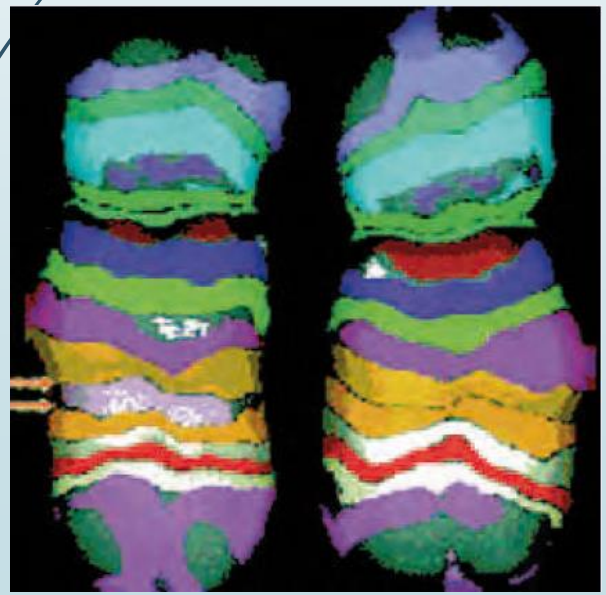
Copy Number Variation

Structure of larger variant calling

Definition

- "Refers to the **genetic trait** involving the **number of copies** of a particular **gene** present in the genome of an individual. Genetic variants, including **insertions, deletions, and duplications of segments of DNA**."

- *NATIONAL CANCER INSTITUTE*

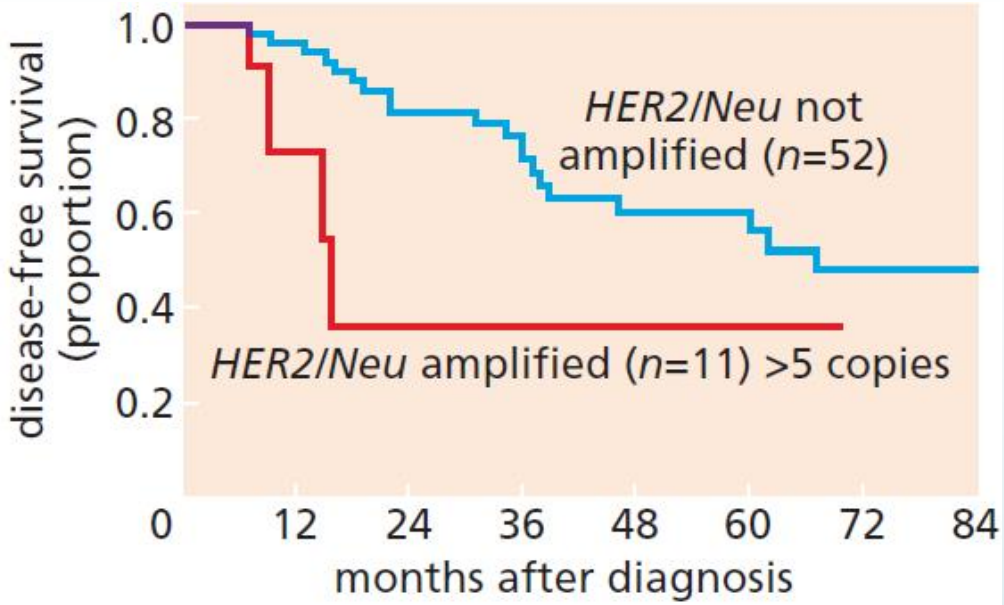


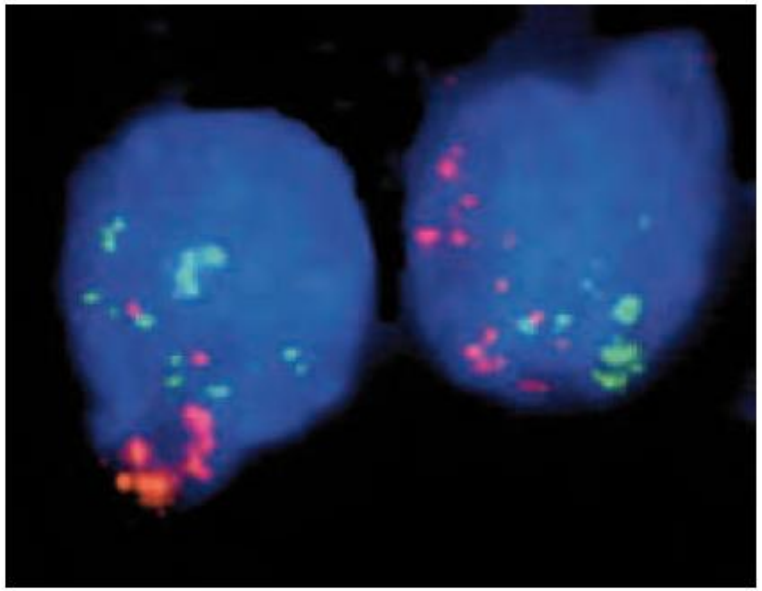
- "The use of multicolor FISH (mFISH) revealed that a segment within normal human **Chromosome 5** (*paired arrows, left*) has been deleted (an **interstitial deletion**, *right*) following extensive exposure to radiation from plutonium."

- *The Biology of Cancer, Robert A. Weinberg*

Gene Amplification

- Amplification of the **erbB2/HER2/neu** oncogene in breast cancers
- More copies resulted in poor prognosis
- The **inverse correlation** between erbB2/HER2 expression levels and long-term patient survival provided a strong indication that this gene, in amplified form, was causally involved in driving the malignant growth of the breast cancer cells.
- Multiple sites of **erbB2/HER2**(light green) and **CCND1/cyclin D1** (orange/pink) - *The Biology of Cancer, Robert A. Weinberg*

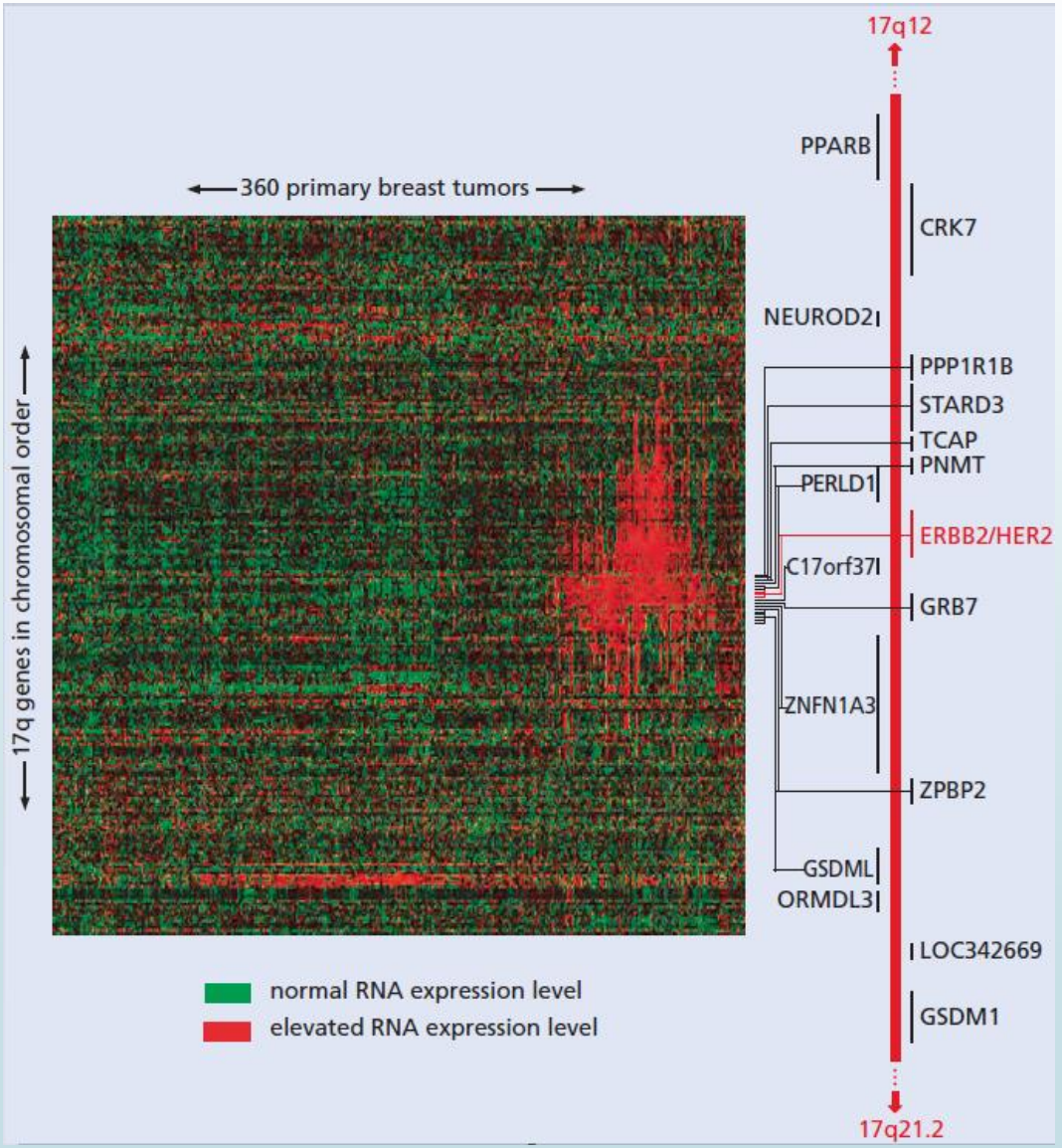




Gene Amplification

- **Expression levels** of a cohort of 160 genes that flank **ErbB2/HER2** for 360 human breast cancers.

- **Amplicons** included a stretch of chromosomal DNA than the gene, resulting in **co-amplification** of neighboring genes that may be collaborating to orchestrate the **malignant phenotype** of human breast cancer cells, and it becomes difficult to ascribe specific cancer cell phenotypes to the elevated expression of only a single gene.



Gene Amplification

- The map of some of the genes identified that flank HER2 on both sides is provided (red vertical bar, right).

- Probes for 160 distinct genes in this chromosomal region were arrayed in the order of their location along human **Chromosome 17q**.