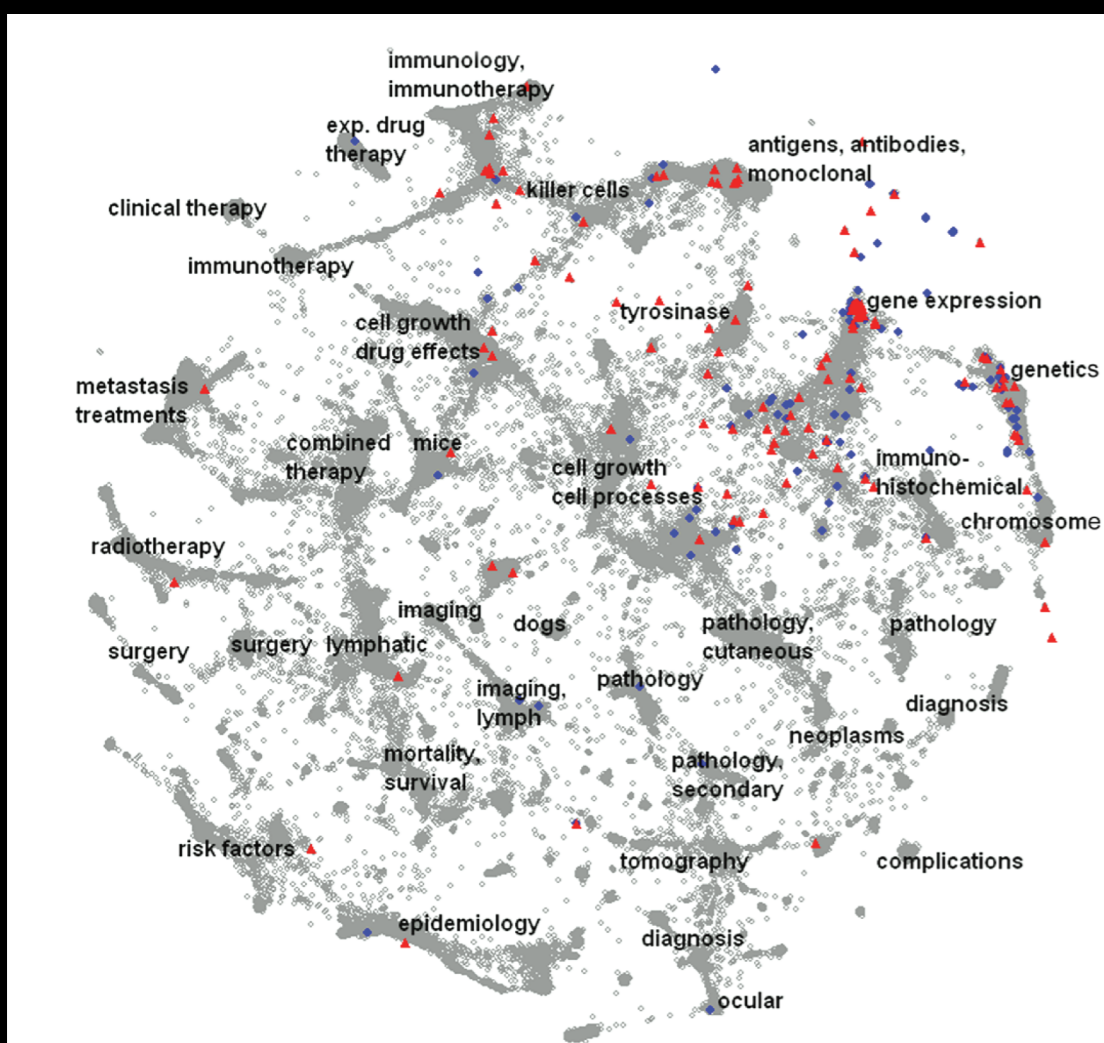


A gene-gene, gene-paper, gene-protein, protein-paper and protein-protein map was generated. The figure shows the gene-paper (left) and gene-gene (right) network. Highlighted in red is a single gene (CMM) and all its connections within the given network.



Paper-Genes Protein Map
 Shown here is the melanoma research area over the last 40 years. Gray dots represent papers, red dots denote proteins, blue dots indicate genes. Experts classified the shown research areas into two main categories:

- **Applied Medical Sciences (left side)** where research work occurs at organism level
- **Basic Molecular Sciences (right side)** with studies related to genes and proteins

Mapping Medline Papers, Genes, and Proteins Related to Melanoma Research

Goal

To provide researchers, practitioners and students with a global map of a research domain, to help them answer questions such as: What are the major research areas, experts, institutions, regions, nations, grants, publications, journals in a certain area of research? Which areas are most insular? What are the main connections for each area? What is the relative speed of areas? What new research areas are evolving? How are the objects of study (e.g., genes, proteins) interconnected via papers?

Top researched genes and proteins

Identification of sudden interests in research/published papers on certain genes and proteins using Kleinberg's burst detection algorithm. Examples of major bursts for genes and proteins along with their time-period are shown here.

Genes: CDKN2A (1997-2004), CDK4 (1996-2001)

Proteins: p53 (1993-2002), Glycoprotein (1983-1990)

Time series analysis

The structure & dynamics of melanoma research was examined:

1964-1973: Diagnostic and immunity based approaches dominate.

Chemotherapy emerges as a new area for cancer treatment.

1974-1983: Chemotherapy gains popularity as viable treatment. Monoclonal studies involving tagging cancerous cells using antigens start.

1984-1993: Research on metastasis behavior of cancer dominates.

1994-2003: Gene-expression and mutation related studies gain popularity.

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