

Deficiencies in Counseling Education and Methodology

Robert L. Brent MD, PhD, DSc
Jefferson Medical College
A. I. duPont Institute Children's Hospital
Philadelphia, PA. & Wilmington, DE.



Early Personal Experiences in Counseling

The Manhattan project at the University of Rochester in 1944.

The University of Rochester 1945
To 1954

Liane Russell, 1950---

Robert Brent
**states that he has no relevant financial
relationships to disclose or COIs to resolve
pertaining to this presentation,**

The Historical Foundation of Professional Counseling

Graduate Medical education in the USA received a major impetus following the publication of Abraham Flexner's (1910) monograph that was commissioned by the Carnegie Foundation for the Advancement of Teaching.

Over the next 50 years the Flexner model of education evolved into the bioscience model of medical education and medical practice. High quality basic science education and research “could provide all the answers”, so that physicians could diagnose, ameliorate, treat or cure most medical problems with which they encountered.

Unfortunately, the bioscience model is incomplete This was evident to George Engle at the University of Rochester. (1960, 1970)

Engle was adamant that you cannot ignore the impact of the environment on the patient's disease or the behavioral defenses available to the patient. It was clear that Engle believed that compassion and empathy were important components of the Biopsychosocial Model of medical care.

Rogers (1942, 1951, 1959) is probably the most important contributor to the elements of proper counseling. He emphasized the humanistic approach with much greater success in properly communicating and educating the contact.

The client, patient or contact has to believe that the counselor believes that the contact deserves respect which is demonstrated by exhibiting compassion and regard for the contact (unconditional, positive regard) (Rogers, 1951).

In the case of a toxicological exposure, the counselor should attempt to determine the magnitude and timing of the exposure, and to provide an unbiased discussion of the facts surrounding the problem.

Empathy requires some knowledge of and sensitivity to the social and cultural position of the persons being counseled.

The Maturation of Counseling

During the first 50 years of the 20th century, the rules of professional counseling were rarely articulated or taught. It was only after the writings of Engle and Rogers that the essential features of professional counseling were legitimized, whether it pertained to psychotherapy, medical care and especially for counseling contacts concerning reproductive and developmental risks from environmental exposures.

Counseling Organizations and Resources

In 2014 there are now many organizations and counseling services that will provide individuals with questions regarding the risk of potential toxic exposures.

Brent, R.L.: Counseling women and men regarding exposures to reproductive and developmental toxicants before conception or women during pregnancy: Determining whether the exposure has increased their reproductive or developmental risks? Seminars in Fetal and Neonatal Medicine (June, 2014).

Brent, RL, Carcinogenic risks of prenatal ionizing radiation. Seminars in Fetal and Neonatal Medicine, June 2014.

NCRP publication 174. Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance, May 24, 2013. pp 372.,7910 Woodmont Ave., suite 400, Bethesda, MD 20814-3095

Counseling families or pregnant women with regard to preconception or prenatal risks of radiation is dependant on data obtained from populations of humans or animals exposed to ionizing radiation.

However, most of the risk estimates have been derived from exposing pregnant mammals (rats, mice, rabbits) to ionizing radiation from exposures from 0.01 Gy to 4 Gy.

Reproductive and Developmental Risks

Genetic Diseases (preconception risks)

Pregnancy Risks (developmental risks and cancer)

Radiation produced genetic disease in the F-1 generation

- There is little to no evidence among the offspring of childhood, adolescent, and young adult cancer survivors; atomic- bomb survivors; residentially-exposed populations or radiation- exposed workers for an excess of cytogenetic syndromes, single- gene disorders, malformations, stillbirths, neonatal deaths, cancer, or cytogenetic markers that would indicate an excess of heritable genetic mutations in the exposed parents (COMARE, 2004; Nakamura, 2006; Winther and Olsen, 2012).

Radiation induced genetic effects

There are extensive data on mutations induced by ionizing radiation in microbes and somatic cells of rodents and humans. However, these data alone cannot be used to assess quantitative mutational risk in human germ cells, possibly because of the biological characteristics of human gametogenesis, compared to that of other mammals and to somatic cells of either humans or other mammals (Sobels, 1993). To accurately assess the influence of ionizing radiation on the genome of human germ cells, it is necessary to conduct studies in human populations.

However, that may be impossible!

Why have we not been able to document radiation induced mutagenesis in humans?

Biological filtration (Brent 1992)

The importance of pure bred strains of experimental animals.

The specific locus test using pure bred strains of mice

The rarity of the persistence of induced mutations., necessitating very large populations exposed to high exposures.

Neel's estimate of the exposure to double the mutation rate from the mouse data is 2 Gy (acute dose), 4Gy (protracted dose).

Etiology of Human Congenital Malformations Observed During the First Year of Life*

Genetic	15-25 %
Unknown	65-75%
Environmental	10%

Tissue Effects observed in the Embryo/Fetus from Pregnancy Radiation Exposure

60 years of animal research has determined that all of these effects have a NOAEL <0.20 Gy. (tissue effects)

- congenital malformations,
- growth retardation,
- miscarriage and stillbirth,
- “The all or none phenomenon”
- mental retardation and neurobehavioral effects,
- convulsive disorders

but not cancer risks in the children of mothers exposed to radiation during pregnancy.

Dose Response Relationship of Reproductive Toxins as Compared to Mutagens and Carcinogens

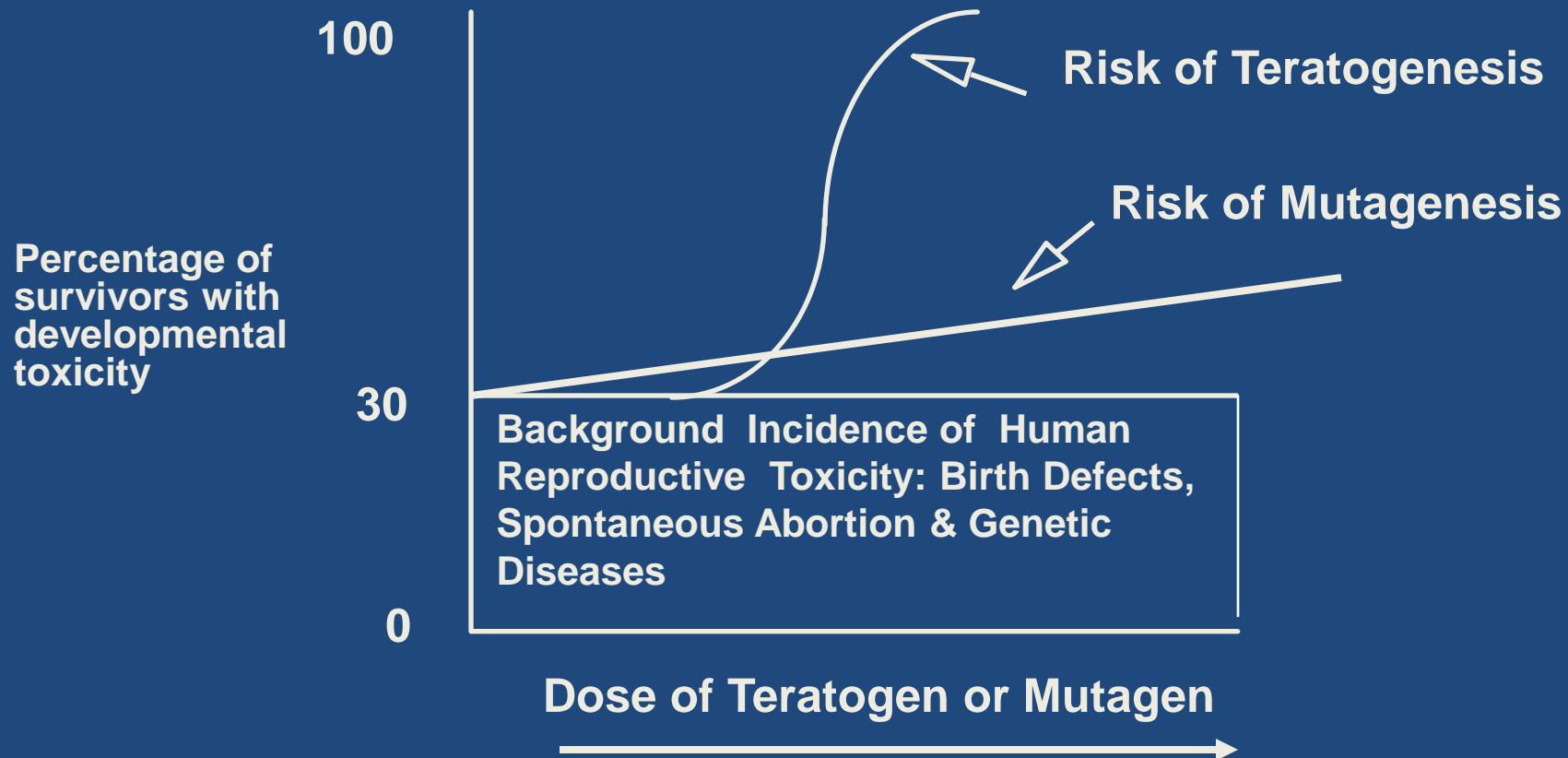
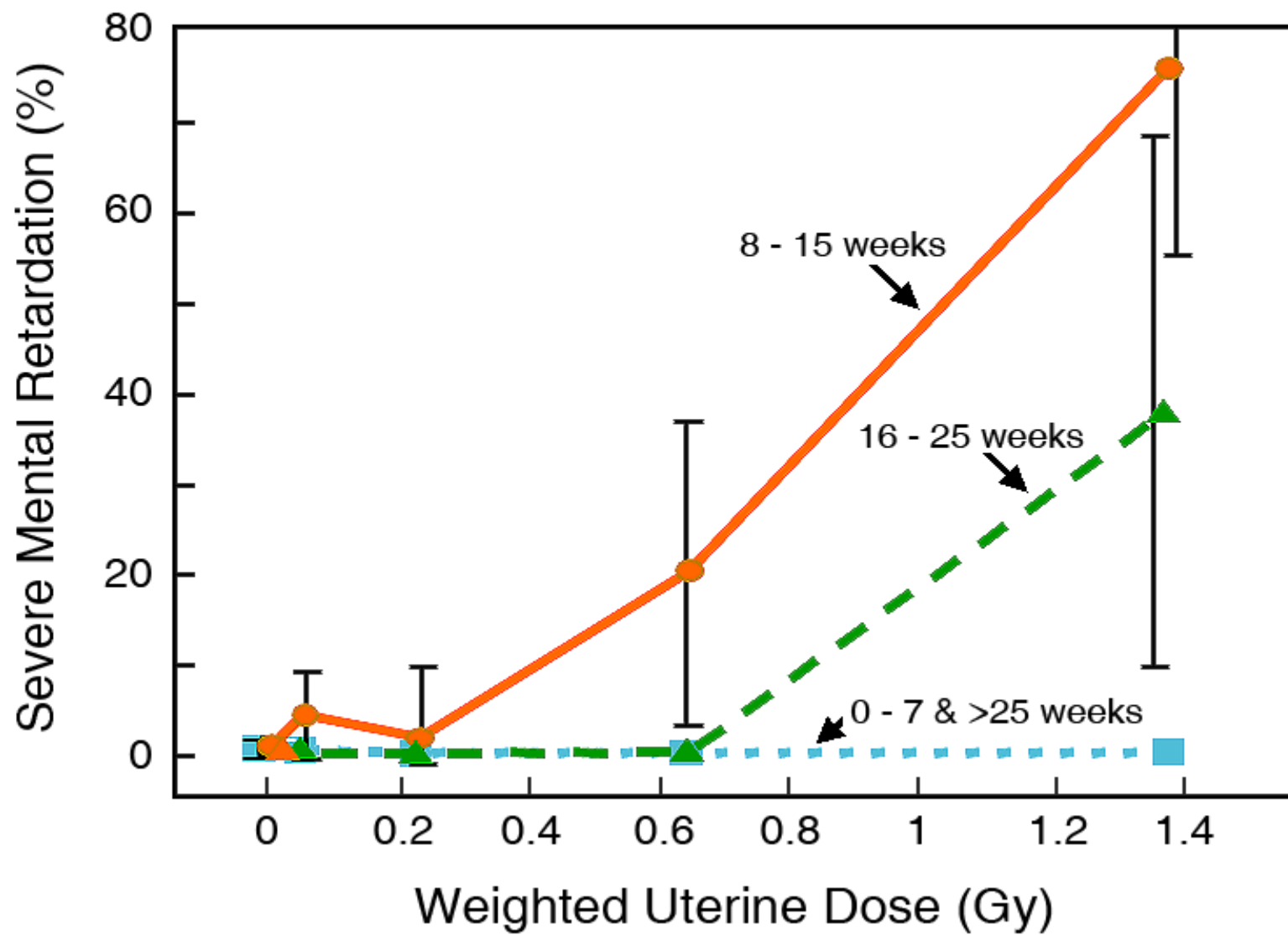
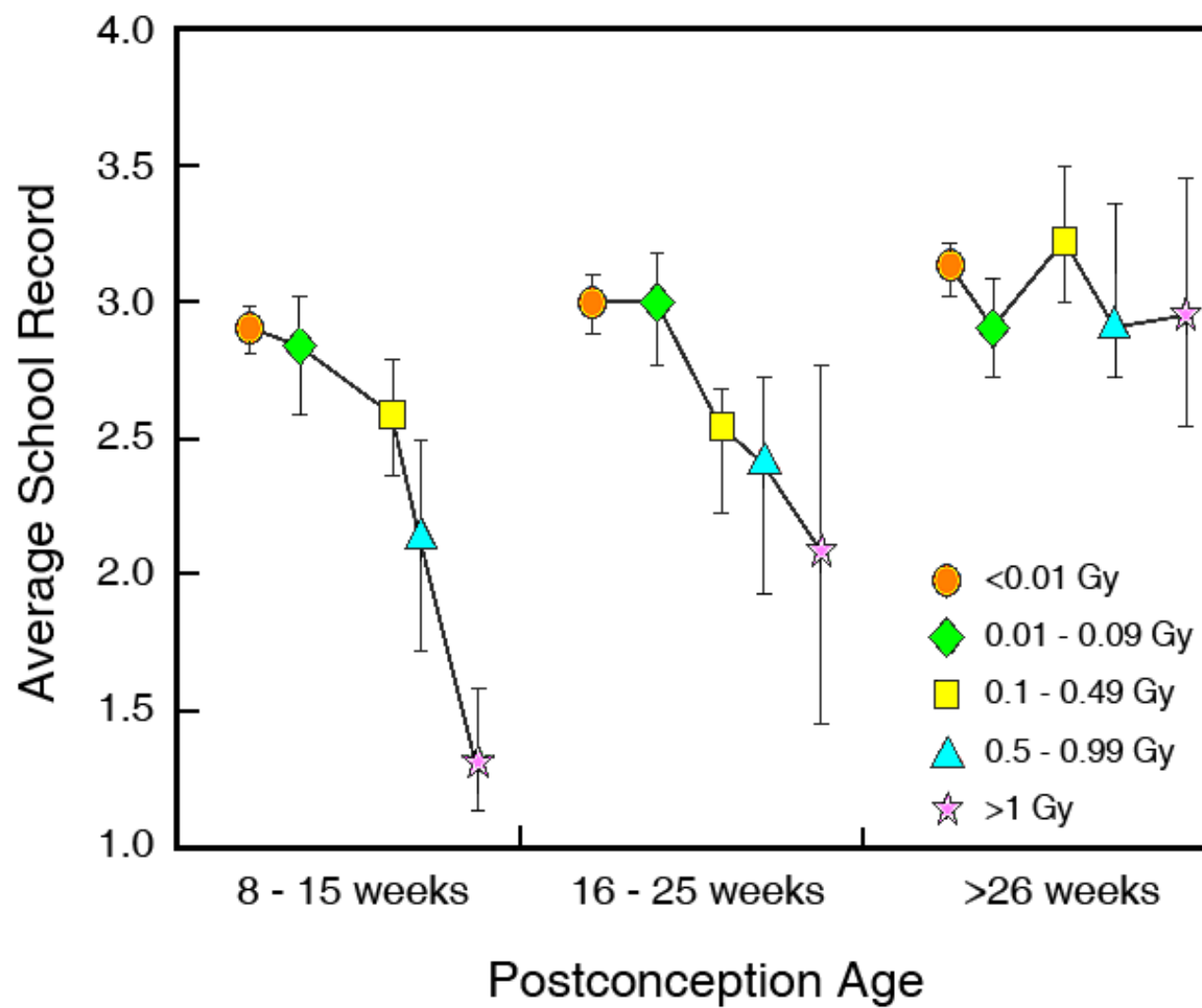


Figure 1

In 1984, Otake and Schull reanalyzed the data pertaining to the children who were irradiated in utero in Hiroshima and Nagasaki (RERF, Radiation Effects Research Foundation).

Their evaluation concluded that mental retardation could be produced below 0.1 Gy and that radiation-induced mental retardation was a stochastic effect (non-threshold effect).





Counseling

Questions submitted by patients or contacts regarding environmental toxicant exposures should never be described as silly, or unnecessary. Every response should attempt to dignify the question as appropriate. However, the counselor should provide scientific explanations as to why the contact's concerns are or are not substantiated by the available facts. The counselor is an educator.

It should be made clear to the contact that the counselor has functioned as an educator. The counselor does not advise contacts on what decision to select, only the options that are available. Yet, many contacts thank the counselor for telling them what to do, in spite of the fact that they are usually not advised on which available option to select.

It is difficult for many counselors to comprehend, the anguish, heartache, fear and concern in the hearts and minds of the contacts when they are concerned about the health of their fetus from exposures to environmental toxicants. The degree of fear is related to the mental state of the contact as well as the type and magnitude of the exposure to the environmental toxicant.

Many novice counselors do not realize that it is their responsibility to provide the contacts with the background risk that they face, even when there are no increased risks from the exposure. The contacts are requested to keep the counselor informed. Do they have any more questions? The consultation is signed with,
Warm regards.

If the consultation determines that the risk for birth defects or miscarriage is not increased above the background risks that all healthy pregnant women face, the contact is informed that the background risks for pregnant women with no personal or family history of reproductive or developmental problems is 3% for birth defects and 15% for miscarriage.

We wish them good luck with their pregnancy and to keep in touch.

If the contact asks about the risks of mental retardation, cancer or other effects, these background risks are discussed as well. The answers are directed specifically to their questions.

It is important to permanently save a written record of the statements of the contact and the counselor.

Each consultation that definitively determined that their reproductive or developmental risks are not increased are informed of the background risks.

Carcinogenic Risks of In Utero Radiation

Survey of obstetricians and family physicians from Ontario, Canada on Medical termination of pregnancy in women who underwent radiography or CT during early pregnancy (Ratnapalan et al., 2004).

Medical termination
of pregnancy
Recommended

Percentage of respondents

Family physicians
(n = 283)

Obstetricians
(n = 65)

	Radiography	CT	Radiography	CT
Yes	1	6	0	5
Not Sure	25	39	6	25
No	74	55	94	70

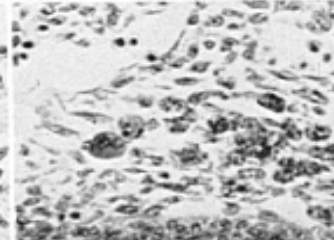
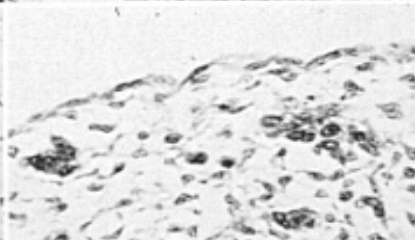
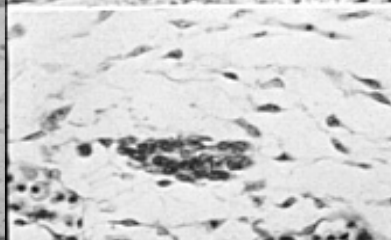
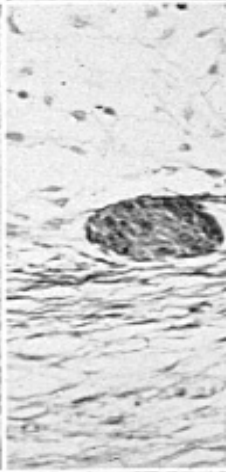
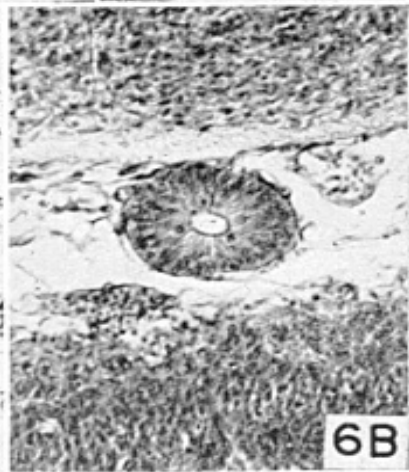
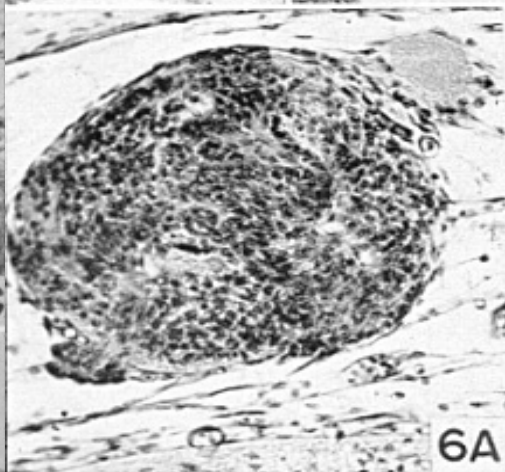
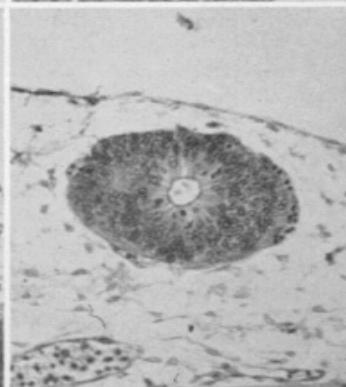
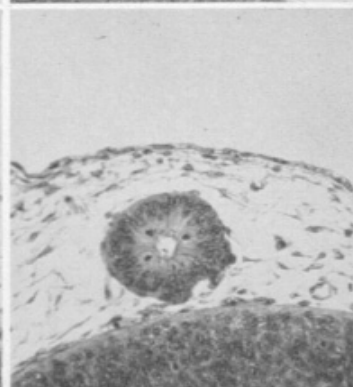
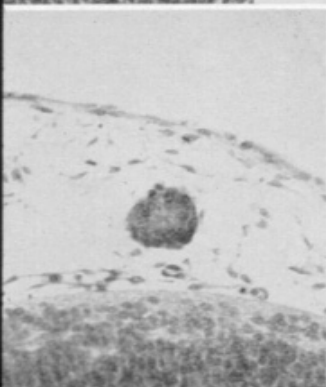
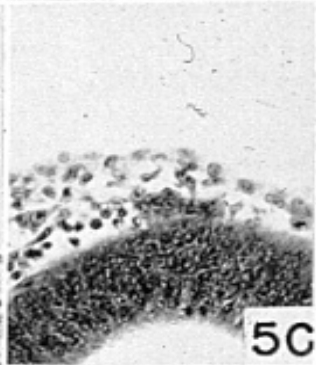
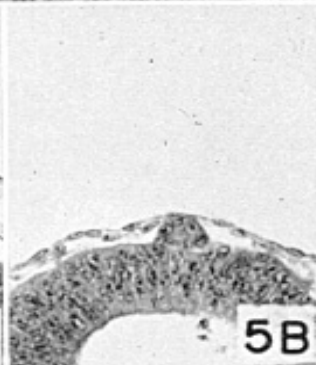
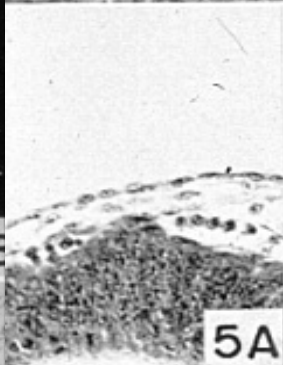
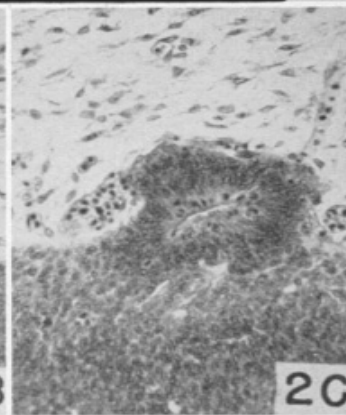
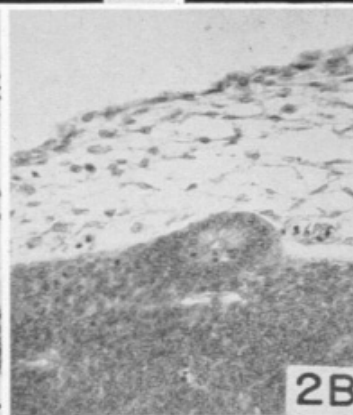
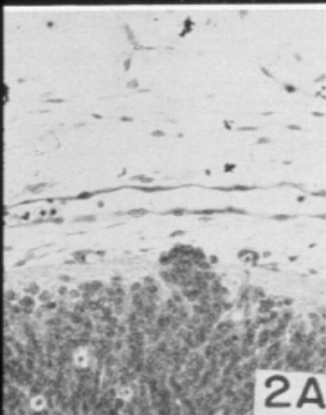
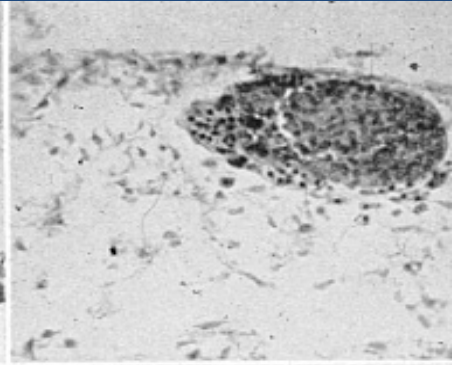
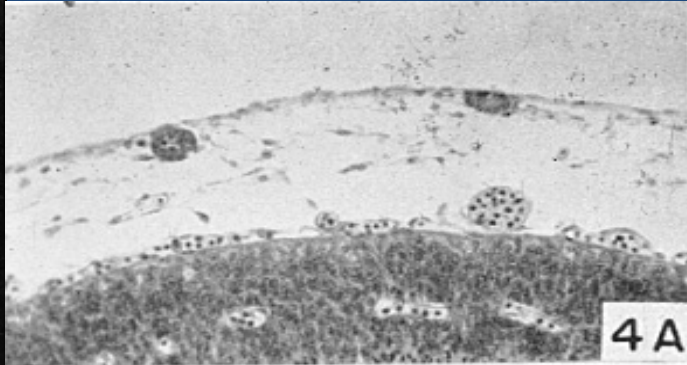
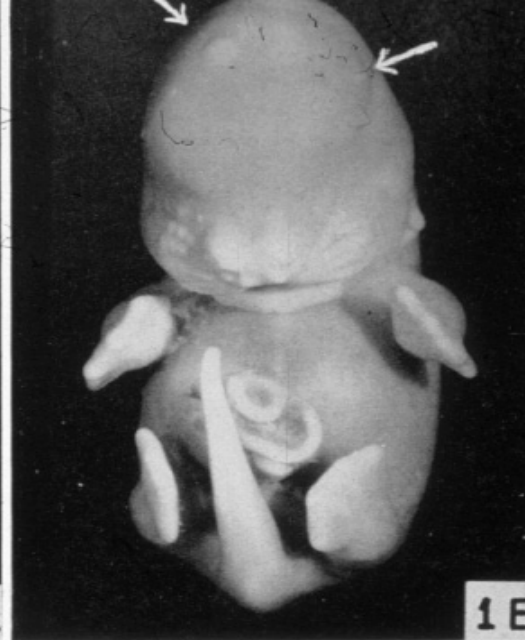
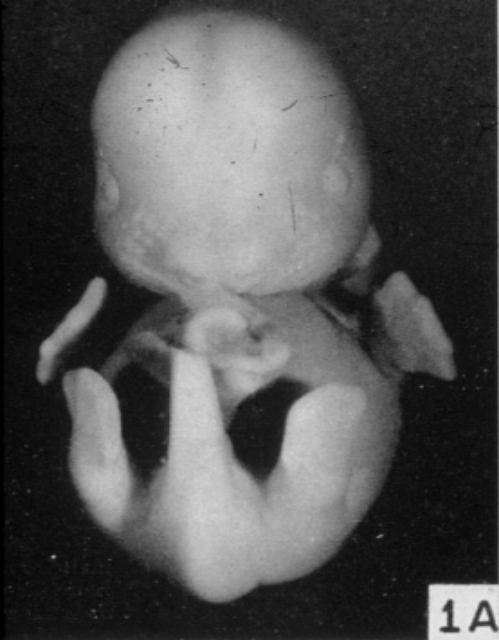
The era of the 1940s and 1950s

Research discoveries at the University of Rochester

Research publications of Alice Stewart 1956;1958; 1972

Brent, RL and Jordan, C, 1951, Radiation induced cancer in the developing embryo

Wilson, J.G., Brent, R.L. and Jordan, H.C.: Neoplasia induced in rat embryos by roentgen irradiation. Cancer Research 12: 222-228, 1952; also appeared in U.S.A.E.C.D. U.R.-183, 1951.



Nakano et al. (2007), Chromosome aberrations do not persist in the lymphocytes or bone marrow cells of mice irradiated in utero or soon after birth .
Radiat. Res, 167: 693-702

The Risk of Cancer from In-utero Irradiation (Publications)

Stewart et al. 1956; Stewart et al. 1958; Ford and Patterson 1959; Ager et al. 1965; Graham, Levine et al. 1956; Lillienfeld 1966; Polhemus and Koch 1969; Stewart and Kneale 1970; Stewart 1972, 1973; Hoshino et al. 1965; McMahon 1985; Harvey et al. 1985; Yoshimoto et al. 1988; Graham et al. 1988; Muirhead and Kneale 1989; Rodvall et al. 1990; Thompson et al. 1994; Yoshimoto et al. 1994; Boice and Inskip 1996; Pierce et al. 1996; Delongchamp et al. 1997; Doll and Wakeford 1997; Miller and Boice 1997; NRBP 1998; Boice and Miller 1999; Miller 1999; Brent 1999; Naumburg et al 2001

Interaction between Stewart and Mole

(Kneale and Stewart 1976, 1977) in a letter to the Lancet criticized Dr. Mole's suggestion that the fetus is not much more sensitive to the carcinogenic effects of low level radiation during the early stages of development than during later stages.

Kneale and Stewart concluded that first trimester exposures are "Probably 16 times as dangerous as third trimester exposures." Stewart reminded Dr. Mole, "Not to forget that as a result 10% of viable fetuses were involved in these examinations between 1953 and 1970." This resulted in a 5% addition to the number of children who died from malignant diseases."

Risk of leukemia following ionizing radiation

Risk of leukemia
per 10^6 persons
Following
0.01 to 0.02
Gy

100

10

1

Fetus

1 –

--10

20

30

40

50

60

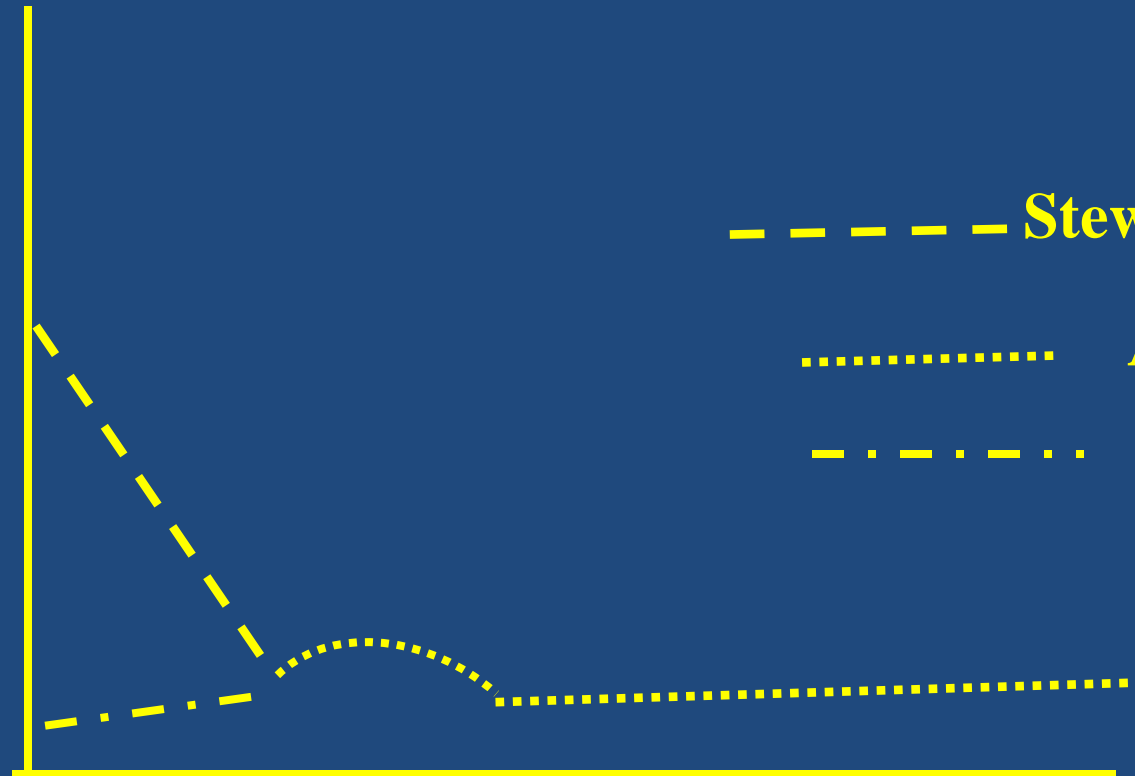
70

Age in years

— — — — Stewart et al data

..... ABCC data

- . - . - . Animal data



Bombshell

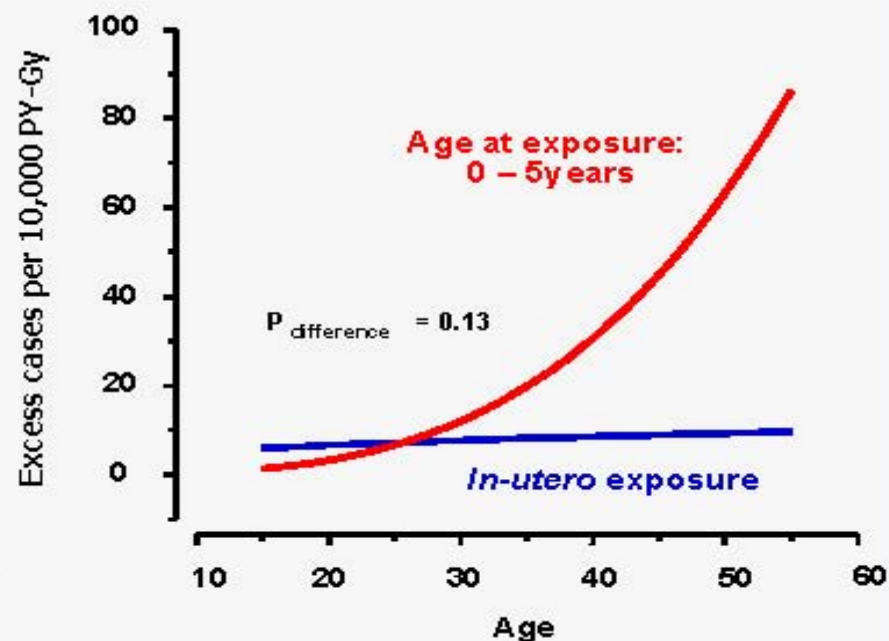
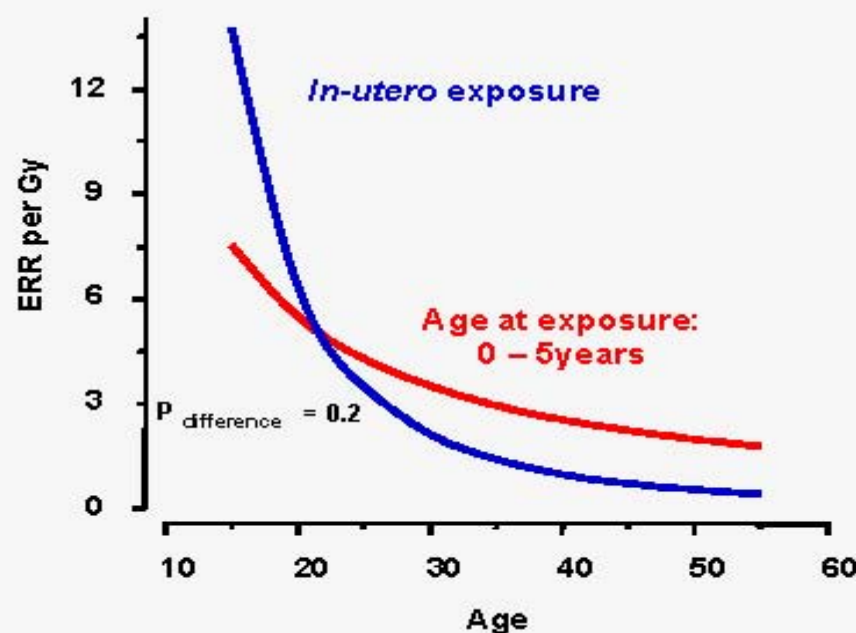


Solid Cancer Incidence in Atomic Bomb Survivors Exposed In Utero or as Young Children

**Dale L. Preston , Harry Cullings , Akihiko Suyama , Sachiyo Funamoto , Nobuo Nishi ,
Midori Soda ,Kiyohiko Mabuchi , Kazunori Kodama , Fumiyoshi Kasagi , Roy E . Shore
J Natl Cancer Inst 2008;100: 428 – 436**

**Lifetime risks following in utero exposure may be
considerably lower than for early childhood
exposure.**

Solid Cancer Risk Patterns for *In Utero* and Childhood Exposure, A-bomb Survivors

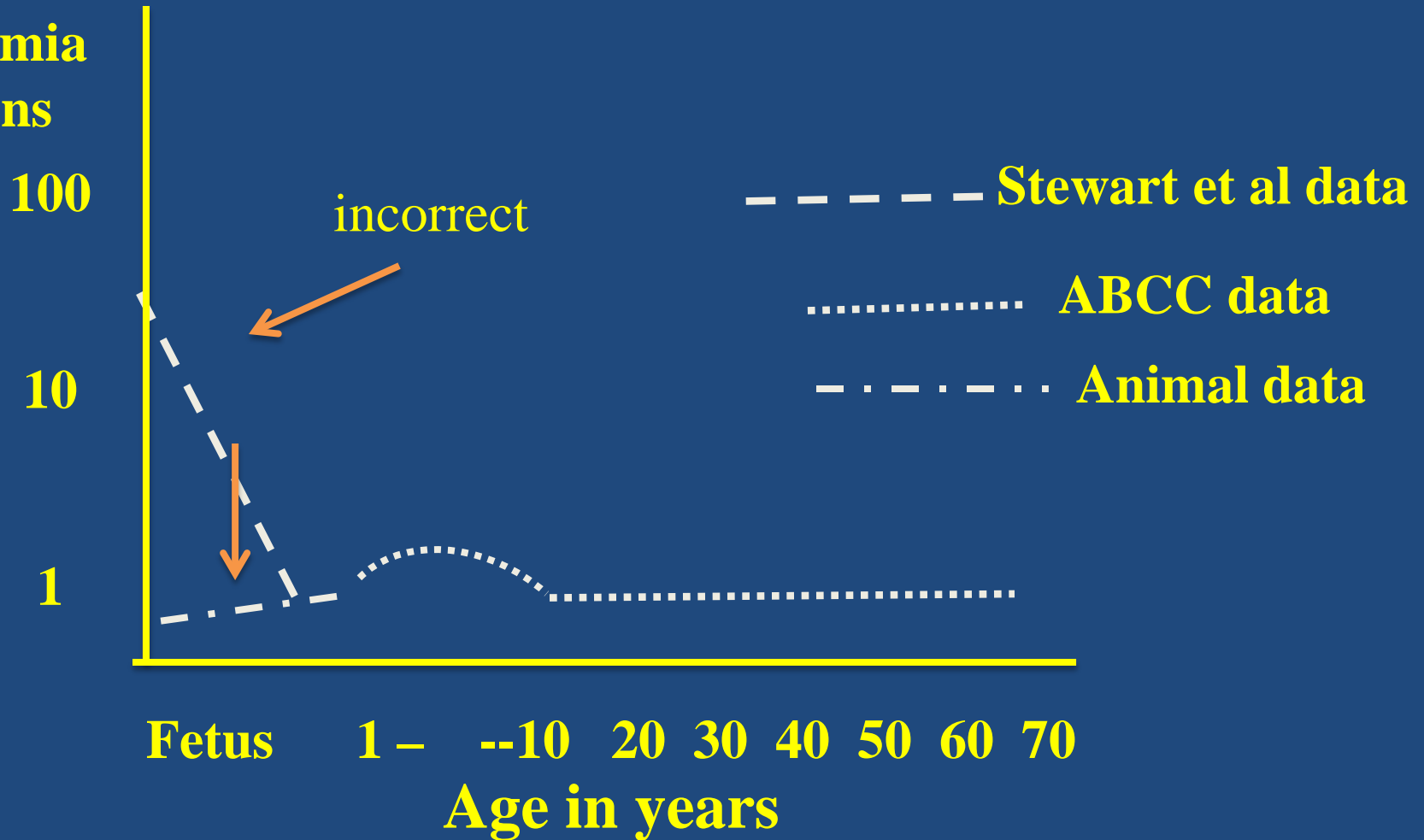


In utero ERR/Gy= 1.0 (95%CI: 0.2, 2.3)

(Preston et al, *J Natl Cancer Inst*, 2008; 100:428-36)

Risk of leukemia in children following ionizing radiation exposure of pregnant women

Risk of leukemia
per 10^6 persons
Following
0.01 to 0.02
Gy



Carcinogenic Risks <0.01 Gy to the Embryo/Fetus

There is the scholarly, conservative view of Martha Linet who writes that the risk is very small and would not justify canceling a radiological study in a pregnant woman if the study is medically indicated. She also suggests that we wait to determine whether the risk increases based on future data from the Preston et al. study, which stated that “additional follow-up of this cohort is necessary before definitive conclusions can be made about the nature of the risks for those exposed *in utero*.”²⁸

- I (Brent) am not one who is reluctant to make predictions. I agree with Martha Linet regarding the risks of embryonic ionizing radiation. However, I would predict that in the next twenty years we will learn that the risk of cancer from embryonic radiation will be further reduced. At my present age I will not be alive to know the results. I believe that the omnipotential (stem) cells protective effect that was present in the embryo at the time of the radiation may continue to be manifested.
- We may be using umbilical cord blood, fetal placental blood cells or other sources of stem cells from the recipient to decrease the risk of future cancers.

Health Physics Pregnancy Website, Ask the Expert (ATE)

In 2013 there were thousands of hits on the pregnancy website.

In 2013, one thousand, four hundred and eighty-three (1483) individuals made direct contact for a personal consultation on the ATE pregnancy website.









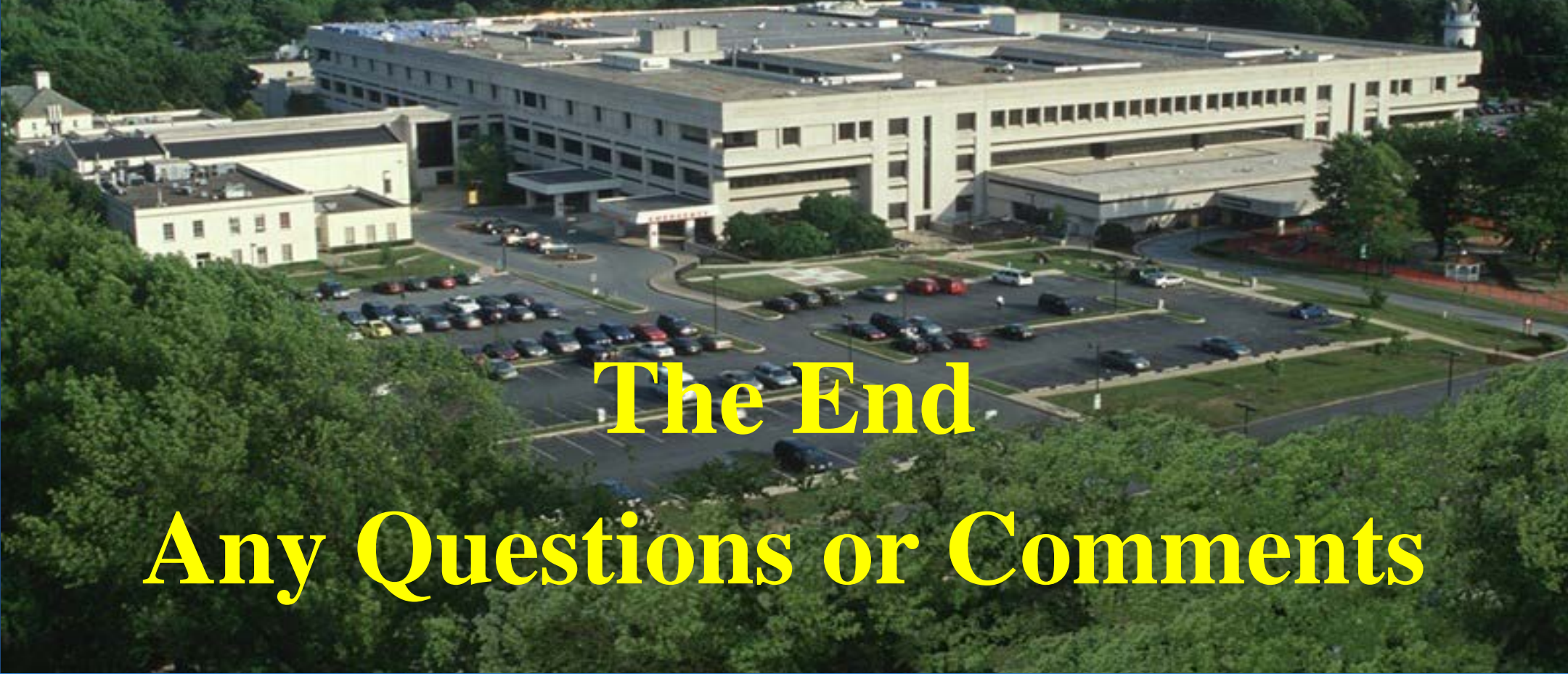
Laboratory scientists who work with animals may never see their research benefit a single patients in their lifetime, although their research may be conceptually important.

Yet the results of radiation embryology research can affect and benefit the lives of thousands of families.

It is important to understand that the main purpose of each individual interaction is the education of the contact about reproductive or developmental risks. The family makes the decision about what to do with this information.

Every physician who practices medicine can change the lives of thousands of their patients by providing quality medical care, one patient at a time.

I have had the good fortune to experience a most memorable and exciting lifetime scientific journey with rewards that would be priceless to any physician; to have the concrete evidence that thousands of lives have been saved or changed.



The End

Any Questions or Comments

Nemours

Alfred I. duPont
Hospital for Children

Nemours
Children's Clinic

