

# Gene transfer, Gene Enhancement or Gene Doping?

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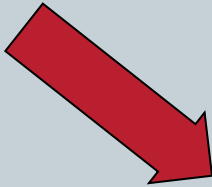
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# Gene transfer as a 'dual-use' technology: From bench, to bedside, to track & Field

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**GENE TRANSFER.  
GENE THERAPY,  
GENE DOPING?**

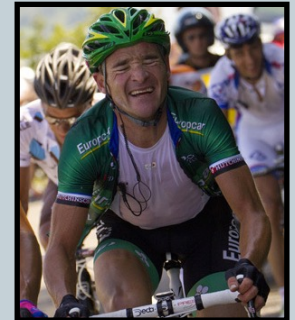


# An ethically permissible technology?

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*Is it ethically justifiable for individuals to seek experimental gene transfer to modulate their response to pain?*

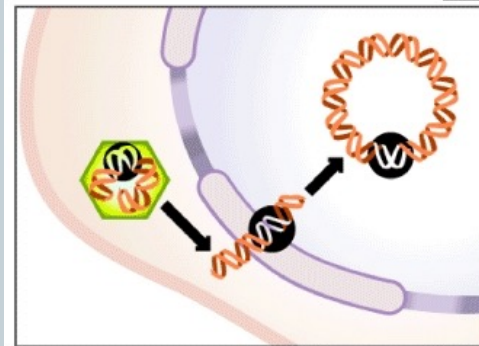


# What we're talking about

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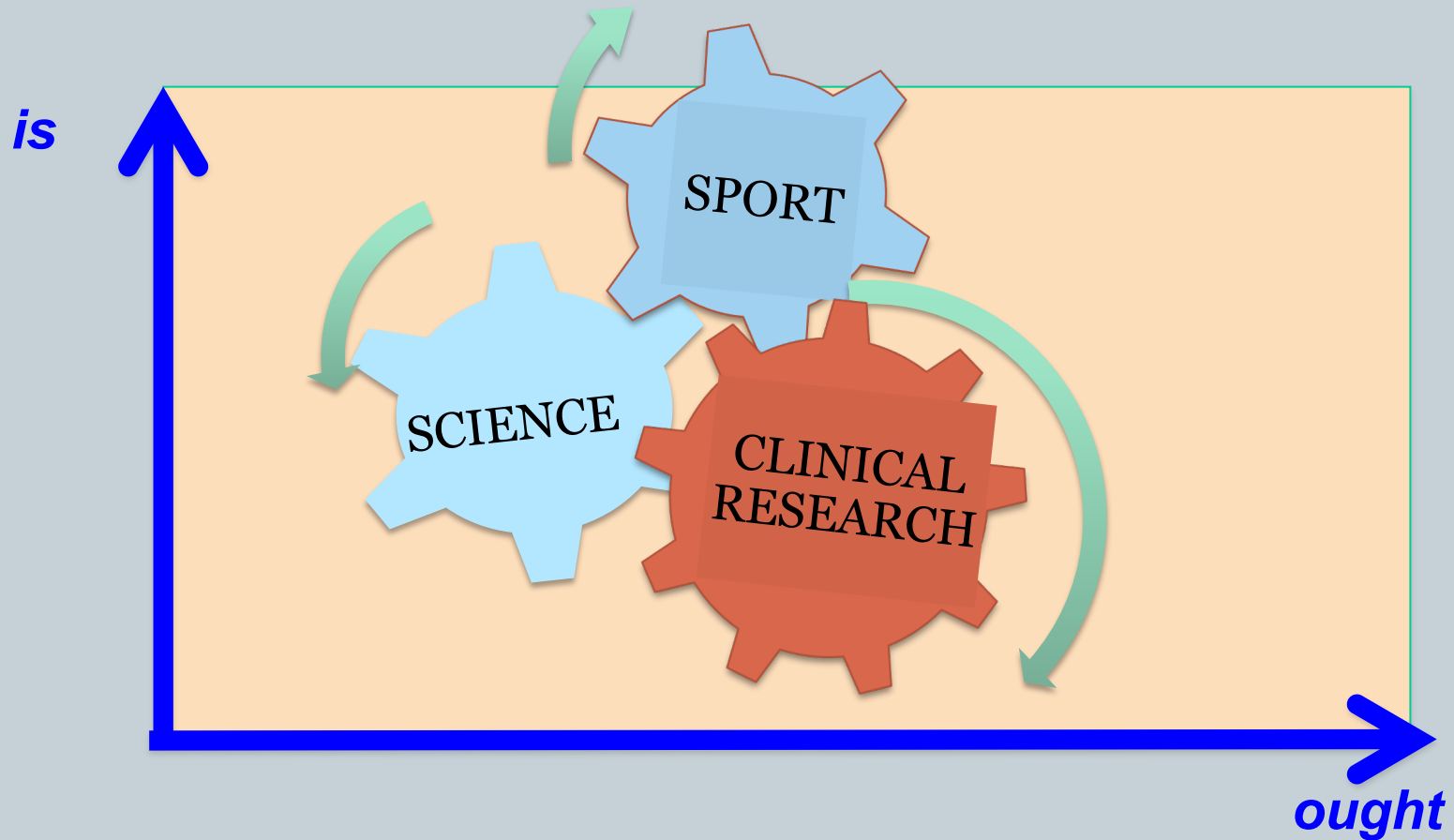
A Phase 1 clinical trial of Vascular Endothelial Growth Factor Gene Transfer (ClinicalTrials.gov Identifier: **NCT00304837**)

The DNA directs the cells of the artery wall to increase production of VEGF → **growth of new blood vessels** → increased oxygen and nutrient supply → increased removal of waste products → relief of ischemic pain → ulcer healing in patients



# Ethics: *Framing the problem*

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*Adopting a contextual, comparative ethics approach...*



# Clinical research context: Ethical issues

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1. Safety concerns
2. Risk/benefit ratio of trial
3. Informed consent and autonomy of choice
4. Vulnerability of patient/participant
5. Therapeutic misconception

# Safety concerns

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RELATED TO  
ENCODED  
TRANSGENE

- Facilitation of tumour vascularization;
- Detrimental consequences in non-target tissues

RELATED TO  
CARRIER or  
VIRAL VECTOR

The DNA coding for the VEGF protein is injected directly into the leg muscles, without any viral or non viral carrier.

# Professional sport context: Ethical issues

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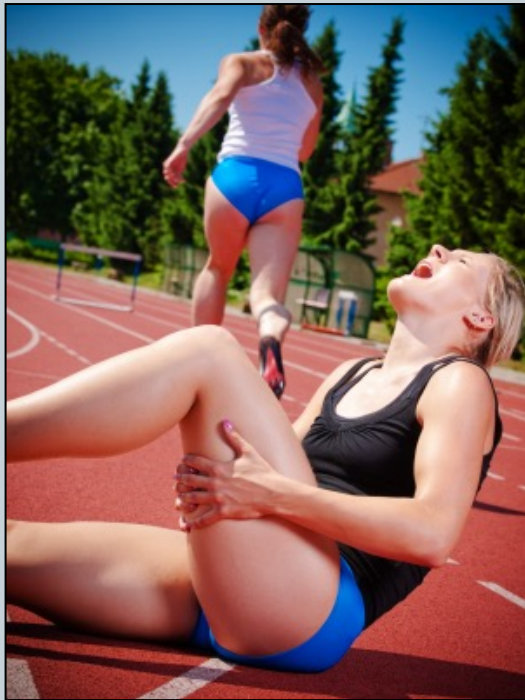
- Safety concerns
  - Risks/benefits ratio
  - Informed consent and autonomy of choice
  - Vulnerability of athlete in the sports 'ecosystem'
  - Enhancing Misconception
- + The meaning and role of 'pain' in competition





# Types and meanings of ‘*pain*’ in sports

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“*Bad*”= injury,  
prevents effort and  
competition

“*Good*” = intrinsic in the  
effort, and meaningful  
for competition



# The context of gene transfer technologies and its ethical relevance



## a) CLINICAL RESEARCH CONTEXT

Participation in an experimental trial would be ethically permissible, provided two conditions are met:

**Informed consent** is valid (competence, and vulnerability) and **therapeutic misconception** is avoided.

## b) PROFESSIONAL SPORT CONTEXT

The conditions in a) are not sufficient for ethical justifiability in this context, where tolerance for pain counts as a **relevant inequality**, which **should not** be leveled out.

Doing so would diminish meaning of athletic performance, and be contrary to the ‘**spirit of sport**’ → hence count as ‘doping’.

# Conclusions: in what ways does gene transfer for pain count as 'doping'?

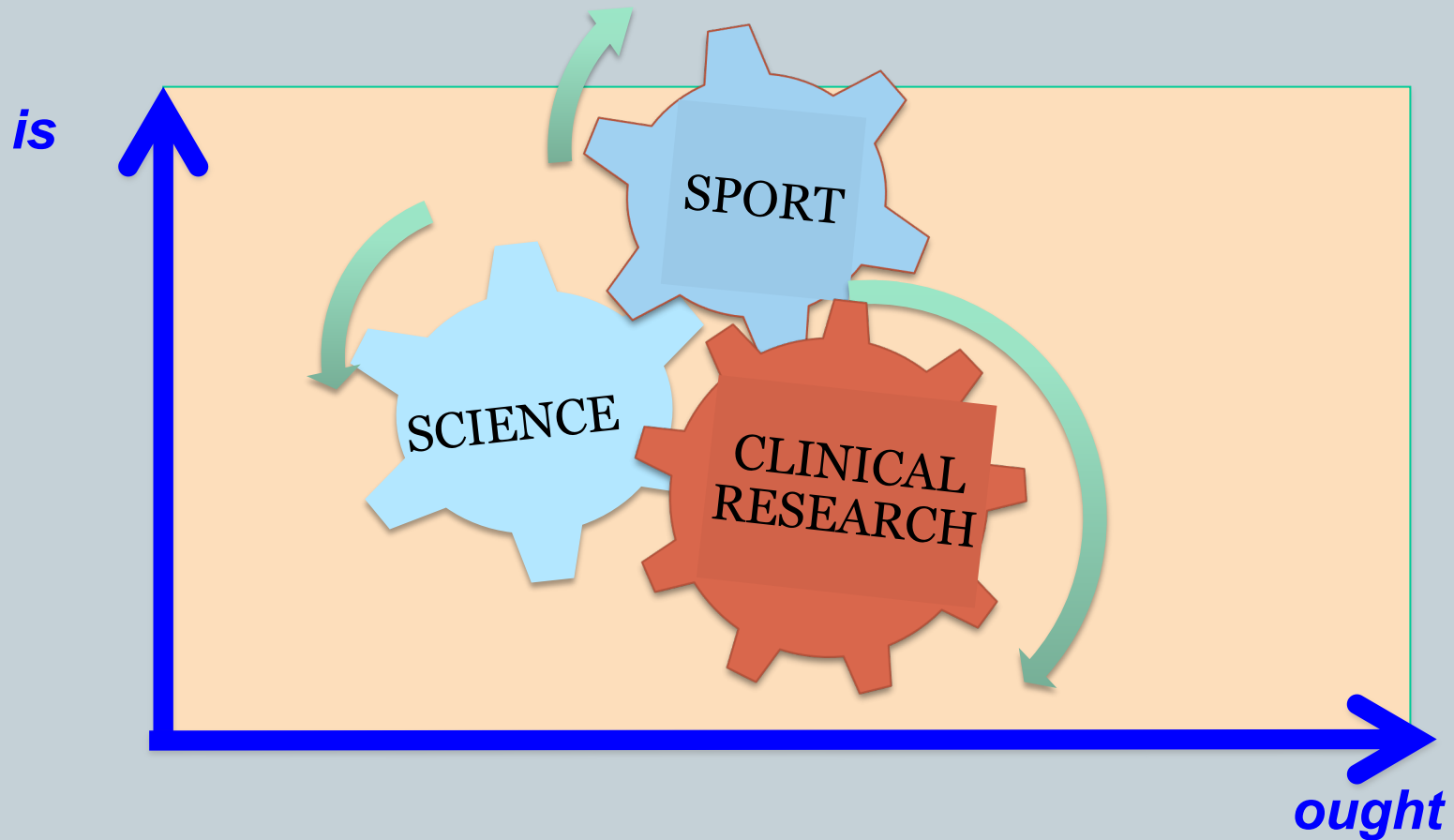
Three criteria (any two of which of are sufficient for inclusion in the Prohibited List):

1. Actual or potential to *enhance* performance
2. Actual or potential *risk* to the health of athlete
3. Violation of the **spirit of sport**, by diminishing the meaning of athletic performance



# A contextual, comparative ethics approach sheds light on both contexts

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***Thank you for your attention!***

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