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How to Protect the Public? Standards of Evidence and Levels of Proof for Taking Action

Different Approaches to Evaluating Scientific Evidence

EMF and Health 2008 RRT Conference at the Royal Society of London - A Global Issue
Exploring appropriate precautionary approaches

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What Approach?
Why Do Results Differ so Widely?

- How is the Central Question Framed?
- What Standard of Evidence (Level of Proof?)
- What Terminology Guides the Assessment?
- What Level of Evidence = Action?

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What Standard of Evidence?

- Scientific standard
- Legal standard
- Environmental standard
- Public Health standard

- The level of proof required to answer the question really determines the outcome.

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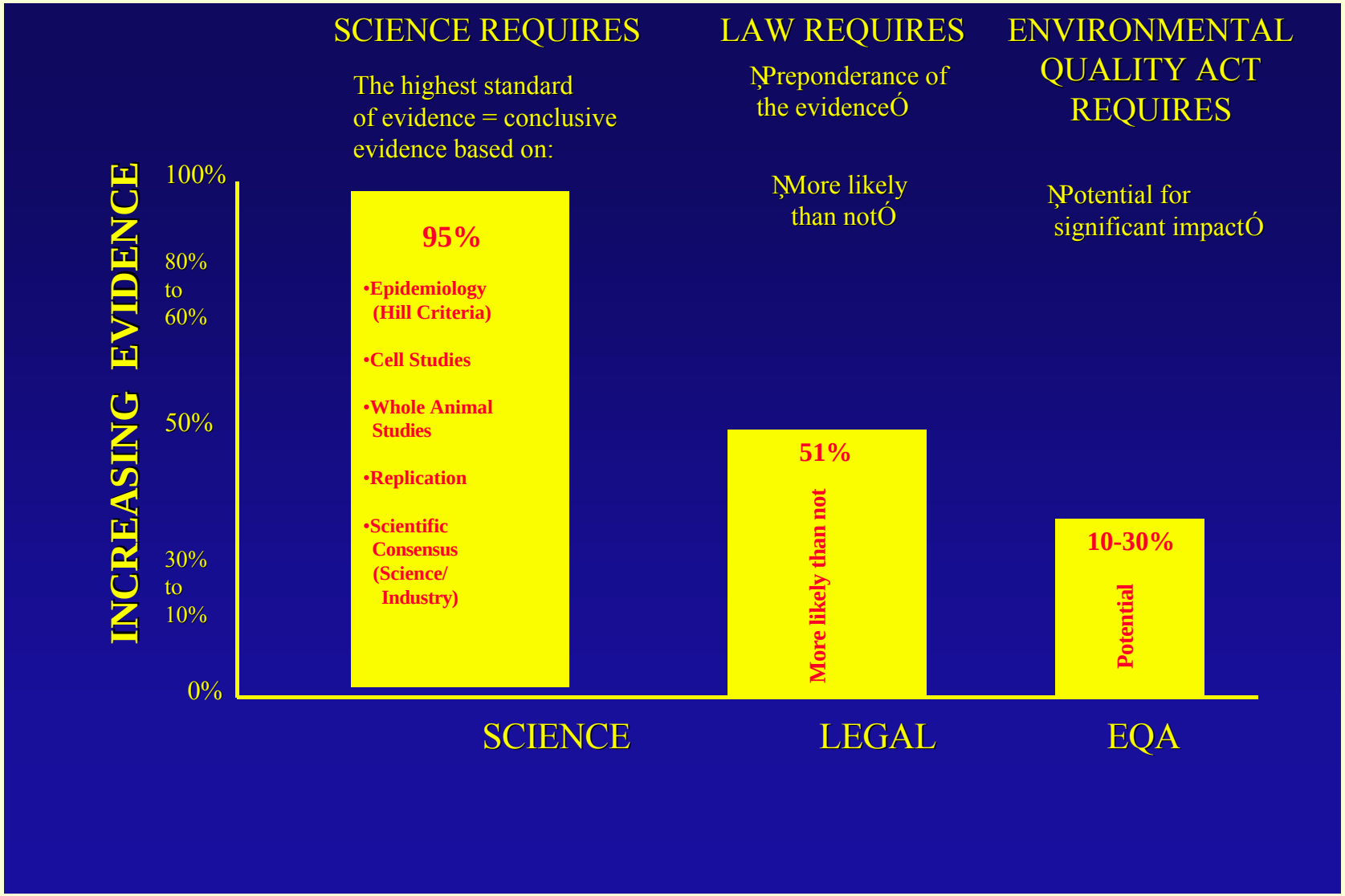

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What Level of Evidence = Action?

- Scientific Standard - 95%-99% certainty

  "causal, demonstrated, clear and consistent"
- Legal Standard - "more likely than not"

  51% certainty - in the possible/probable range.
- Environmental Standard - 10% - 30% certainty "the potential for a significant impact".
- Public Health Standard - Variable

PUBLIC HEALTH REQUIRES

STANDARDS OF EVIDENCE FOR ACTION

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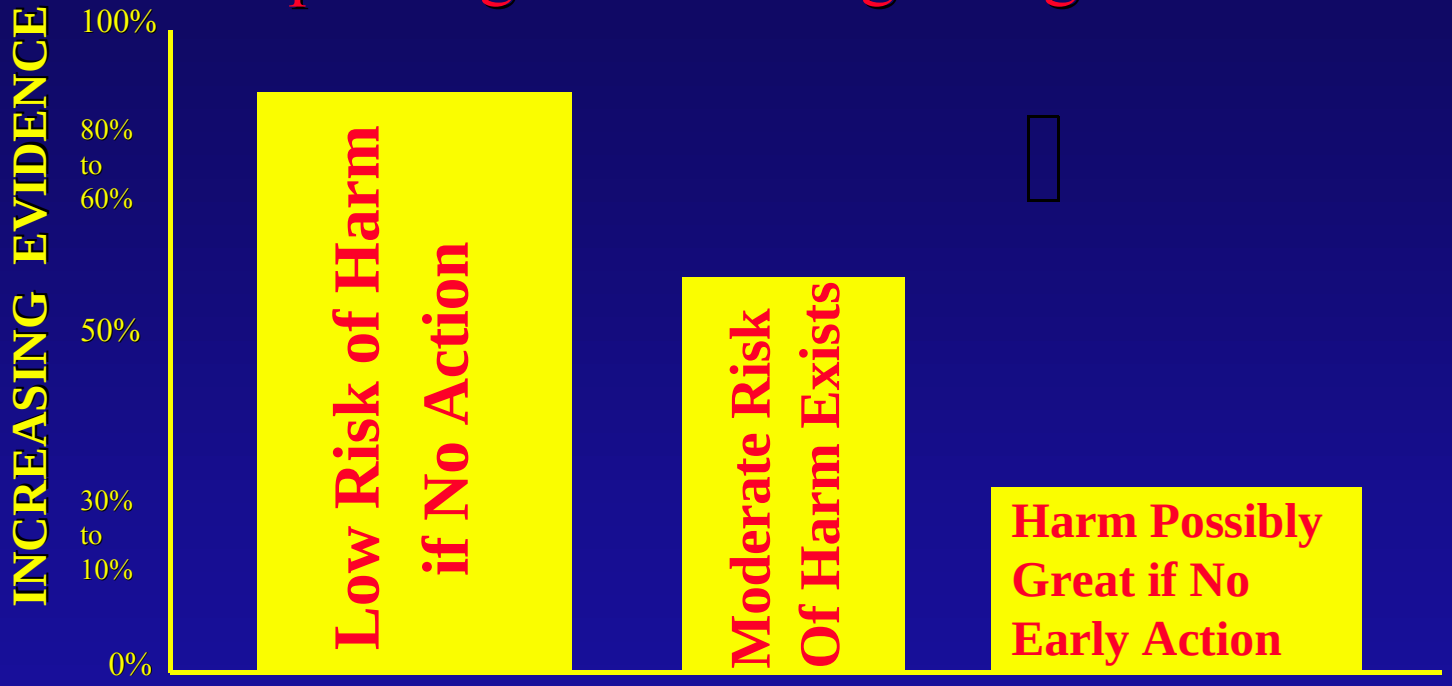
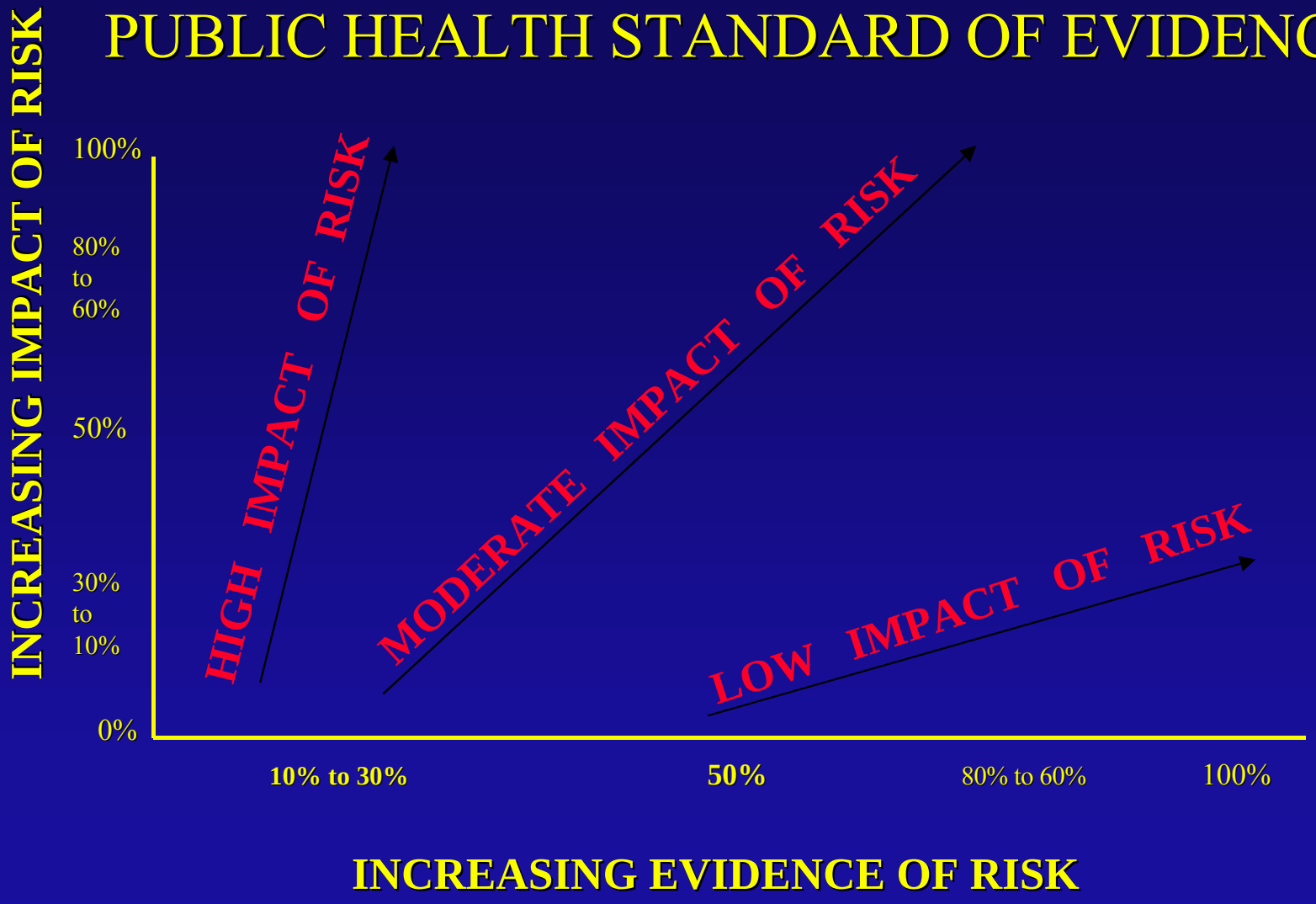
What does Public Health Require?

- A body of evidence suggesting health effects
- A belief that we should pay attention to human effects (epidemiology) showing risks
- A knowledge that public safety limits don't yet cover these effects
- A reasonable assumption that these effects, with chronic exposure, may result in disease and death
- Good options for alternatives that do not have risk

Proportionate Public Health Actions Can Vary Depending on Risk in Ignoring the Problem



PUBLIC HEALTH STANDARD OF EVIDENCE



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How is the Question Framed?

- Is there a health risk demonstrated?

or

- Is there a possible effect on health?

- How the question is asked largely structures the outcome of reviews, and frames the 'message'

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- Conclusions -
How asking a different question can lead to a 100% different answer

- No changes warranted to ICNIRP limits
- Changes warranted to ICNIRP and FCC limits.

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What is the Key Terminology?

- Do the terms signal a scientific standard for judging the evidence?

or

- Do the terms signal a public health or environmental standard for judging the evidence?

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Critical Definition Words

How these key terms are used is critical to outcome

- Evidence
- Effect
- Adverse effect or risk
- Proof
- Consistency
- Certainty
- Plausible biological mechanism

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What is the Key Terminology? The Short List

SCIENTIFIC STANDARD

- "No consistent proof"
- "Relationship not proven"
- "The link remains uncertain"
- "Studies fail to provide consistent support for"
- Data sparse for long-term low-level effects (limited)
- "No health effect has been consistently demonstrated"
- No established mechanism

PUBLIC HEALTH STANDARD

- Sufficient evidence exists to act
- Reasonable suspicion of risk from studies
- Risks are possible/probable based on biological effects that, with chronic exposure can reasonably be presumed to lead to health risks
- Converging lines of evidence
- Plausible biological mechanism

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What is the Key Terminology?

The Long List

(PRO) Precautionary Viewpoint	(CON)Science-based Evidence Viewpoint
There is suggestive evidence	No causal evidence (no proof)
Reasonable suspicion of risk exists	Relationship not proven, link uncertain
The trend is positive (for effect)	Chance effect (confounders in all studies)
Some inconsistency is expected	There is no ‘consistency” in studies
Human (epi) evidence is there	Animal evidence is sparse or lacking
Biological effects clearly occur	No conclusive adverse risk-bioeffect only
Chronic effects matter, look to be risky	Acute exposure limits are sufficient
Plausible mechanism(s) are known	No mechanism is established
Lack of evidence is not proof of no risk	Evidence is limited or weak
Broad assessment of possible diseases	Limit to one disease of low incidence
Include other cancers and study	Dismiss other cancers before full study
Precautionary action is justified or, preventative action is justified	Actions are premature, not justified Only no-and low-cost measures, or none
No positive assertion of safety can be made	No demonstrated, established risk
We should choose an interim number	Any number must be science-based
We should advise the public	We should not create fear or panic
Scientific paradigm is questioned	Paradigm shift is unwelcome, ridiculed

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What Actions are Justified for ELF/RF? Scientific-only Standard

- More research
- Identify biophysical mechanism(s)
- Determine critical exposure parameters
- Review existing safety limits
- But, keep existing thermal limits in place

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What Actions are Justified for ELF/RF? Public Health Standard

- Strong preventative action on RF/wireless technologies is justified
- Wide-scale communication to public and decision-makers
- Promote retention of corded land-line phones
- Redesign of all new cell phones and cordless phones by industry
- Promote wired earpieces, speaker-phone mode in existing phones
- No use of wireless phones by children except in emergencies
- Public advisories to reduce exposures in homes, schools, pre-schools, day-care, libraries, health care facilities, elder facilities, parks.
- Limit wireless antenna sites to non-residential areas, not near schools
- Promote wired internet alternatives, choose OTHER options
- Adopt new biologically-based safety limits that key to studies

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What Actions are Justified for ELF/RF? Environmental Standard

- Identify impacts on wildlife, waterfowl, pollinating insects
- Promote research on key species indicators
- Require ELF/RF assessments of impact of new ELF and wireless projects, and identify mitigation measures
- Restrict exposures in critical environmental zones/sensitive habitats under existing laws; act before you have species fragmentation and collapse
- Limit deployment and re-direct high impact projects to more suitable locations

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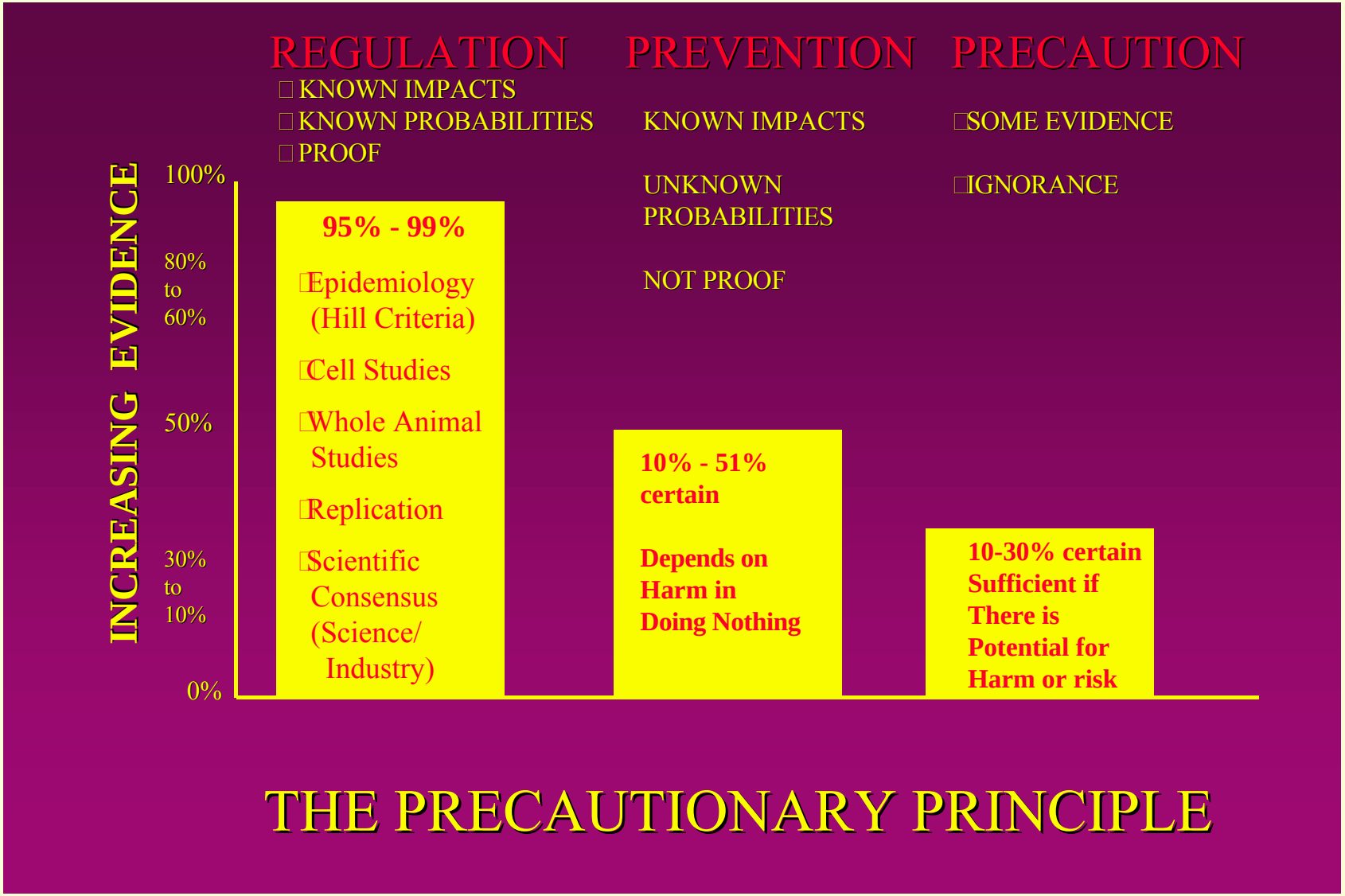

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Conclusions

- Asking (or answering) the wrong question, not making explicit the standard of evidence used to judge the science, differences in what terms mean (inconsistency, uncertainty, effect, risk, plausible vs. demonstrated mechanism, evidence vs. proof, causality) and how these terms are employed in the expert review to define what actions are justified…
- Can result in opposite conclusions in reviews.
- Can intentionally confuse the public and decision-makers.
- Can result in stalemates rather than action and prevention.

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How Can We Move To Resolution?

- Make clear that public health policy (precautionary and preventative action) is warranted, even where science is not complete
- Specify real actions and timelines
- Recognize that scientists contribute, but that actions are defined by all stakeholders
- Get public health experts on ICNIRP/IEEE reviews and bring clear standards for judging evidence
- All actions may not be "in the comfort zone of all participants" depending on their profession and culture of decision-making; and on their peer groups.