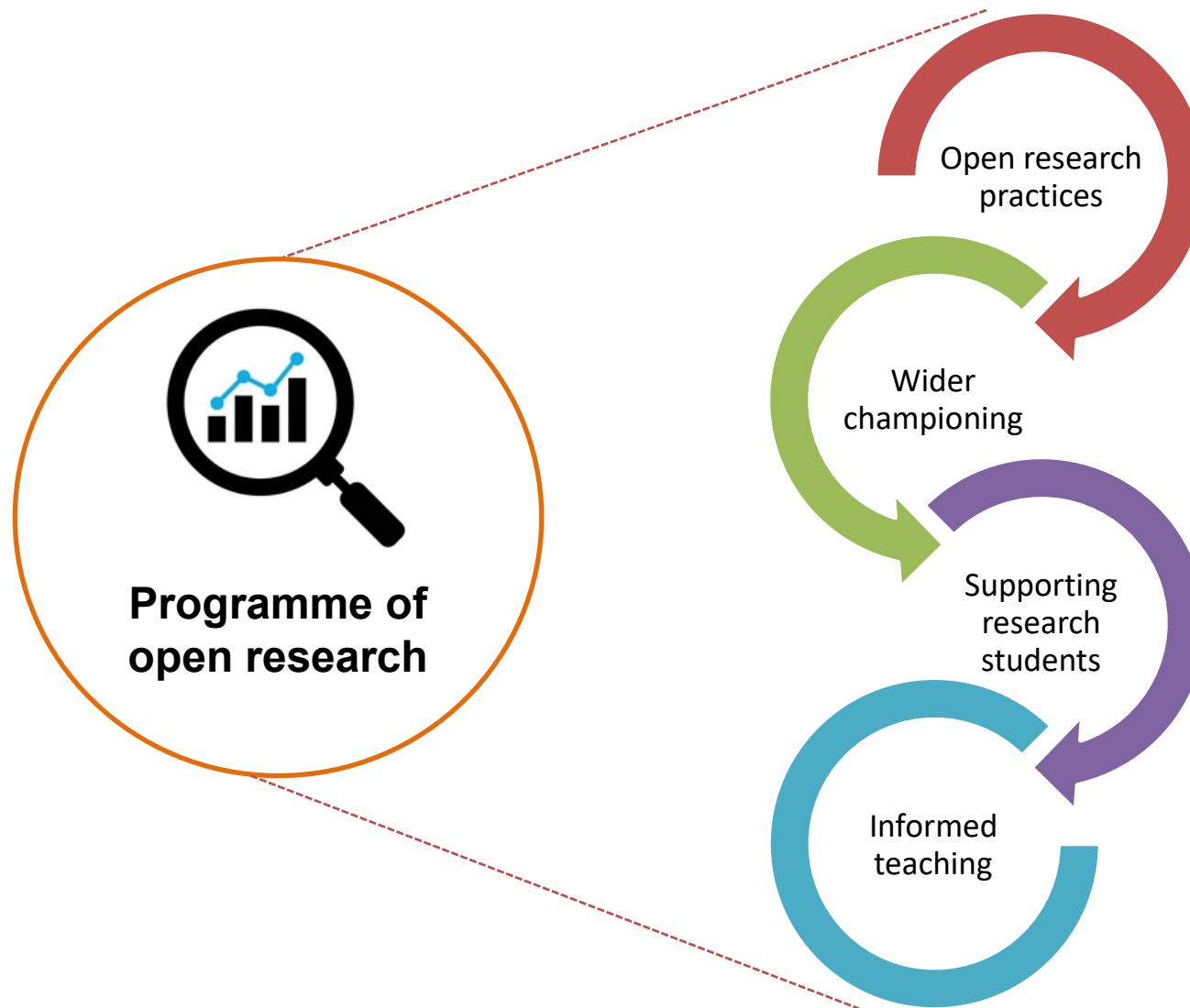
 [@SamOrange01](https://twitter.com/SamOrange01)

Research background

- **Lecturer** in School of Biomedical, Nutritional & Sport Sciences
- **Early career researcher (3 years post-PhD)**
 - Population health science institute
 - Translational and clinical research institute



Open research programme





Case study

Paper published in *Int Journal Cancer* in 2022

#5 Transparent
amendments

#6 Dissemination

#1 Pre-
registration

#2 Preprint

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CANCER THERAPY AND PREVENTION

IJC INTERNATIONAL JOURNAL OF CANCER

Acute aerobic exercise-conditioned serum reduces colon cancer cell proliferation in vitro through interleukin-6-induced regulation of DNA damage

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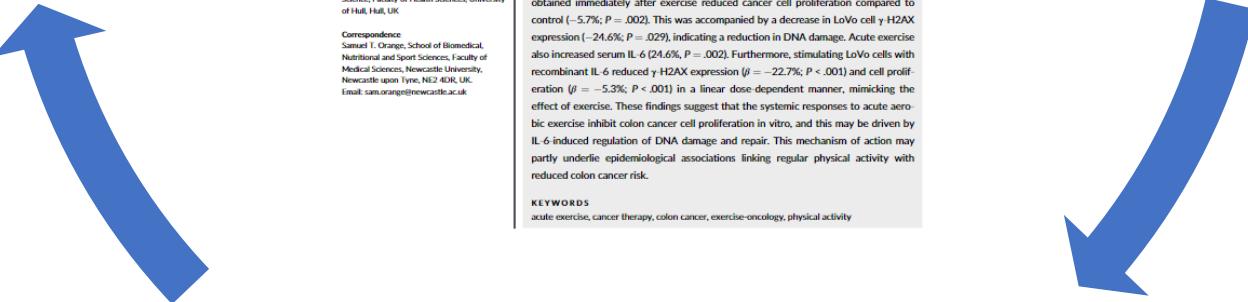
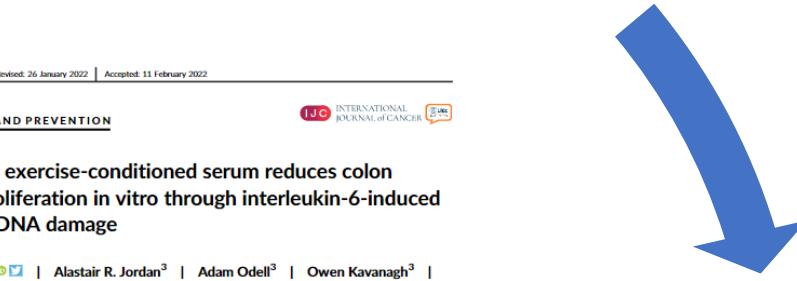
Abstract

Epidemiological evidence shows that regular physical activity is associated with reduced risk of primary and recurrent colon cancer. However, the underlying mechanisms of action are poorly understood. We evaluated the effects of stimulating a human colon cancer cell line (LoVo) with human serum collected before and after an acute exercise bout vs nonexercise control serum on cancer cell proliferation. We also measured exercise-induced changes in serum cytokines and intracellular protein expression to explore potential biological mechanisms. Blood samples were collected from 16 men with lifestyle risk factors for colon cancer (age \geq 50 years; body mass index \geq 25 kg/m 2 ; physically inactive) before and immediately after an acute bout of moderate intensity aerobic interval exercise (6 \times 5 minutes intervals at 60% heart rate reserve) and a nonexercise control condition. Stimulating LoVo cells with serum obtained immediately after exercise reduced cancer cell proliferation compared to control (-5.7% ; $P = .002$). This was accompanied by a decrease in LoVo cell γ H2AX expression (-24.6% ; $P = .029$), indicating a reduction in DNA damage. Acute exercise also increased serum IL-6 (24.6%; $P = .002$). Furthermore, stimulating LoVo cells with recombinant IL-6 reduced γ H2AX expression ($\beta = -22.7\%$; $P < .001$) and cell proliferation ($\beta = -5.3\%$; $P < .001$) in a linear dose dependent manner, mimicking the effect of exercise. These findings suggest that the systemic responses to acute aerobic exercise inhibit colon cancer cell proliferation in vitro, and this may be driven by IL-6-induced regulation of DNA damage and repair. This mechanism of action may partly underlie epidemiological associations linking regular physical activity with reduced colon cancer risk.

KEYWORDS
acute exercise, cancer therapy, colon cancer, exercise-oncology, physical activity

#4 Open
data

#3 Open
access



#1 Pre-registration

I prospectively registered the study on an open clinical trials registry (ClinicalTrials.gov)

NIH U.S. National Library of Medicine

ClinicalTrials.gov

ClinicalTrials.gov ID: NCT04057274

Tracking Information	
First Submitted Date <small>ICMJE</small>	August 13, 2019
First Posted Date <small>ICMJE</small>	August 15, 2019
Last Update Posted Date	August 20, 2020
Actual Study Start Date <small>ICMJE</small>	September 23, 2019
Actual Primary Completion Date	March 6, 2020 (Final data collection date for primary outcome measure)

#2 Preprint

I uploaded a preprint on a publicly accessible research repository (Open Science Framework; OSF)



#3 Open access publication



I published the study in an open access journal via the University's "transformative agreement"

**Transformative
agreement**

Wiley



The [Wiley Open access agreement for Jisc institutions](#) allows full staff or students affiliated with Newcastle University who act as the 'responsible corresponding author' to publish articles as open access at no additional cost

#4 Open data

I made the raw data, code & supplementary materials publicly available on OSF



Acute Effect of modeRate-intensity aerOBIC Exercise on Colon Cancer Cell Growth (AEROBIC)

- OSF Storage (United States)
 - + Data
 - + Preprint
 - + Sample_size_estimation
 - + Statistical code
 - + Supplementary materials

DATA AVAILABILITY STATEMENT

All data and code are available on the Open Science Framework project page (<https://osf.io/trw78/>).

#5 Transparent protocol amendments

I documented & justified all changes that were made from the pre-registered protocol

Supplementary Table 1. Deviations to the prospectively registered protocol

Deviation	Justification
#1 Measuring the effect of acute exercise on serum markers that pre-specified	We initially planned to measure serum insulin, IGF-1, epinephrine, norepinephrine, TNF- α , and IL-6. However, we decided to measure serum IL-6, IL-8, IL-10, irisin, osteonectin, and oncostatin M because of they have recently emerged as candidate cytokines linking exercise to cancer control.
#2 Evaluating the effect of exercise-conditioned serum and recombinant IL-6 on the expression of candidate proteins in LoVo cells	Our results showed that acute-exercise conditioned serum reduced colon cancer cell growth, and we wanted to explore potential molecular mechanisms underlying the effect. These experiments add important information to the results.

#6 Dissemination

I disseminated the findings via: press release, blogs, social media, infographics & podcasts

← Thread

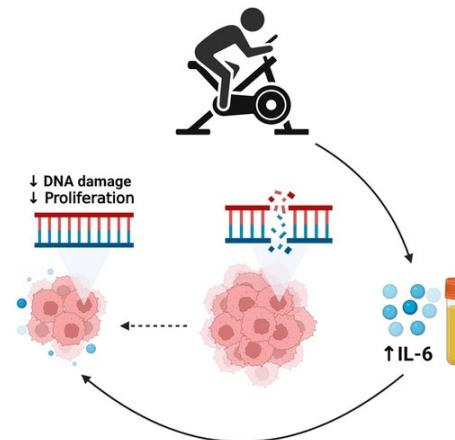
 Sam Orange
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New paper in [@IntJCanc](#) identifying a potential mechanism of exercise and cancer prevention.

"Acute aerobic exercise-conditioned serum reduces colon cancer cell proliferation in vitro through interleukin-6-induced regulation of DNA damage"

onlinelibrary.wiley.com/doi/10.1002/ij...

Brief thread



Exercise can cut bowel cancer risk by a fifth, Newcastle University finds

THE TIMES

Can exercise slow down cancer?

According to new research, even moderate activity may have an effect on tumour growth

Altmetrics



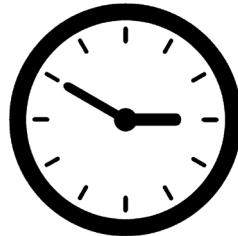
ALL RESEARCH OUTPUTS

#42,142

of 21,438,248 outputs

In the **top 1%** of all
research outputs ever
tracked by Altmetric

Key challenges



Lack of time



Lack of incentive

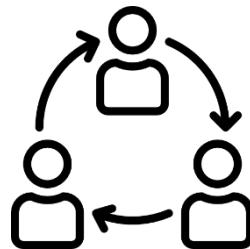


[Senior] colleagues who don't want to engage with open research

Key benefits



Increases rigour & diligence in your own work

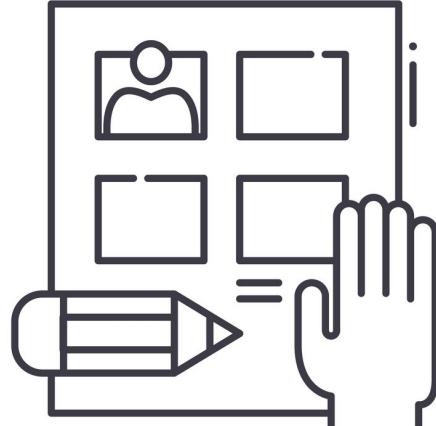


Promotes scientific progress & collaboration



Empowers research students

What's next?



Integrate open research as a core component in BSc/MSc programme curricula



Continue to champion open research via STORK activities inc. conferences, seminars, & open source textbooks

Thank you