

University of Pittsburgh Institutional Biosafety Committee
Guidance on use of Oncogenes in Recombinant Research
Approved May 13, 2024

Background Information

The Institutional Biosafety Committee (IBC) recognizes the importance of obtaining a concise and updated list of oncogenes and tumor suppressor genes for investigators and for IBC membership and staff to evaluate and review the safety of protocols.

In the past, resources defining oncogenes and tumor suppressors included genes that might be associated with cancers but were not specifically causative of tumors.

The following definitions are presented by the IBC:

- 1) An **oncogene** is a gene or mutated gene that independently has the potential to cause a tumor.
- 2) A **tumor suppressor** gene encodes a growth/replication controlling factor that when absent or inactivated, independently results in a tumor.

Please note that protooncogenes are not oncogenes until specific mutations are acquired that give them oncogenic activity.

Website Resources

- A) The IBC recommends as a first resource, the [German government website](https://www.bvl-bund.de/) (found at [BVL - Unit 4 \(bund.de\)](https://www.bvl-bund.de/)). This website is updated regularly and provides easy access to decisions based on more strict definitions of oncogenes. A search function is available to locate your genes of interest. Additional detailed information and references can be obtained by clicking on the gene of interest.

The German government website has some descriptions written in german and it is not a U.S. government sanctioned site. It also is a single source resource. For these reasons the IBC recommends searching an another site (MSK see below) for additional information to make more complex oncogene and tumor suppressor decisions.

- B) The Memorial Sloan Kettering (MSK) website database of genes ([OncoKB](https://www.oncokb.org/cancer-genes)) is found at: <https://www.oncokb.org/cancer-genes>

Suggestions to optimize the use of the MSK website:

- For more efficient searches, the gene list can be downloaded by clicking on the Cancer Gene List button and then open the file using Microsoft Excel
- For best results, it is suggested that the user compare the columns of “is oncogene” and “is tumor suppressor” (MSK OncoKB opinions) as well as the Vogelstein and Cosmic CGC columns to gain a consensus for each gene of interest
- Additional information for each gene can be obtained by clicking on the gene name
- TSG = tumor suppressor gene

It is noted that the Cosmic CGC oncogene list often includes cancer-associated genes that are technically *not* oncogenes (see definitions, above).

Further investigation may be required that requires additional information.