

REVIEW OF EXPOSURE LIMITS AND HEALTH CONCERNS

**Base Station
Telecommunication Transmitters**



www.planningcenter.com

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ORANGE COUNTY | LOS ANGELES | INLAND EMPIRE | COACHELLA VALLEY | UTAH

SCOPE OF SERVICES

Review, Describe, Discuss, and Summarize

- ✦ **Review** EMF types (“power,” “radio”); health concerns; exposure limits; and agency policies.
- ✦ **Describe** processes for health risk assessment and health-based standard setting.
- ✦ **Discuss** scientific uncertainties and alternative policy responses: “proof” vs. “precautionary.”
- ✦ **Summarize** debate regarding safety of existing EMF exposure limits: pro and con.

ELECTRO-MAGNETIC FIELDS/RADIATION

Simplified Categories (EMF/EMR)

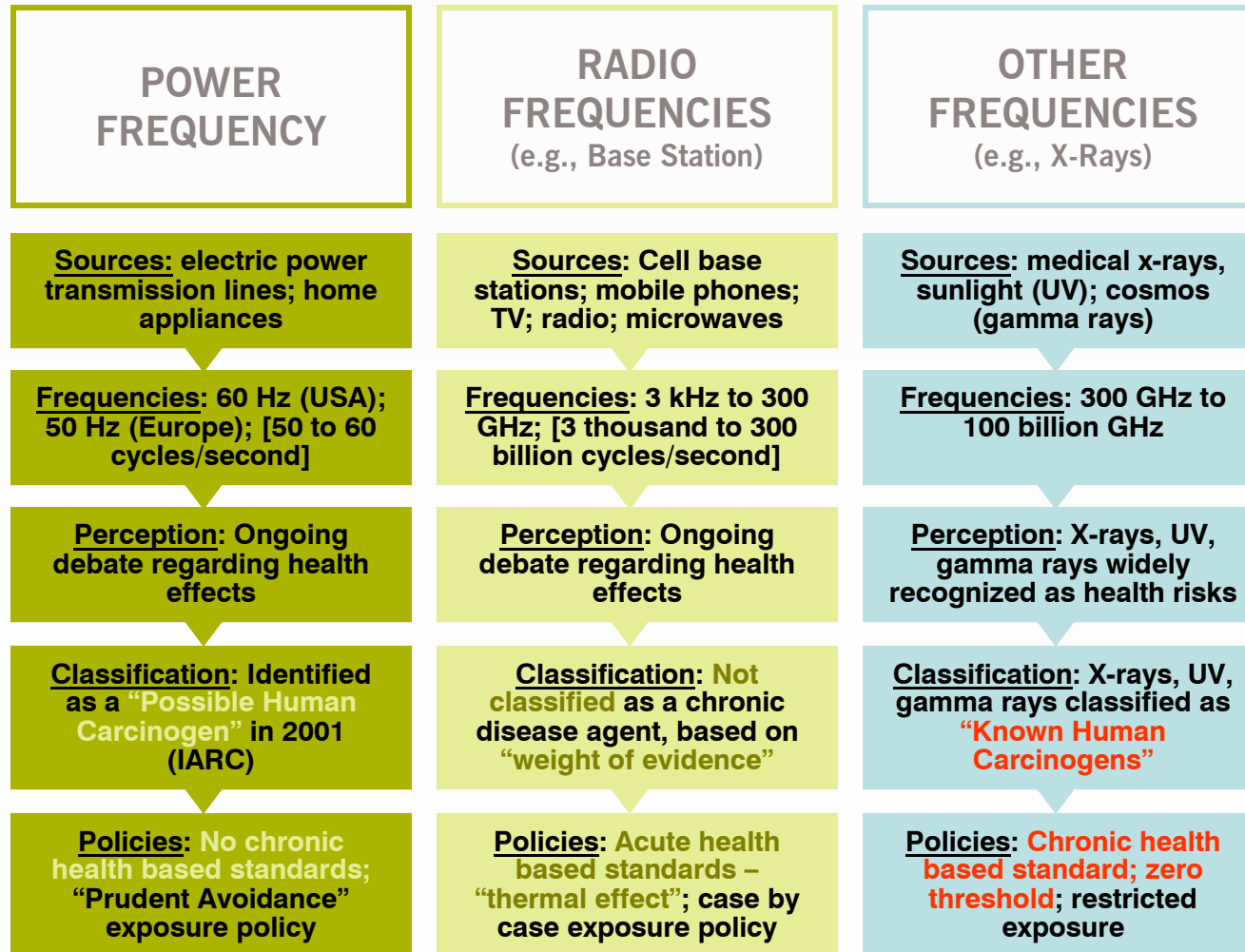
**POWER
FREQUENCY**

**RADIO
FREQUENCIES**
(e.g., Base Station)

**OTHER
FREQUENCIES**

ELECTRO-MAGNETIC FIELDS/RADIATION

Overview: Characteristics, Health Concerns, and Policies



EXISTING EXPOSURE LIMITS (Thermal Effects)

Radio Frequencies (RF)

- ✦ **FCC (1996)**. EMF and power density (W/cm^2) emissions from base stations. Based on SAR.
- ✦ **ICNIRP (1998)**. Specific Absorption Rate (SAR; W/kg): heating tissue in head, limbs, and whole-body.
- ✦ **IEEE (2006)**. Maximum permissible exposure (MPE) limits; power density and SAR; worker and public.
- ✦ **Summary**. Limits vary by frequency, duration, agency, and country. Typical base station emissions are well below limits. All limits: to avoid “thermal effects” only.



ARE EXISTING RF LIMITS ADEQUATELY PROTECTIVE?

...according to WHO policy to date.

World Health Organization (2006):

CANCER

Reported cancer clusters around base stations can be due to natural variability.

NON CANCER EFFECTS

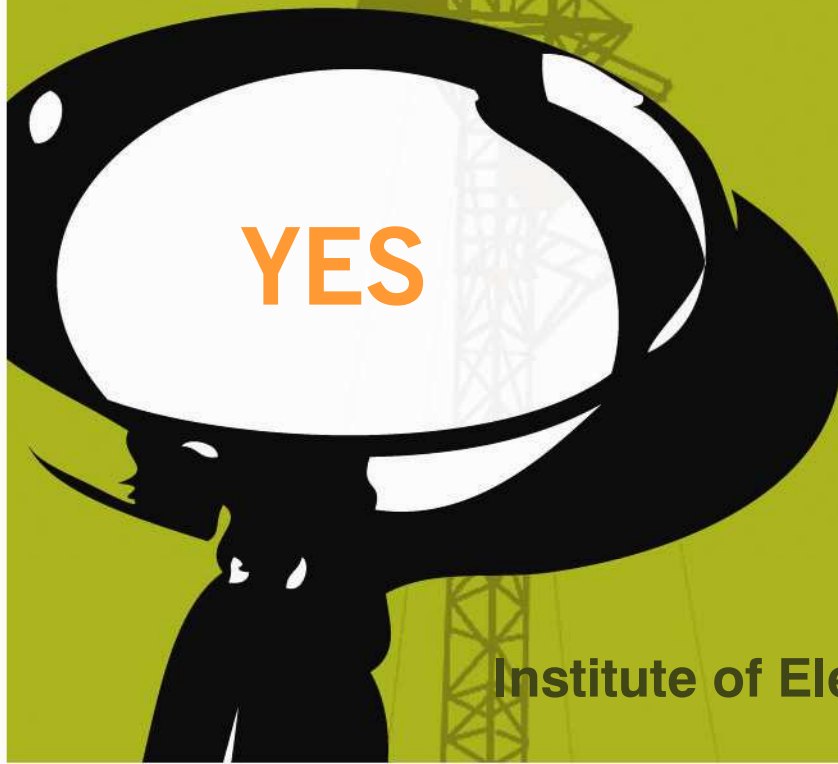
Few studies have investigated general health effects of exposure to base station RF.

CONCLUSION

To date, there is no **convincing** scientific evidence that RF from base stations cause **adverse** health effects. 1400 relevant studies in WHO database.

FUTURE

The IARC reportedly will undertake an “overall health risk assessment for RF fields in 2007/2008.”



ARE EXISTING RF LIMITS ADEQUATELY PROTECTIVE?

...according to IEEE guidelines to date.

Institute of Electronic and Electrical Engineers (2006):

BIOLOGICAL DATABASE

50 years of studies shows no **repeatable** (i.e., “established”) low level RF effect.

ANIMAL CANCER STUDIES

All 29 studies since 1992 show no significant change in tumor incidence **except two** (Repacholi, 1997; Anghileri, 2005).

ANIMAL CANCER STUDIES

The few studies reporting effects have not been **confirmed** by recent studies.

ANIMAL CANCER STUDIES

The **weight of scientific evidence** (35 studies) shows no adverse effect on cancer processes at whole-body SAR up to 4 W/kg.



ARE EXISTING RF LIMITS ADEQUATELY PROTECTIVE?

...according to some researchers.

A. Ahlbom, Karolinska Institute, Sweden (2005):

EXPOSURE FROM TRANSMITTERS

Exposure intensity is weak, but it is whole body and long term. There is public concern.

EPIDEMIOLOGY STUDIES

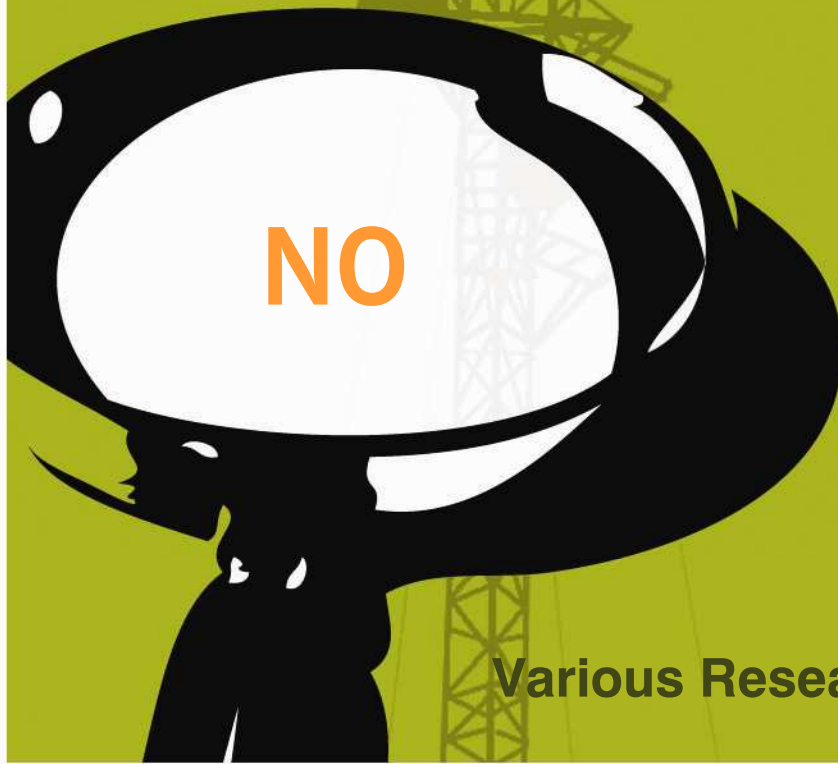
10 studies since 1992 looked at cancer risk. 2 studies looked at other symptoms.

STUDY RESULTS

Several studies suggest risk elevations, but basis for hypothesis of association is weak.

UNCERTAINTIES /CHALLENGES

Studies based on proximity, not exposure. Random variability.



ARE EXISTING RF LIMITS ADEQUATELY PROTECTIVE?

...according to some researchers.

Various Researchers (Bio-Initiative Report, 2007):

BIOLOGICAL EFFECTS

Biological effects shown at exposure levels far below existing “safety” limits.

EXAMPLES

Stress proteins formed by RF exposure; not an “adverse” effect per se, but sign of cell distress.

STUDY LIMITATIONS

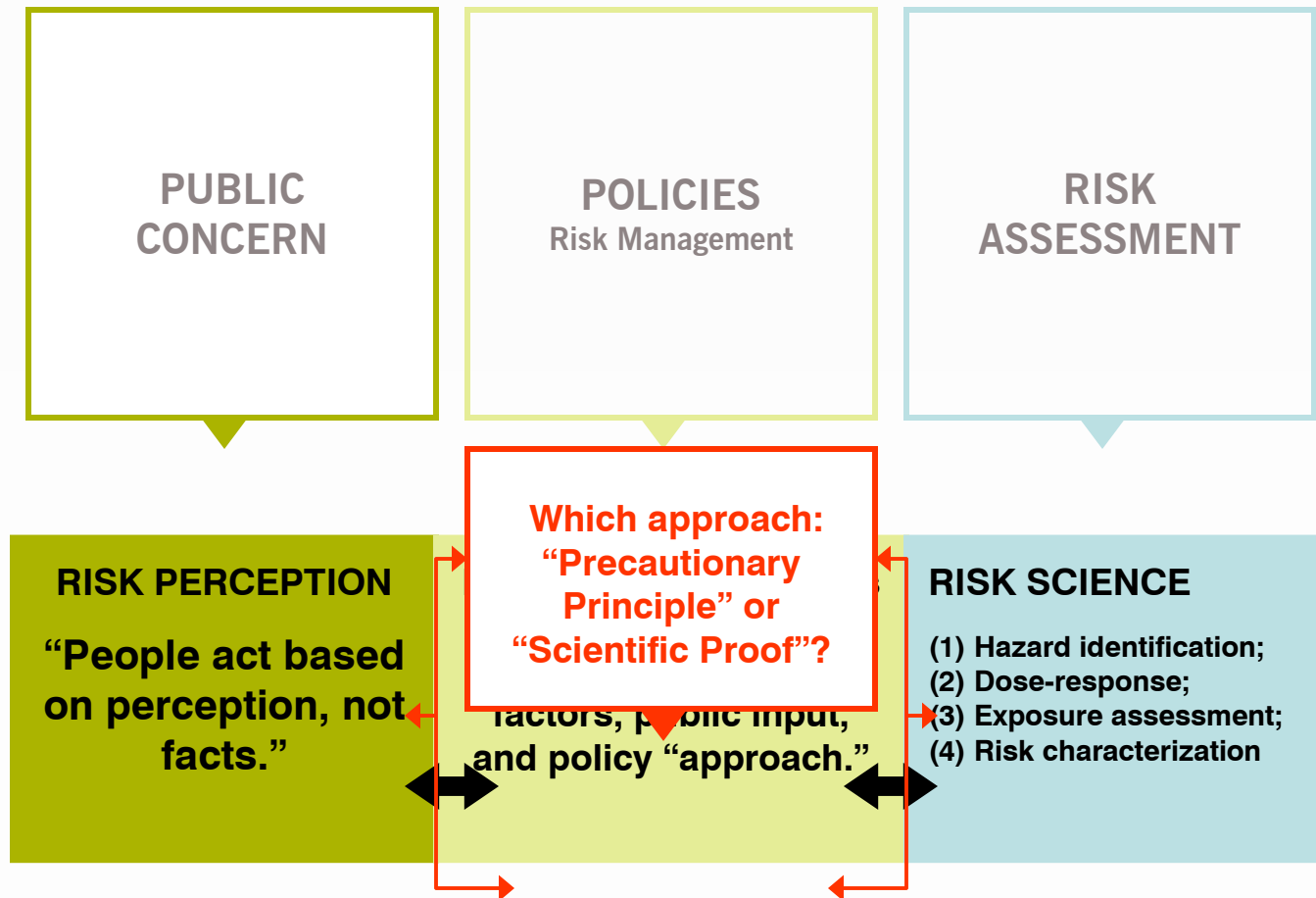
Existing studies don’t account for unique susceptibility of developing children; latency.

POLICY APPROACH

The Precautionary Principle should apply, especially for children, in the face of suggestive but incomplete science; not more “scientific proof.”

RISK MANAGEMENT PROCESS

Developing Exposure Limits (or, siting base stations?)



GENERIC RISK ASSESSMENT PROCESS

Risk Assessment Requires Four Elements

- ✦ **Hazard Identification.** Identifying and characterizing the biological and adverse effects that RF can have.
- ✦ **Dose-Response Assessment.** Determine relationship between RF exposure dose and effect (dose – response curve; probability of effect).
- ✦ **Exposure Assessment.** Estimating the amount and duration of exposure to RF.
- ✦ **Risk Characterization.** Calculate risk of effect based on RF exposure and does-response; compare to “acceptable” risk level (i.e., 1 in 100,000/yr).

WHY CONFLICTING VIEWS OF ONE SCIENCE DATABASE?

Key Reasons Experts Disagree

- ✦ **Standard of Proof.** Scientists and public health policy experts use different standards of evidence to judge scientific results.
- ✦ **Adverse vs. Biological Effects.** Should biological effects count, or only “established” adverse effects?
- ✦ **Measured Dose.** Exposure dose is difficult to measure. Does that simply weaken the scientific database, or call for greater safety factors and action?
- ✦ **Consistency of Evidence.** Does every study have to be verified by another study to be “established”?

SUMMARY

Rationale that Existing RF Exposure Limits are Adequate

- ✦ **Database.** The WHO database includes 1400 studies relevant to RF safety; only thermal effect “established.”
- ✦ **Standard for Action.** Weight of evidence: consistency of results across studies, biological plausibility, and quality of test methods. “Scientific proof.”
- ✦ **Effects of Concern.** An adverse effect is “established” when consistent findings are published in peer reviewed scientific literature; w/dose-response data.
- ✦ **Policy.** Exposure limits protect against thermal effects, only “known” adverse effect. Limit also considers “overall practicability.”

SUMMARY

Rationale that Existing RF Exposure Limits are not Adequate

- ✦ **Database.** The WHO database does not include all studies relevant to biological effects from low level RF.
- ✦ **Standard for Action.** Scientific studies suggest biological effects and cause for concern; children susceptible; action warranted. “Precautionary Principle.”
- ✦ **Effects of Concern.** Biological effects are relevant, even if adverse effects are not directly demonstrated. Domino theory: complex and sequential bio processes.
- ✦ **Policy.** Establish biology-based exposure limits. Proposed: thousand-fold lower than existing limits.

WHAT ARE SOME OTHER SCHOOL AGENCIES DOING?

Actions by LAUSD Board and CDE

- ✦ **LAUSD (2000).** The Board adopted a resolution opposing further placement of cell towers on or adjacent to schools, pending appropriate standards.
- ✦ **LAUSD (2000).** “Recent studies suggest there is evidence that radio-frequency radiation may produce ‘health effects’ at ‘very low field’ intensities.”
- ✦ **LAUSD (2000).** “...more research is needed to provide a definitive answer as to... [RF] radiation on our health...”
- ✦ **CDE (1998).** The CDE issued a memo discussing health concerns and regulatory issues for cell towers.



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