

Hot Science Cool Talks

UT Environmental Science Institute

81

The War on Cancer: 41 Years After Nixon's Declaration

Dr. Mark Clanton
November 30, 2012

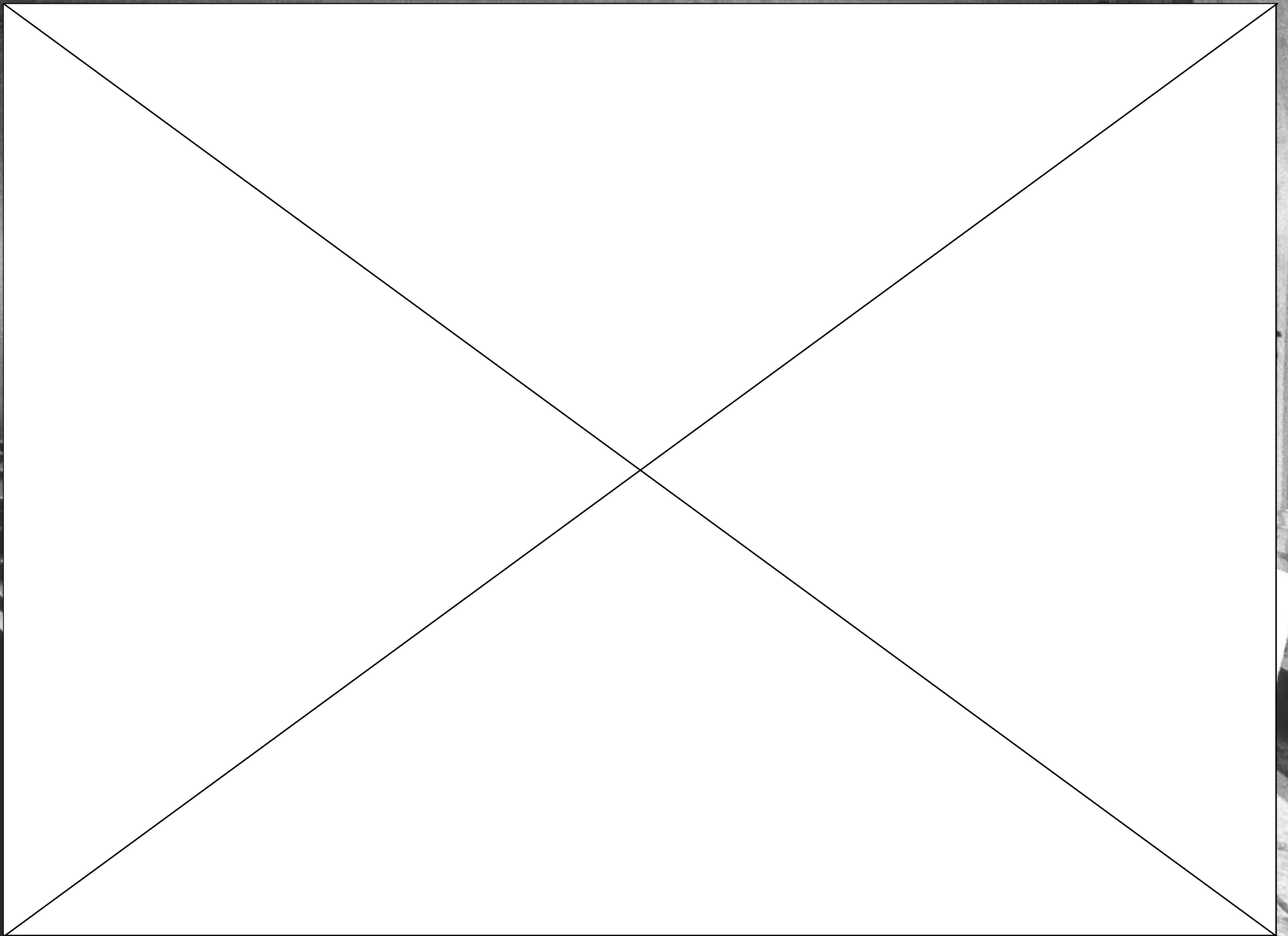
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The War on Cancer: 41 years after Nixon's Declaration

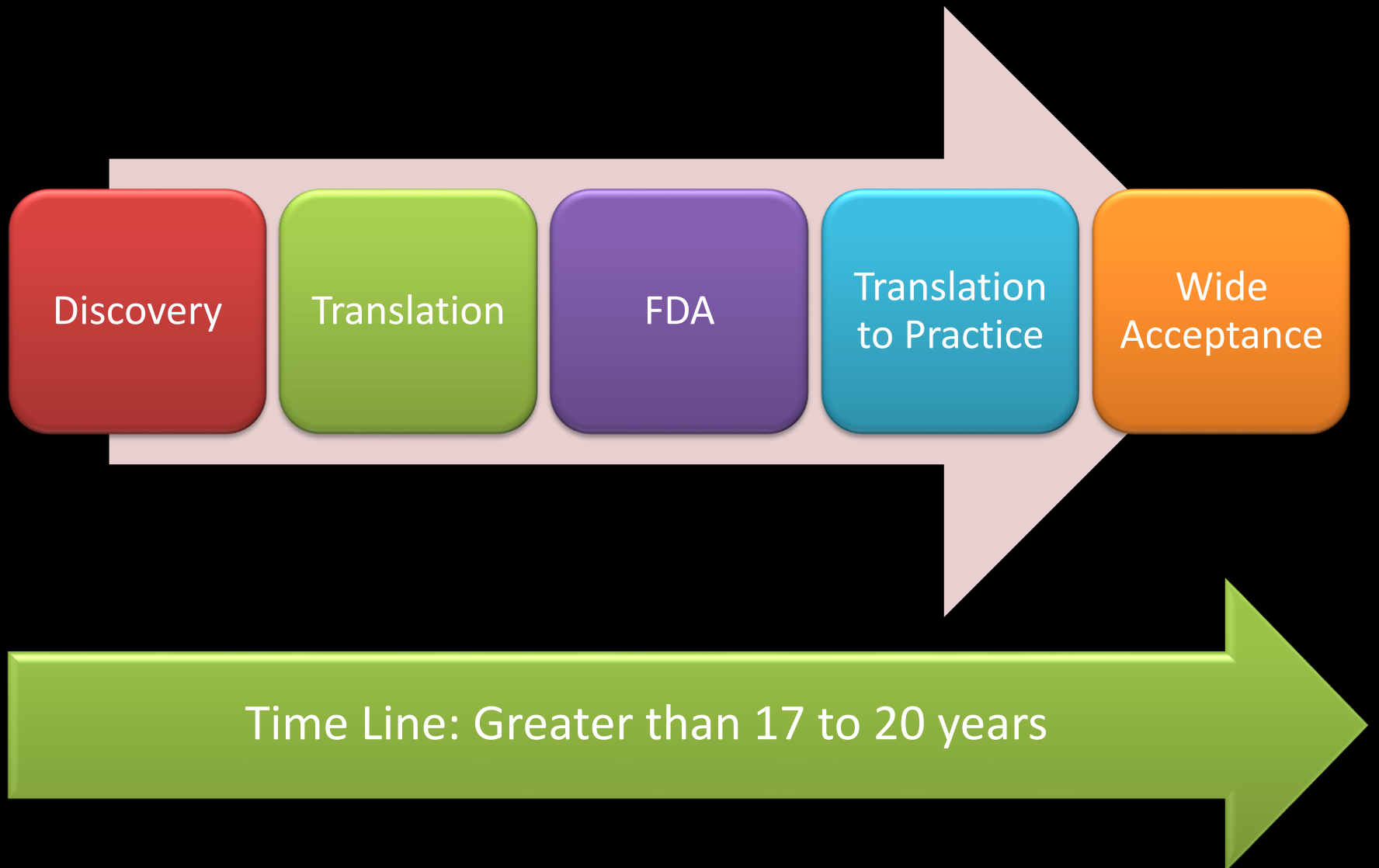
Mark Clanton, MD, MPH,
Chief Medical Officer,
American Cancer Society, High Plains Division



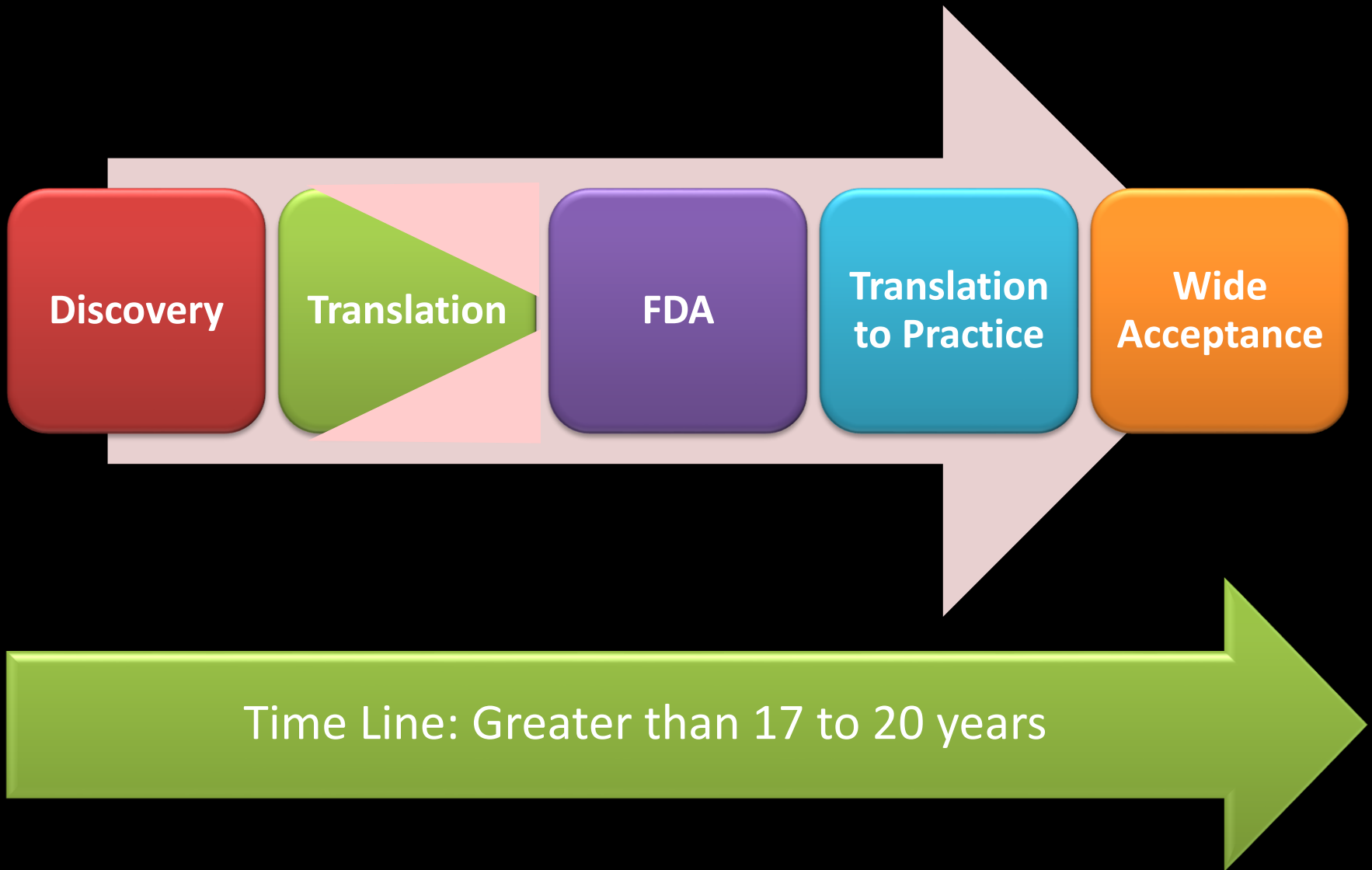




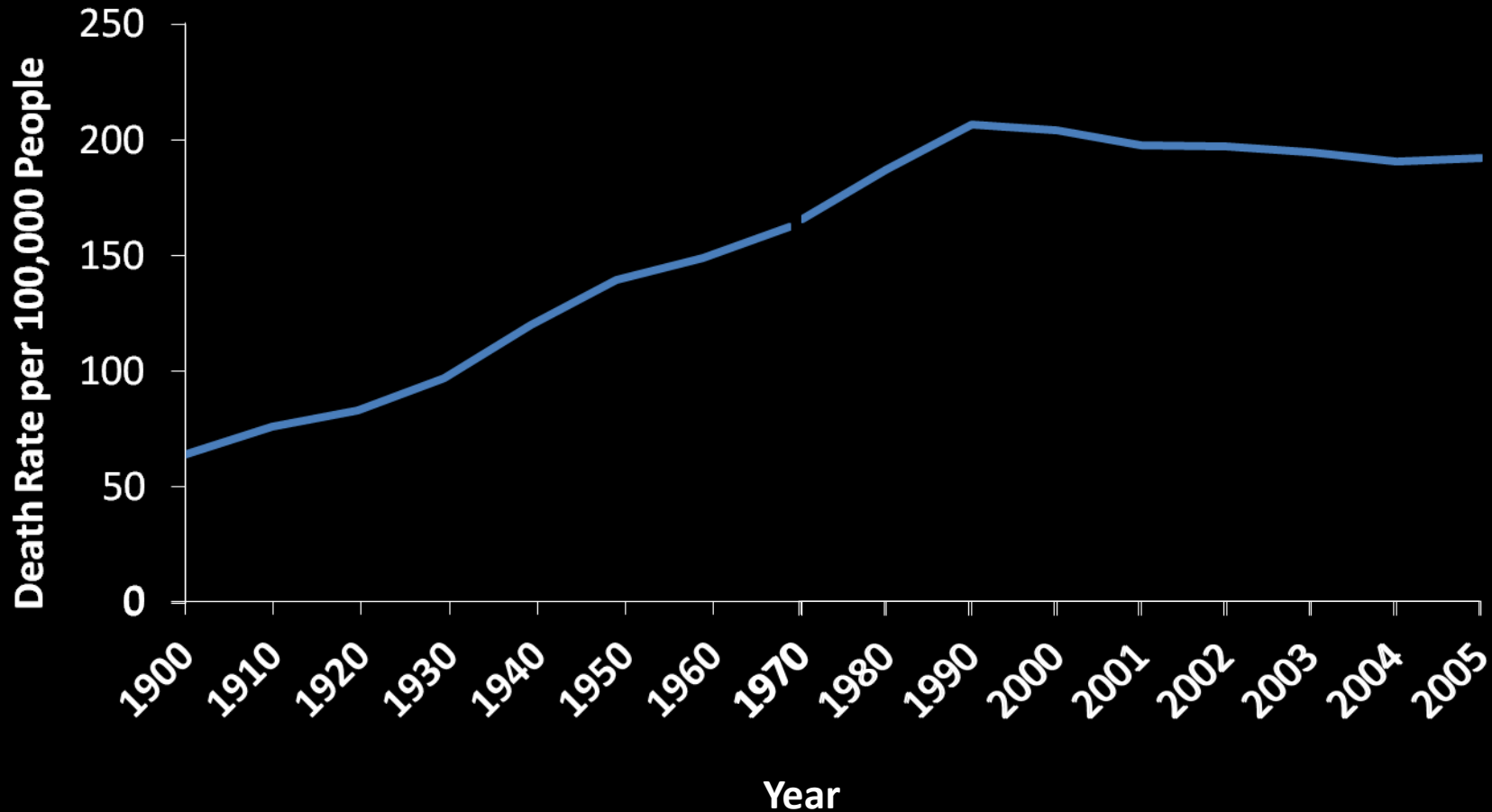
Fighting Cancer: Time to Translation



Fighting Cancer: Time to Translation

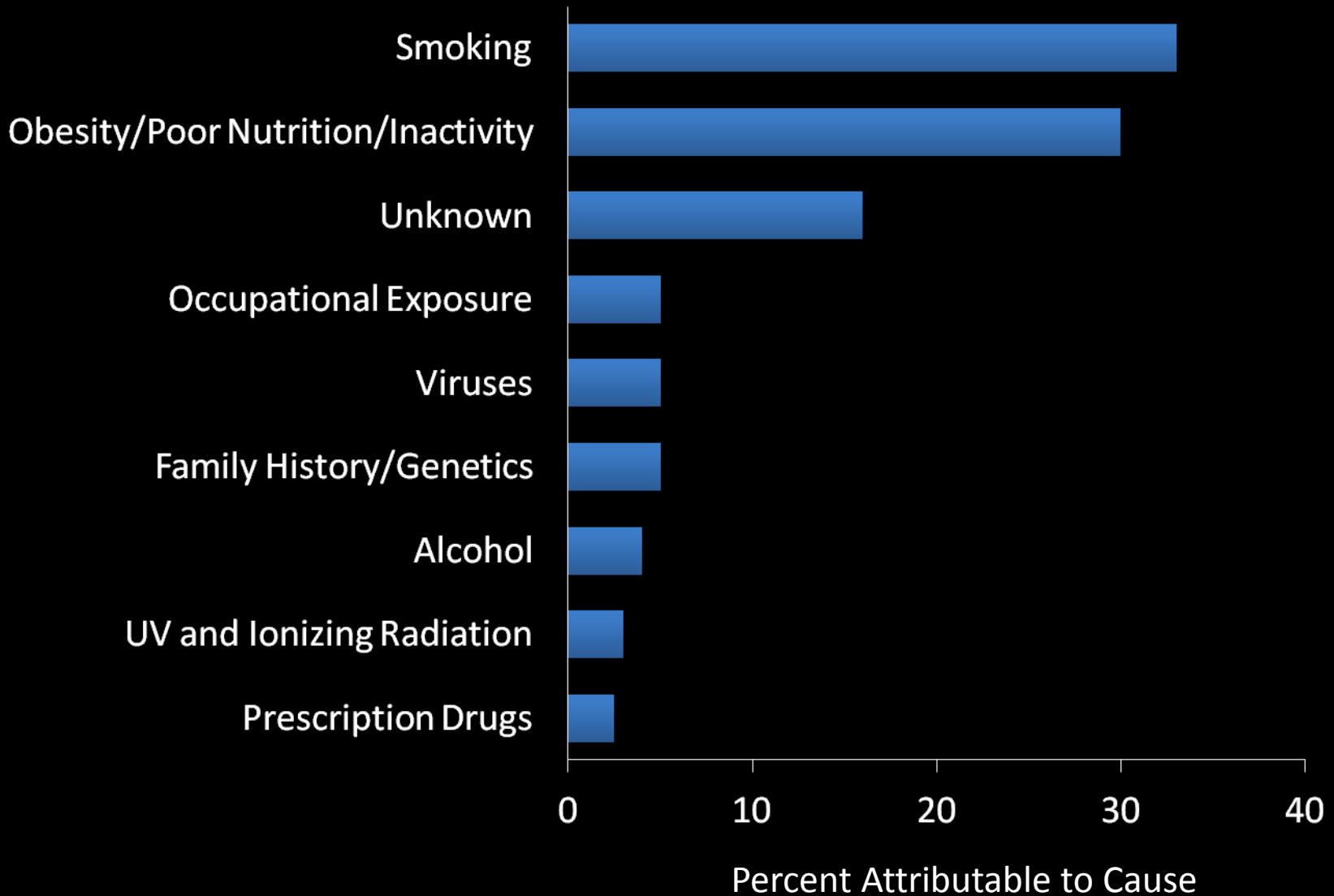


US Cancer Death Rate

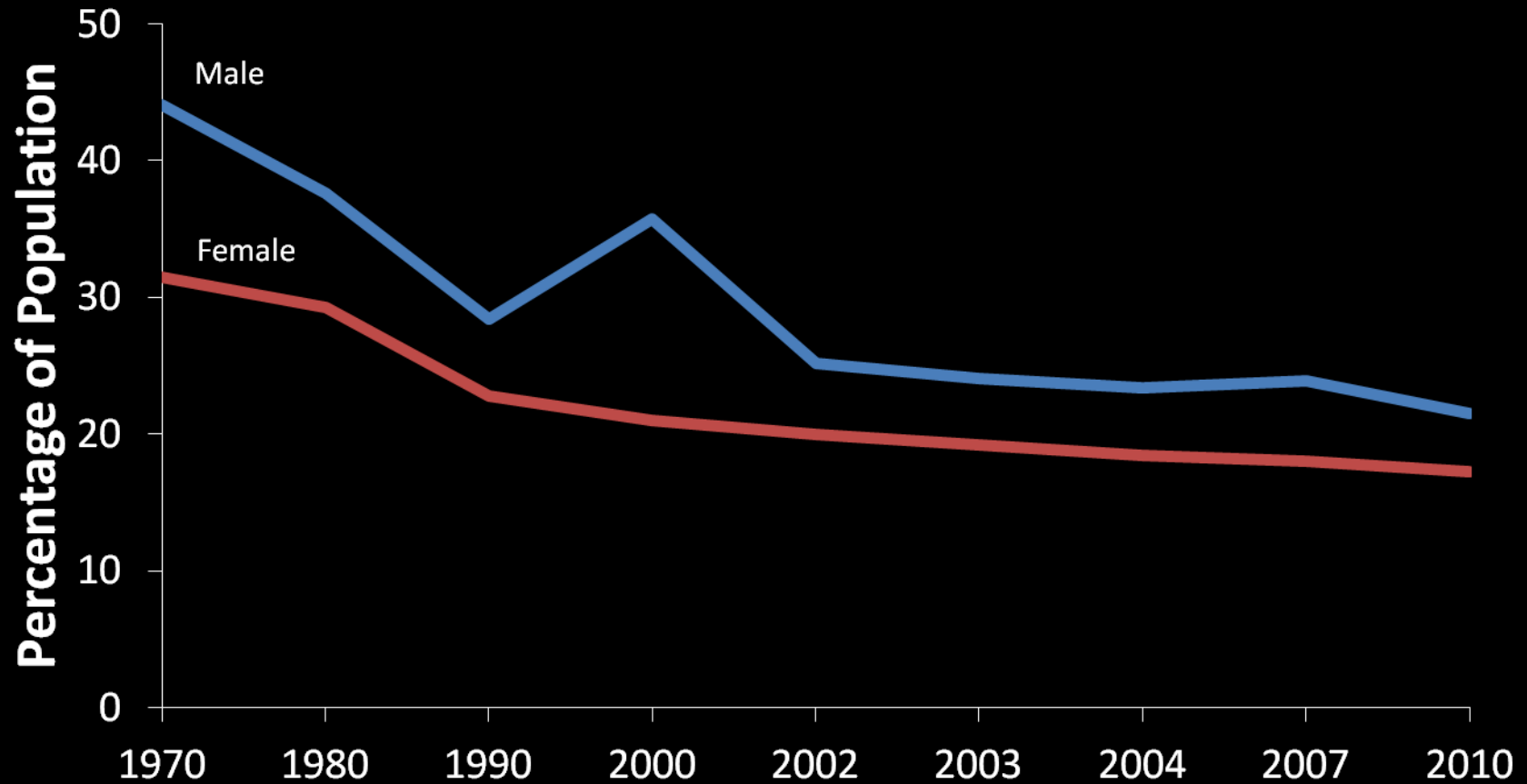


Source: 1900-1970, U.S. Public Health Service; 1971-2001, U.S. National Center for Health Statistics

Risk Factors/Causes of Cancer in the US



Cigarette Smoking by Adults 18 and Older in U.S.



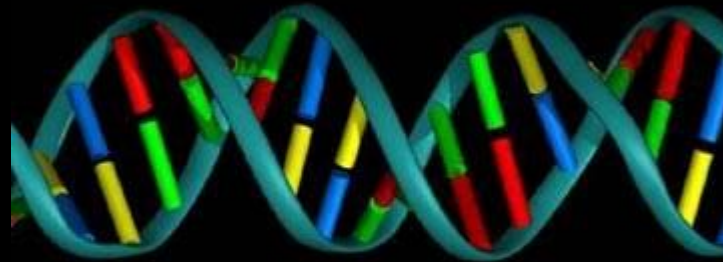
Source: National Health Interview Survey, 1965 – 2010

Where and How will Science
Battle Cancer in the Future?

Where will the War on Cancer be Waged in the Future?

- Understanding Personal and Population Risk for Cancer
- Precision Screening and Diagnosis
- Changing Science Policy

Gene-Environment Interaction: Public Health and Personal Risk



or


Where DNA Meets the World



If smoking is the most common cause of lung cancer, why do only 10 to 20% of heavy smokers develop the disease?



Why are rates of breast cancer high in the United States compared to other parts of the world...



...though, even in the US, most women do not develop the disease?



Comprehensive answers will be found
when we understand what happens
when DNA meets the world



DNA

- Single gene mutation
- Multiple gene mutations
- Gene-environment interactions

Individual

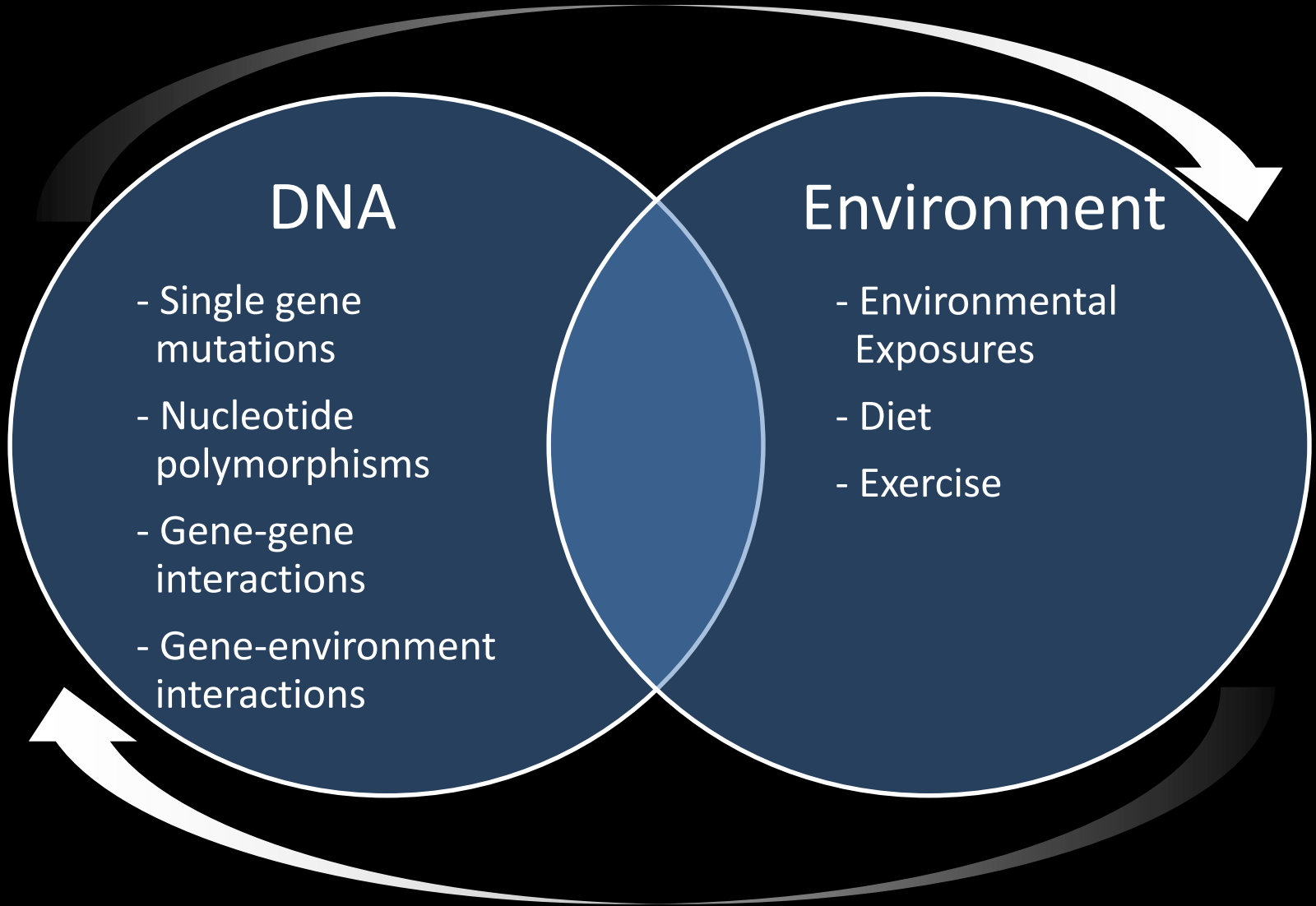
- Single gene cancer
- Multiple gene mutations and cancer
- Gene-environment changes resulting in loss of tumor suppressor

Population

- Public health and gene-environment interactions studies
- Nurses health study
- Cancer prevention studies

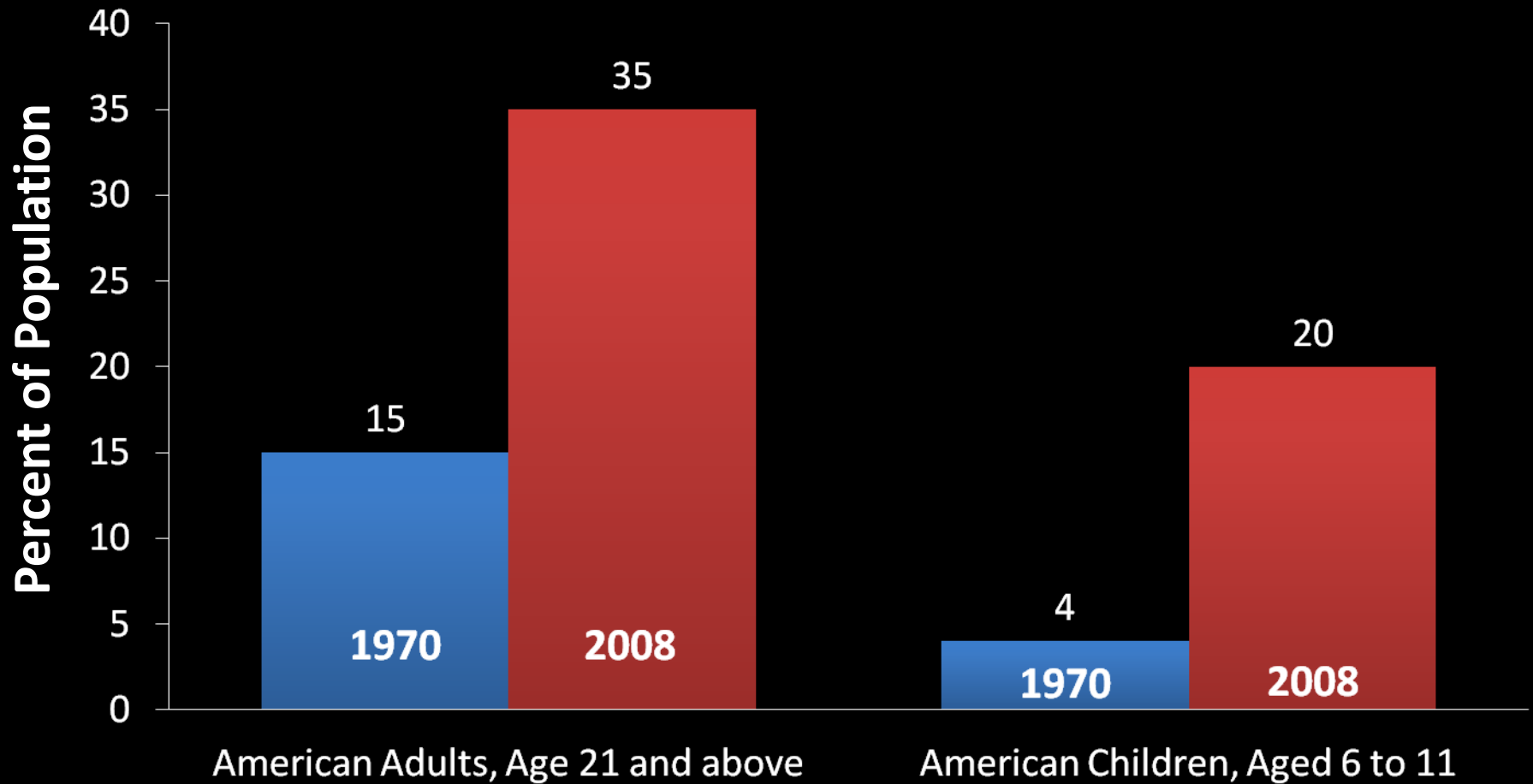
Environment

- Diet
- Exercise
- Environmental exposure



Is Obesity a Genetic or
Environmental Cause of Cancer?

Obesity in the United States 1970 and 2008



The Impact of Gene-environment Interactions



RECENTLY ENROLLING: CPS-3

- UT Medical School could play a role here
- Need more than 300,00 enrollees
- Enrollments occurring in Missouri, Oklahoma, and Texas
- Long term commitment
- Diverse population



Can we find Cancer Cells before they become a Cancer Diagnosis?

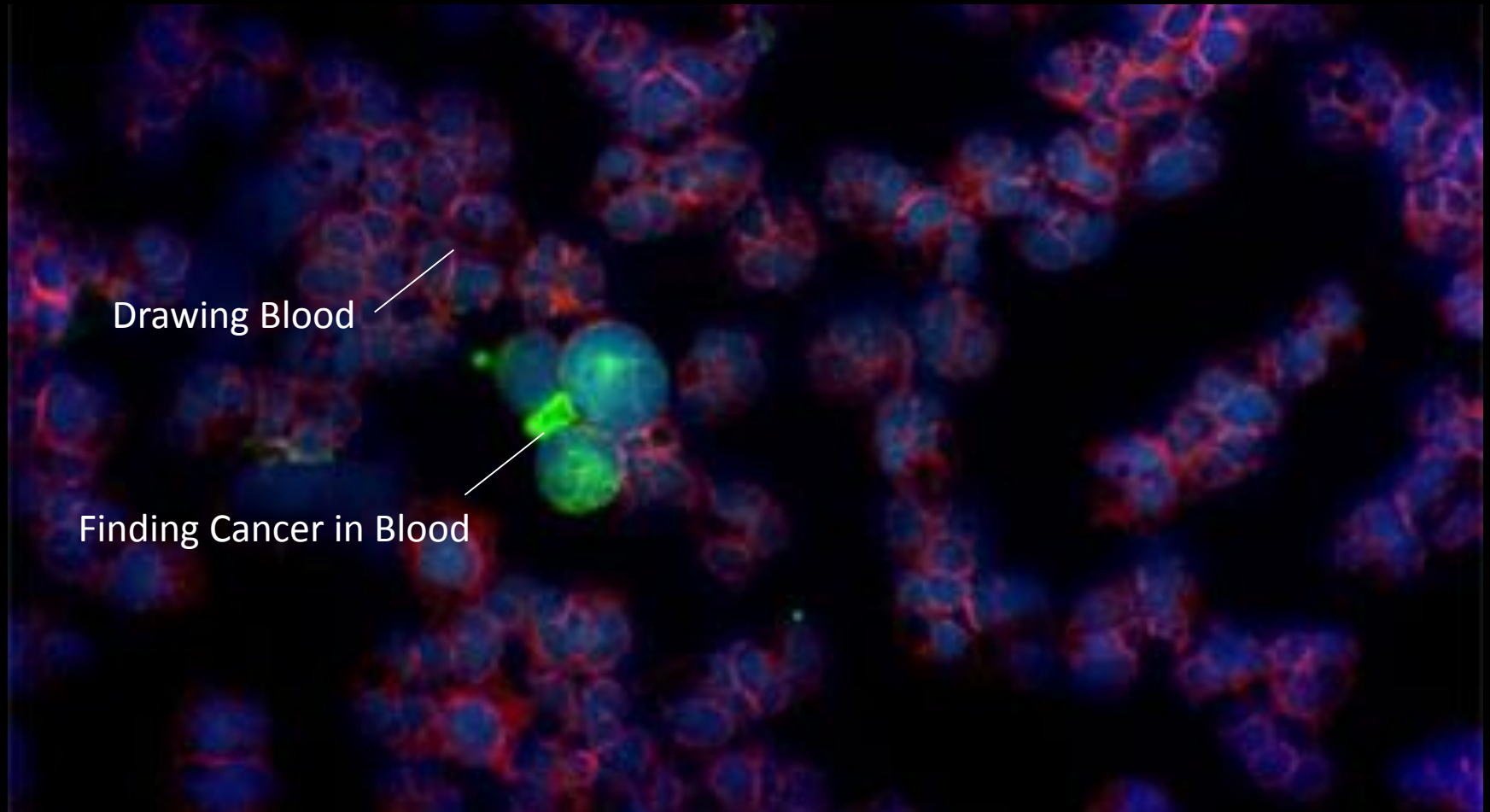
- Circulating Tumor Cells

Circulating Tumor Cells: Shed from tumors, and in the bloodstream

- Progress in Prostate Cancer?
- What is Our Detection Limit Capability?

The Liquid Biopsy

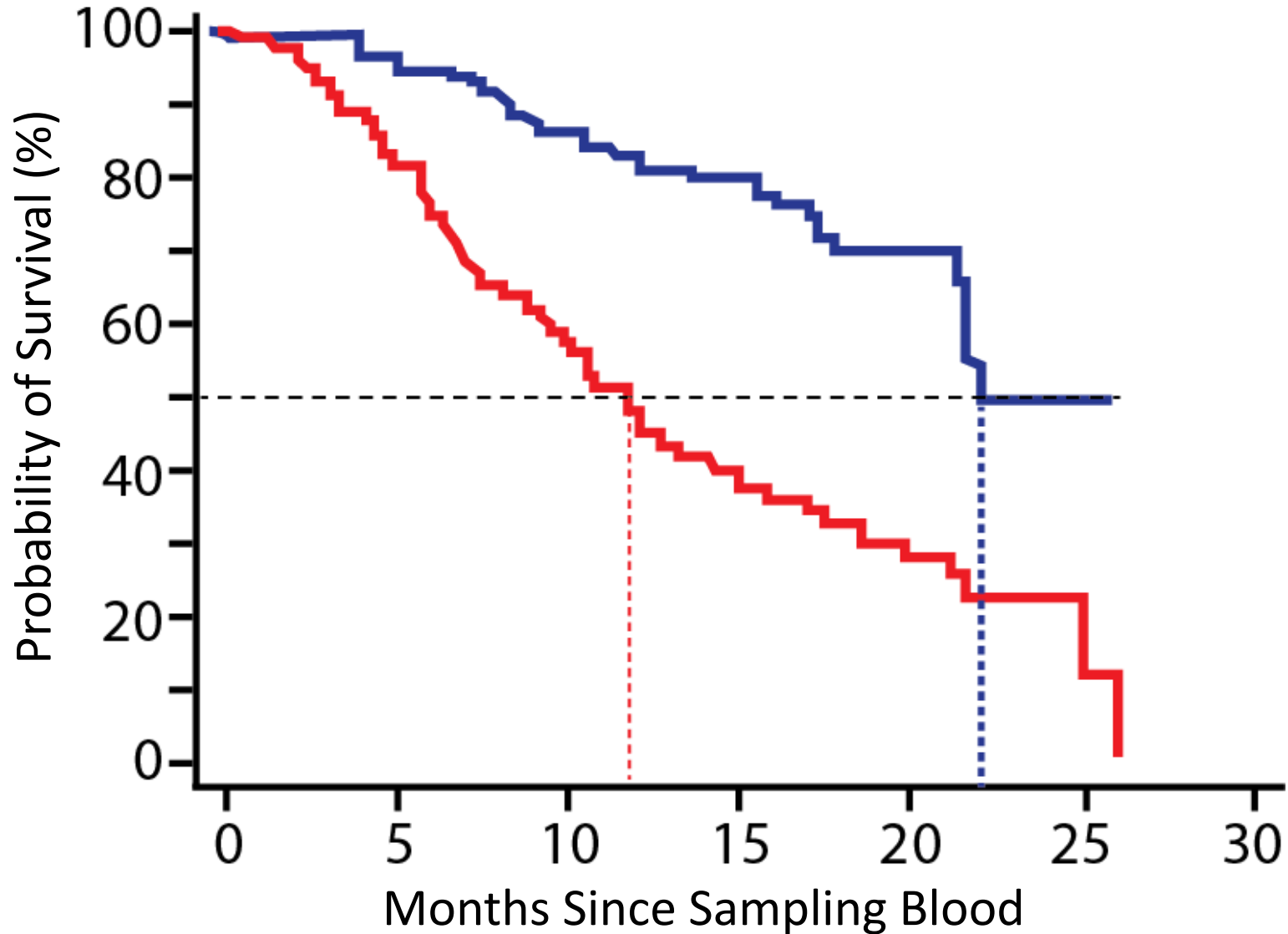
Screening for Cancer in Blood



Prostate Cancer and CTC

- Draw blood
- Find the cancer
- Test for whether it is deadly (genetic profile)
- Inform prognosis

Number of Circulating Cancer Cells Can Predict Survival and Guide Treatment in Hormone Resistant Prostate Cancer



Precision Screening Cancer: Colorectal Screening

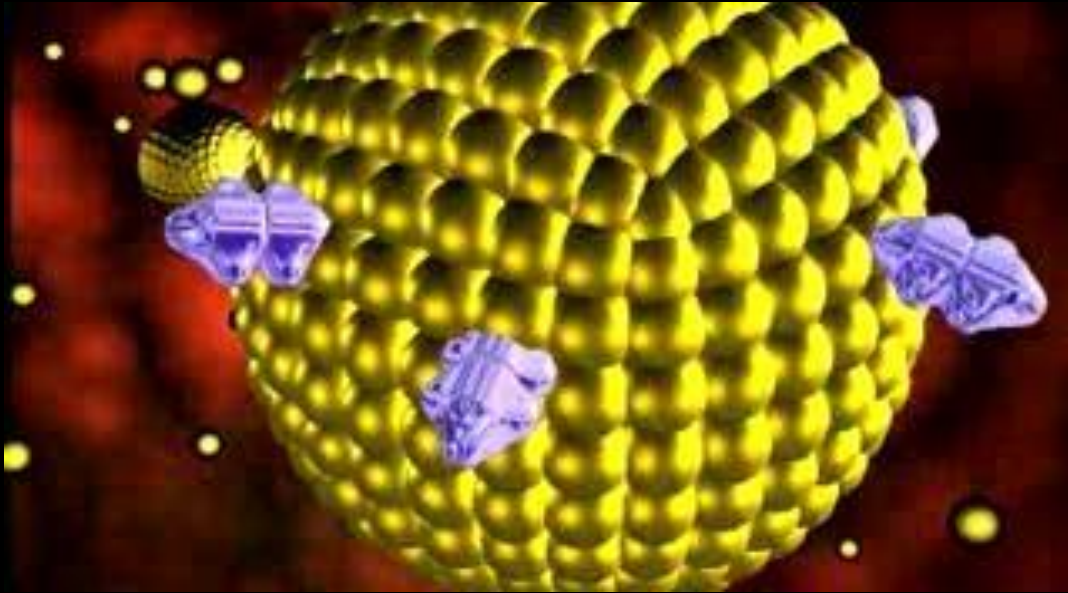
The Present as an Example

Colon Cancer Screening Today

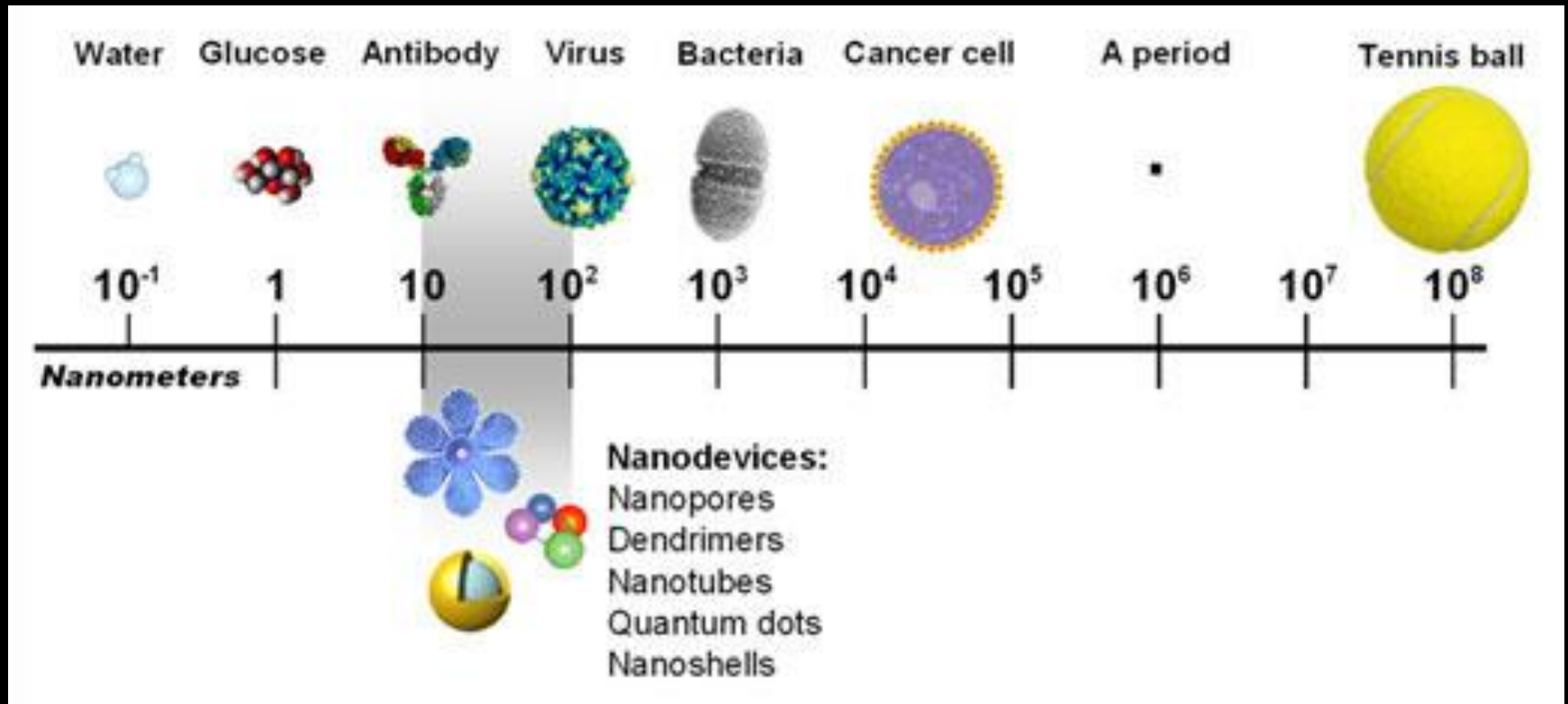
- Card based test such as Hemoccult and SDNA
- Sigmoidoscopy
- Virtual Colonoscopy
- Double Contrast Barium Enema
- Colonoscopy



Colon Cancer Screening Tomorrow



How Early can Cancer be Diagnosed?: Nanoscale Devices

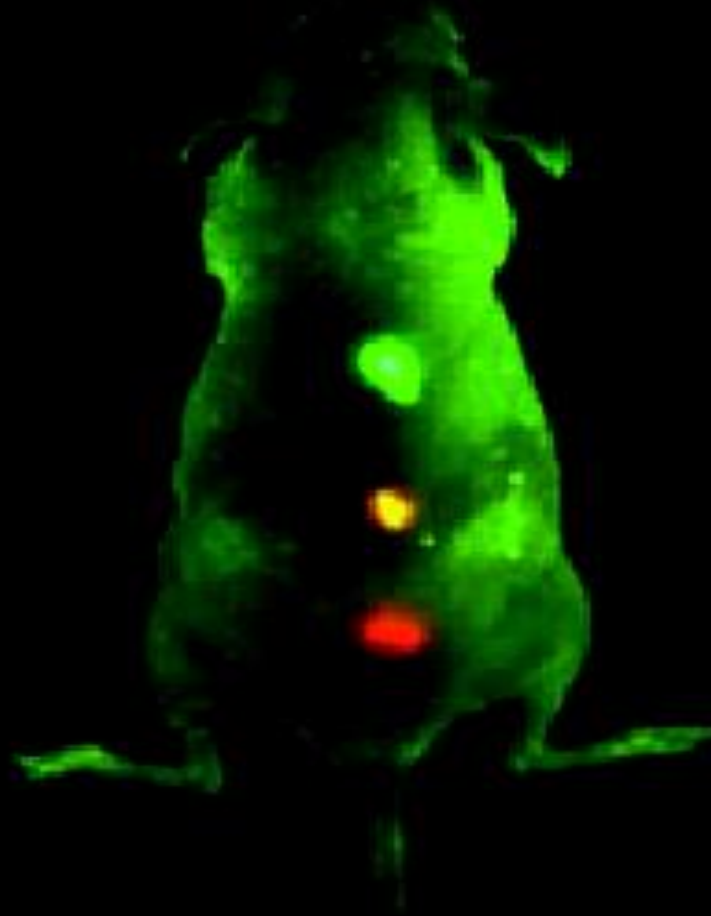


Can nanostructures help us see cancer ?

Quantum dots:

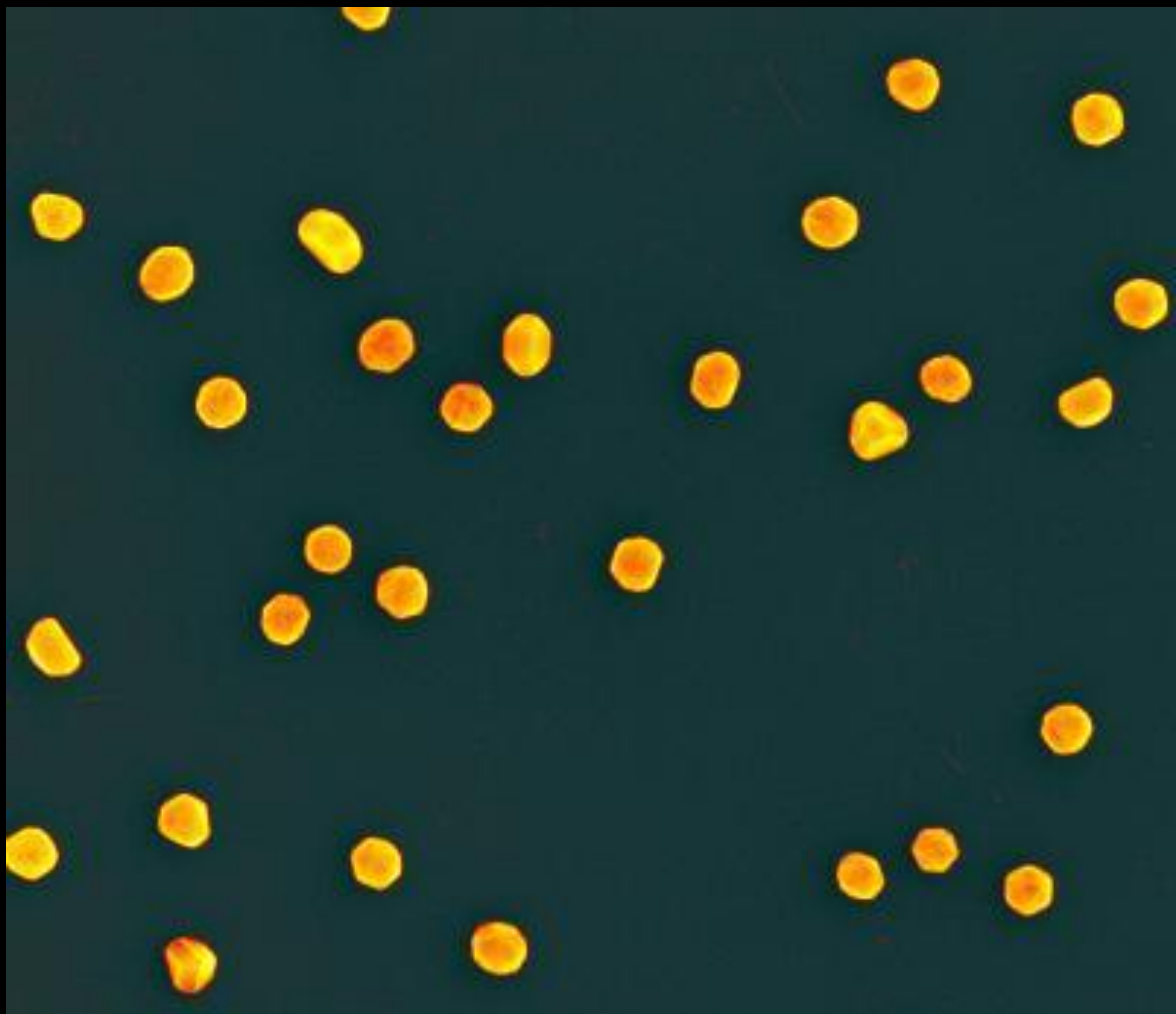
- Tiny quantum dots are made from semiconductor crystals as small as one nanometer (one-billionth of a meter).
- They can zero in with pinpoint accuracy on human prostate cancer.

In ultraviolet light, each dot radiates a brilliant color.



Advances in Colorectal Screening and Diagnosis: Gold Nanoparticles

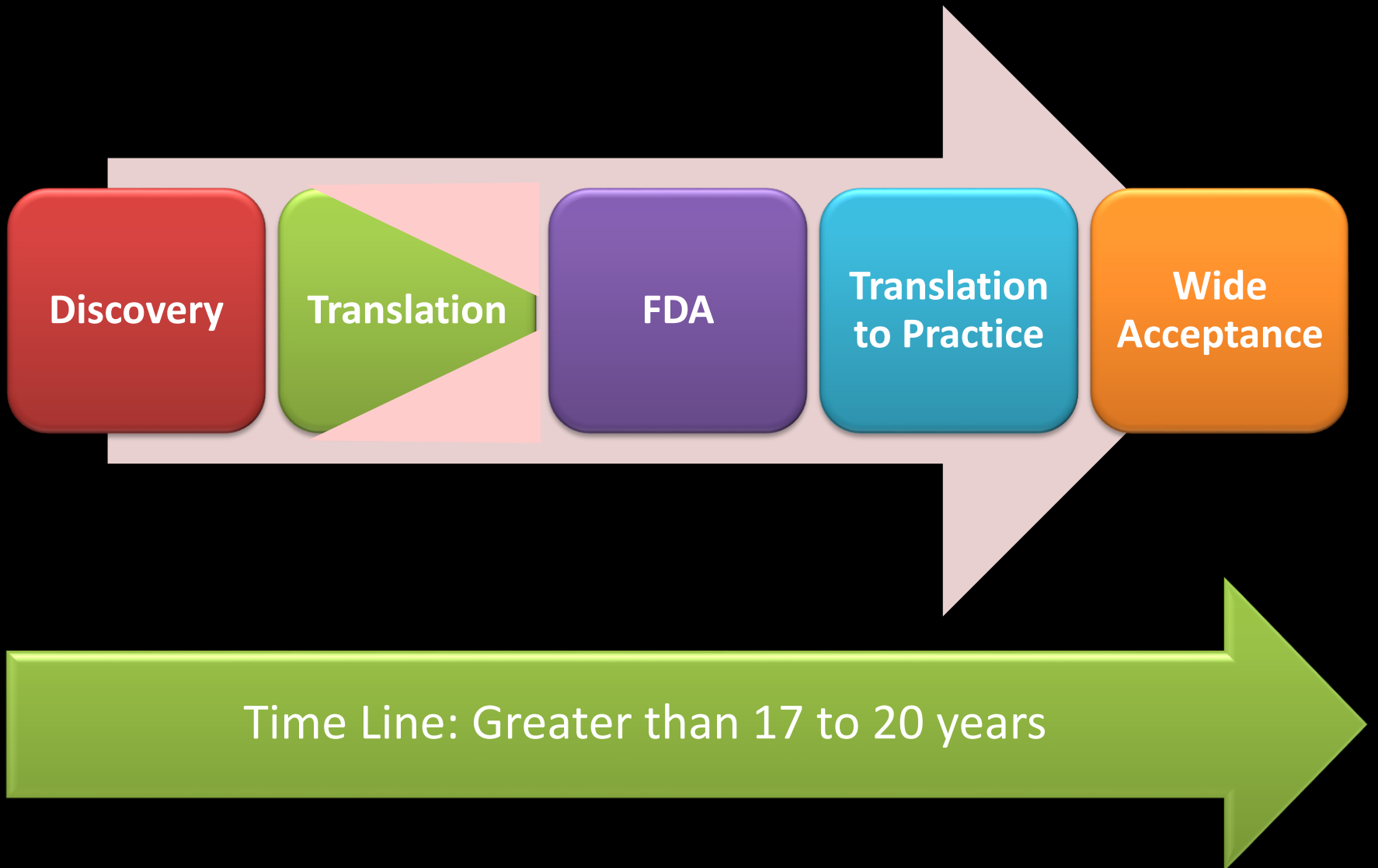
- Identification and removal of non-invasive high grade neoplasia
- Flat/ulcerative colorectal neoplasms more dangerous
- Flat lesion more difficult to find
- Gold nanoparticles may offer more precise diagnosis of GI cancers.



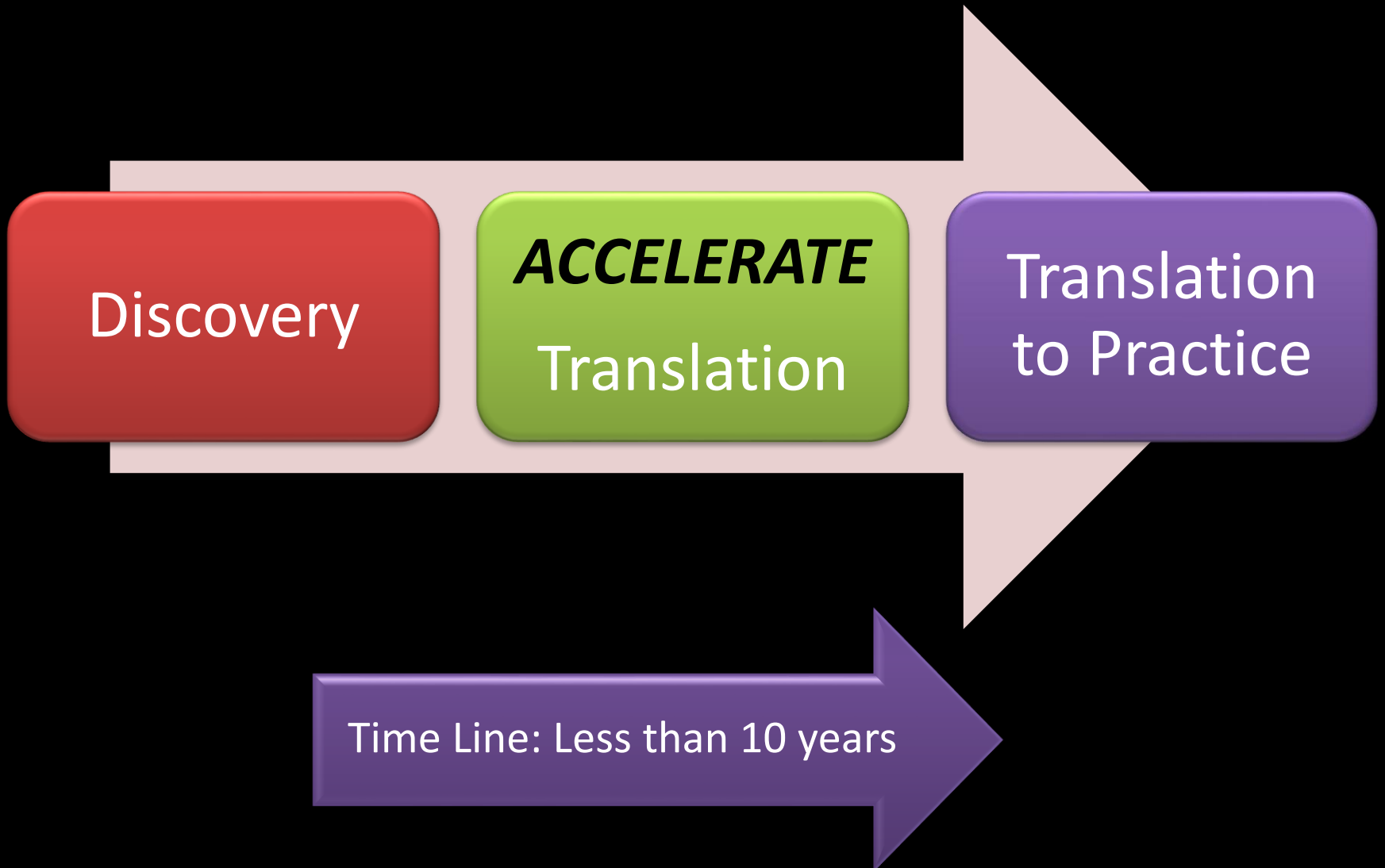
Scanning electronmicrograph of gold nanoparticles created by the National Cancer Institute and the National Institute of Standards and Technology. Credit: NIST (2008)

Can Research be changed to
speed its impact on Humans?

Time to Translation



Time to Translation



“The highest and best purpose of biomedical science is realized when the knowledge derived from research **is used** to improve the human condition.”

Mark Clanton, MD, MPH - NIH

QUESTIONS?

Health Policy and Medical Practice Issues

- Understanding more about the mechanisms of disease will undoubtedly lead to new treatments
- The more scientists identify and fine-tune the genetic factors behind disease or drug response, the more doctors will want to screen individuals for gene variants in order to tailor medical care
- Such personalized medicine may well lead to higher health care costs and thus may create a policy quandary

Policy Quandaries

- If not communicated well, the findings from gene-environment research could even backfire.

If you found a set of genes that made people highly resistant to the effect of smoking on lung cancer - and again, that's a hypothetical - it's unlikely that those same genes would make people resistant to the other bad effects of smoking like heart disease.

Dr. Mark Clanton



Dr. Mark Clanton is the chief medical officer of the High Plains Division of the American Cancer Society and was the deputy director of the United States National Cancer Institute at the National Institutes of Health. Prior to Federal service, he served as the chief medical officer of Blue Cross Blue Shield of Texas and the vice president of a 1 million member drug card program.

In both 2005 and 2006, Dr. Clanton was honored with the Secretary of Health and Human Service Distinguished Service Award as well as the National Institute of Health directors Award of Merit. An accomplished scientific researcher, Dr. Clanton is currently a voting member of the Food and Drug Administration's Tobacco Products Scientific Committee; and a member of the Washington University in St. Louis National Council for the Institute of Public Health, where he advises the Institute on the development of a full time school of public health.

In 2011 Dr. Clanton was named to the Washington University Transdisciplinary Research in Energetics and Cancer Center (TREC) external advisory board. The TREC grants represent a 45 million dollar, multi-site consortium whose purpose is to understand the causes of obesity and its relationship to cancer.