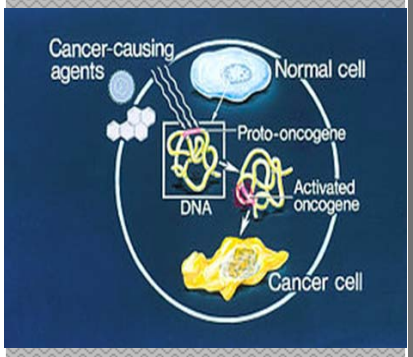


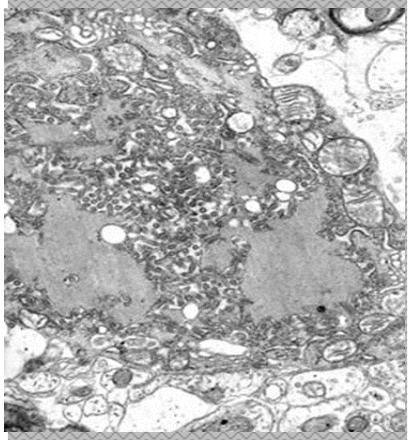

# EMGEN Newsletter

Vol. 6, Issue 9

## IN THIS ISSUE:



Eastern Mediterranean Health Genomics and Biotechnology Network (EMGEN) was created in 2004 with collaboration of representatives of selected centers of excellence in (health related) molecular biology, biotechnology & genomics in the Eastern Mediterranean region by recommendations and efforts of WHO/EMRO. Sponsored by Iran Biotechnology Development Council.

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# BIOREMEDIATION

Bioremediation states the utilization of germs to reduce pollutants that have ecological and humanoid threats. Bioremediation procedures naturally include the actions of numerous dissimilar germs acting in collateral or orderly to complete the reduction procedure. Both *in situ* and *ex situ* remediation methods are applied. The flexibility of germs to reduce a huge range of contaminants makes bioremediation a knowledge that can be practiced in diverse soil circumstances. Although it can be cheap and *in situ* methods can decrease disruptive industrial practices, bioremediation is not a mutual exercise yet.

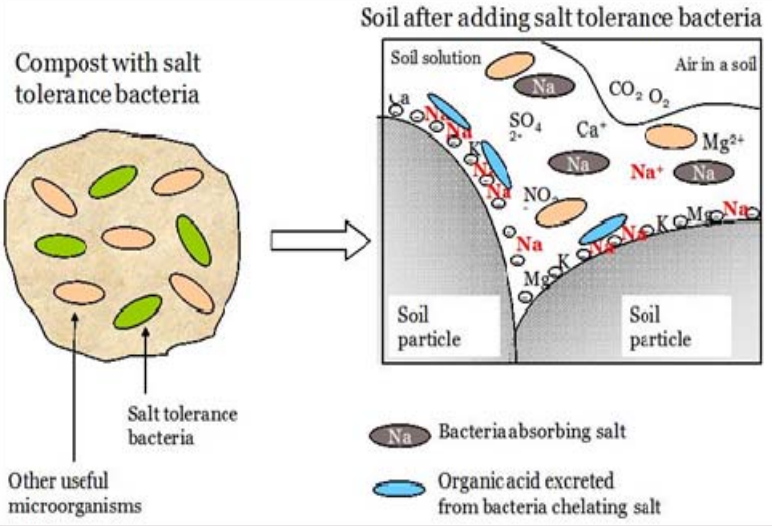


**Figure 1:** Mechanism of salt removal from tsunami affected soil by bioremediation.

**Principles of bioremediation**

The crucial actors in bioremediation are microbes that live almost everywhere. Germs are perfectly suitable to the task of pollutant annihilation, since they hold enzymes that let them to consume ecological pollutants as food and for the reason that they are so tiny which are talented to access pollutants simply.

*In situ* bioremediation can be observed as a deployment of the fact that germs have attended in the earth for hundreds of years: the decomposition of intricate humanoid, animal, and vegetal trashes so that life can endure from one race to the succeeding. In lack of the action of germs the earth would factually be inhumed in the garbage, and the nutrients essential for the continuance of life would be imprisoned in detritus. Whether germs will be effective in eradicating man-made pollutants pertains to three elements: the kind of creature, the kind of pollutant, and the environmental and biochemical circumstances of the polluted location. In assessments how germs abolish pollutants and what kinds of creatures be a factor in *in situ* bioremediation are discussed. Following, it assesses which pollutants are most vulnerable to bioremediation on the earth and defines the varieties of locations where bioremediation is most probable to be successful.

**The role of germs in bioremediation**

The aim of bioremediation is to excite germs with nutrients and other substances that will permit them to abolish the pollutants. Nowadays bioremediation processes depend on germs native to the polluted locations, cheering them to work by providing them with the optimal levels of nutrients and other substances crucial for their metabolism. Therefore, contemporary bioremediation methods are restricted by the abilities of the native germs. Nevertheless, scientists are presently examining methods to enhance polluted locations with nonnative germs - comprising genetically modified germs - particularly appropriate to reducing desirable pollutants at specific locations. It is probable that this procedure, identified as bioaugmentation, could increase the array of opportunities for upcoming bioremediation approaches. Irrespective of whether the germs are native or recently familiarized to the location, a comprehension of how they abolish pollutants is crucial to realize bioremediation. The categories of bacterial procedures that will be used in the refinement guide us that what dietary supplements the bioremediation procedure must secure. Additionally, the derivatives of bacterial methods can deliver signals that the bioremediation is effective.

**Bioremediation treatment methods**

In order for bioremediation to be fruitful, it needs adequate evidence for the reduction of pollutants. Yet, defining the proficiency and wholeness to reach adequate outcomes is one of the key subjects. Natural reduction depends on ordinary procedures to clean up or decrease contamination in soil and groundwater. This remediation is completed deprived of humanoid interface, and is principally applied as a checking point, to make sure more offensive cleaning policies are not necessary. Abiotic and biotic elements are peculiar aspects of how operational bioremediation is done.

Contemporary checking approaches define the evanescence of pollutants and their reduction yields to controlling levels that are checked by noxiousness testing, typically on single creatures or species to safeguard there are no prompted alterations that may cause remaining poisoning. The issue with these checking methods is that the calculation of pollutants may cause an inexact sign of remaining poisoning. Relatively, assessing the whole bacterial species reply may be a more appreciate sign of remaining poisoning than a solo species. When adequate proof is delivered, humanoid involvement may be required for a more operative cleanup procedure.

There are two kinds of remediation that are used; "*ex situ*" which is completed by eliminating the polluted soil

or water and detoxify it outside the source, and "*in situ*" which detoxification carries out in the polluted location. There are some handling approaches that can be either *ex situ* or *in situ*. Some methods may cope with the mobilization of contaminants, to move them outside a region, or restrained to keep them outside a zone, for example a water source.

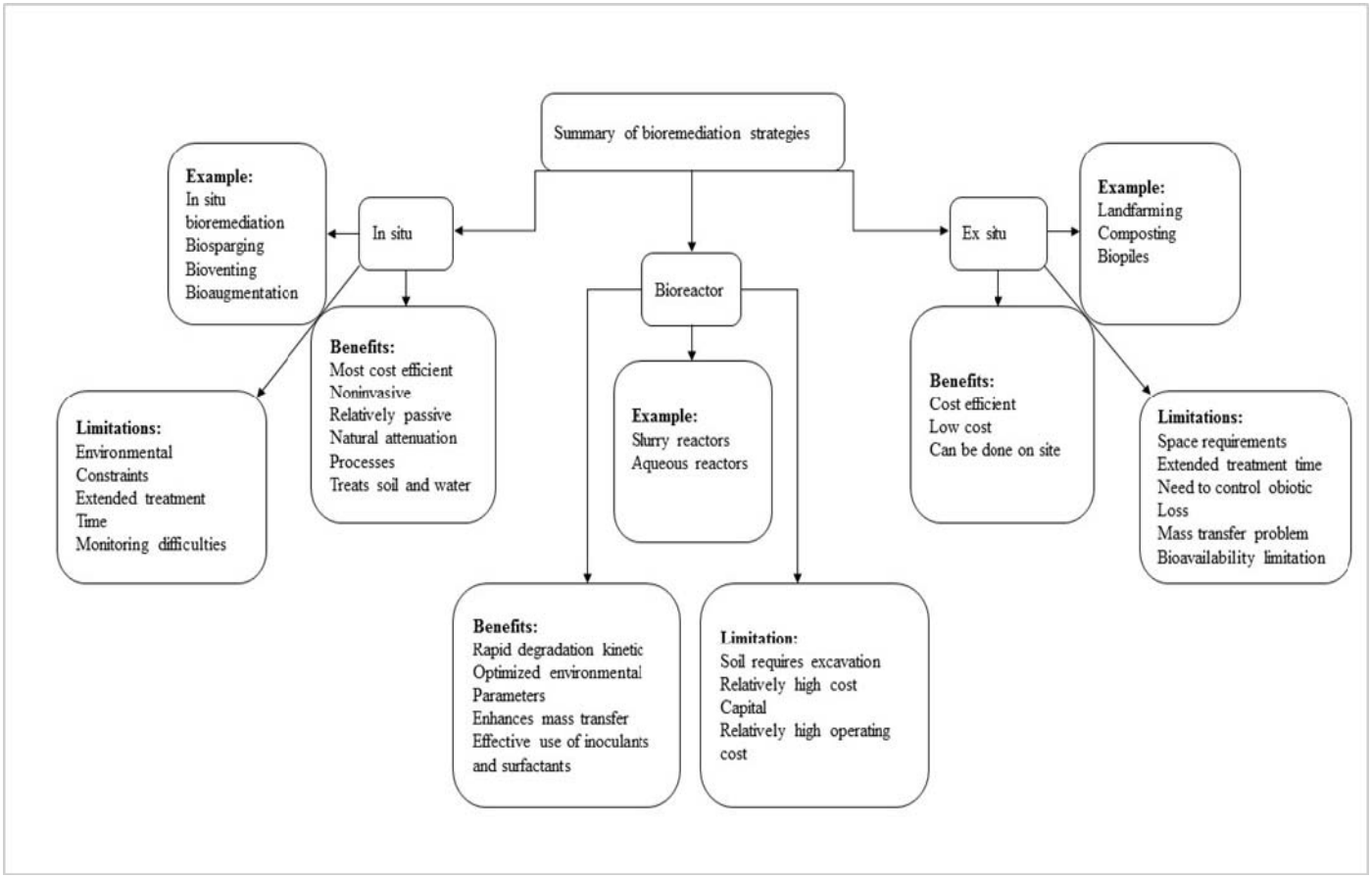


**Figure 2:** Bioremediation strategies.

**Bioremediation advantages**

1. Bioremediation is a widely approved action of contaminated soil since it is grounded upon natural procedures. Germs that absorb pollutants upsurge in population when the pollutant exists. The opposite is factual, reduction of the pollutant brings population decay of those germs.

2. Bioremediation is hypothetically intended to wholly reduce a wide array of contaminants into innocuous yields on site. This eliminates the dangers related to moving for detoxification and elimination of polluted

ingredients.

3. Bioremediation is inevitable to wholly remove precise poisons deprived of the dangers of spreading pollutants from one location to another (land, air, and water).

4. Bioremediation can be an inexpensive substitute for other skills applied for pollution extenuation.

**Bioremediation disadvantages**

1. Merely biodegradable ingredients are talented of experiencing bioremediation. Not every ingredient is able of entirely degrading speedily.

2. The yields of biodegradation may possibly be even more refractory or poisonous than the primary pollutant.

3. Biological functions are exceedingly explicit and necessitate the attendance of germs that are talented to absorbing the pollutants. In order for the true germs be existent, the suitable ecological circumstances, levels of nutrients, and pollutants need to be met.

4. Expanding the size of investigations from small original studies to commercial-scale arena processes is challenging.

5. The real setting comprises pollutants that are diverse, unequally dispersed, and in dissimilar forms (solid, liquid, gas). More studies need to be done to produce technologies that can adjust.

6. Compared to other detoxification approaches, bioremediation often requires more time.

7. Difficulties regarding guaranteeing suitable interactions between the germs and the pollutant favored pathway and soil construction can origin ambiguity in remediation dispersal.

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3. King R.B., Sheldon J.K. and Long G.M. (1997). Practical environmental bioremediation: the field guide. *CRC Press*.
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5. https://en.wikipedia.org/wiki/Bioremediation

# DISPOSABLE FERMENTER & FERMENTATION METHOD

A disposable fermenter that might be utilized instead of a more costly jar fermenter has the same efficiency in a temperature administrated room instead of a sanitized room, with the benefit of not being prepared of glass which crushes and which may be moved as is, by just closing the bag. A flat cylinder prepared from plastic film is injected into the underneath of the bag with the cylinder closed to the bag, leaving a window in the cylinder so the opening may not be shut. After the adding of liquid, semi fluid or solid media are made, the breather is adjusted and the bag door is closed, the bag is sanitized before or after the bag door is closed and the ventilation is completed via the flat cylinder.

**Background of the invented method**

Formerly, glass and stainless steel have been utilized as the substantial for fermenters and needed at least, ventilation sparger and air passage in addition to blender and specimen port. These fermenters are accessible in several capacities, e.g. the tiny jar fermenter with capacities of 1 to 5 liters prepared of glass, the jar fermenters prepared of stainless steel with capacities of 10 to 200 liters and lastly even greater fermenters. The tiny size fermenters have been utilized to produce laboratory statistics and for fermentation trials and at times, 10 or more are run at the same time but generally, they are costly, consequently merely some of the scholars can apply these fermenters. Newly, more accurate and easy to regulate fermentation rooms have come to be available because of the proficiency and amplified acceptance of air conditioners and the extent of the fermentation rooms have improved. More effective utilization of the fermentation rooms by hiring several equal size fermenters to create more operative use of the space, and simple fermenters with high fermentation efficacy, shipping of the fermentation product, and lastly effectual leftover removal of the fermenter are now requested.

**Summary of the invention**

The current contraption has been established to answer the problem stated above. The contraption comprises an enduringly fixing to the extremity of the bag fermenter, a flat plastic film cylinder which permits unrestricted passage through the cylinder into the bag. The media positioned in the bag can be liquid, semi-liquid or solid media. The bag is closed, leaving lonely the breather open, and the media may be sanitized before or after closing the bag. The ventilation is completed via the flat plastic cylinder at the extremity. These are the features of this contraption.

The substance applied to create the fermentation bag should be durable enough to support the weight of the subjects of the bag once packed and should be durable enough to endure pressure sterilization of 125°C for over 30 minutes. The substance should be lucid plastic film prepared from either polypropylene, high density polyethylene or polyolefin. The plastic flat cylinder should be prepared from the same substance as the bag fermenter. The current contraption does not restrict the fermentation bag to any specific form and can be a gusset sort bag where both sides of the cylinder substance are folded inward, vertically wrapped cylinder kind, or a tube kind film which has been folded and closed beside the flanks, or a cylinder formed which has been wrapped beside the flanks, or a tube kind film with one end closed. A flat plastic cylinder is injected into the extremity of the bag before closing the extremity and both sides of the cylinder in interaction with the position to be closed at the extremity will be closed with the exclusion of the inner portion of the cylinder permitting free passage via the tube into the bag. The flat cylinder may previously have been injected with a thin stick covered with a substance that can be simply peeled off, e.g. fluorine resin. This flat cylinder may be injected near the extremity or at the bottom of the vertically closed bag and secured. This contraption copes with the incorporation of a flat cylinder into the extremity of the bag which performs as a port for path of air. Overall, the flat cylinder is completed from the fine film closed on both extremities, but likewise the fine film may be crumpled with the open sides heat closed by the other side crumpled. Furthermore, it may be a cylinder type deprived of any closed portion and the folded side may be closed at the same time when the extremity of the bag is closed. Preferably, the flat cylinder should be closed on both ends. The port for air passageway should be at least 2 cm or preferably greater than 3 cm. The airport rather than closed may be open, but to gain the most effectual ventilation, very tiny openings in the film may be made adjacent the end of the closed cylinder. As it is hard to keep the opening of the airport situated on the outside of the bag open, it would be best not to close the tip of the flat plastic cylinder outside the bag. It might be useful to modify the length of the front and back slices of the cylinder or to cut the tip of the cylinder in a zigzag way. The breather may be injected and secured to the top of the bag in the similar way as the airport by utilizing one or more flat plastic cylinders. The location of the breather should be such that it will permanently be above the maximum level of media in the bag. This breather may be applied for sampling or may be applied as the place for insemination of germs. The breather is not completely essential. The bag door may be closed in such a way that there are incomplete doors. The unclosed portion of the cylinder may be such that it will not affect air removal as well as will avoid the pollution from outside, or an opening near the top of the bag which is then enfolded with a singular filter.

The airport or breather or both may be introduced with a constant porous plastic foamed substance such as urethane foam or a textile complex substance. This substance would behave as filters and consequently non -sterile air may be used in a non-sterile room deprived of having to worry about pollution. The filter should be prepared from a hydrophobic substance.

To create a fermentation by the current contraption, a prearranged amount of media is added to the bag. If the flat plastic tubes are located as the breathers at the top of the bag, then the opening at the top of the bag may be closed and a pipe may be introduced to the flat plastic cylinder. This pipe will cover an opening and then the whole bag may be heat sanitized. After cooling, the media may be injected through the breather or the injection may take place via a syringe. The disinfection may be done while the top of the bag is open and after injection, the top of the bag may be closed. In the case where flat plastic tubes are not applied as breathers at the top of the bag, the top of the bag can be moderately closed and the distance of this partial seal should be 2.5 cm from the edge of the bag and preferably more than 3 cm. If there is not enough bag film material before the partial opening this can lead to pollution. The bag opening can be incompletely closed two or more times with the open portion staggered. If this is completed, the distance amongst the two should be at a minimum of 1.5 cm and preferably more than 2 cm. The bag opening may be folded twice and then incompletely closed. The bag may be closed before or after disinfection but if the bag is closed before disinfection, then the injection should be finished with a syringe. This current contraption deal with the use of a light plastic bag which the fermenter having a nozzle is made of the same substance for aerating which is a flat cylinder. Placing this bag in a temperature controlled room will give the same performance as a jar fermenter in addition to being simple and easy to carry. The flat cylinder will not open by outside forces and will close from the pressure of the inside media, so none of the fillings will escape outside. Throughout the fermentation, suitable aeration can be upheld through the pipe introduced into the flat cylinder.

**References:**

1. US patent: US5565015A.
2. US patent: US20050282269.
3. US patent: US6432698.
4. patent: EP1602715A2.

# RESEARCH OFFERS NEW HOPE FOR UNDERSTANDING DEADLY INFECTIONS

*Mucorales* attacks the cells of individuals with attenuated immune systems and origins the lethal infection, mucormycosis. In a new investigation, performed by Loss Angeles BioMed scientists, numerous pathways recognized that are essential for mucormycosis to grow in a patient. The scientists described 30 isolates of *Mucorales* and the assessment of the transcriptomes of three most prevalent reasons of mucormycosis, in relation to lung epithelial cells. They recognized numerous pathways that are vital for mucormycosis pathogenesis. Those most in danger of mucormycosis are patients with unrestrained diabetes ketoacidosis, other kinds of metabolic acidosis, corticosteroids therapy, compact organ or bone marrow replacement, neutropenia, ulcer and injuries, as well as those endured virulent hematological complaints and deferoxamine therapy in patients receiving hemodialysis. Cutaneous necrotizing soft tissue mucormycosis epidemics in otherwise vigorous persons have furthermore been recognized to follow natural tragedies, as demonstrated by the *Apophysomyces* contaminations, typically connected with trauma, subsequent the tsunami that spoiled Indonesia in 2004 and the tornadoes that happened in Joplin in June 2011.

**Reference:** https://www.sciencedaily.com/releases/2016/07/160721072607.htm

# ECOLOGISTS CREATE A FRAMEWORK FOR PREDICTING NEW INFECTIOUS DISEASES

Naturalists are guiding a universal work to forecast where new infectious sicknesses are probable to arise. They define how macro-ecology can deliver valorous visions about sicknesses. By using the tools and properties of macro-ecology we can improve our comprehension of sickness ecology and extensive outlines of sickness varieties, it can additionally do something that other current extensive tactics can't, which is to aid us forecast where new anonymous illnesses might originate from. Infectious sicknesses cause about 9.6 million decease each year. Humanoid population growth, infringement into regions where wildlife live, and growing in universal trade and travel all incorporate to increase the probabilities that new sicknesses will appear and spread.

This approach utilizes advanced calculation methods to search for molds in huge information sets. When used to assay environment, this sort of examination can aid scholars comprehend associations amid parasites, hosts and their surroundings. What's vital about the study direction is not only that we've got some of the most eminent macro-ecologists and ailment biologists in the universe, it's that we're taking together specialists from various dissimilar fields, from arithmetical approaches to phylogenetic comparative approaches. Those projects comprise investigating molds of ailment overlay in wild species, how species' choice changes in answer to weather change will influence germ distribution, and examination of natural characters of host creatures most focus in host-parasite relations. Macro-ecology can't tell us precisely what will occur, but it's certainly the best tactic we have for understanding what's more or less probable to occur according to illness appearance, illness spreading and population reduction.

**Reference:** https://www.sciencedaily.com/releases/2016/07/160721180527.htm

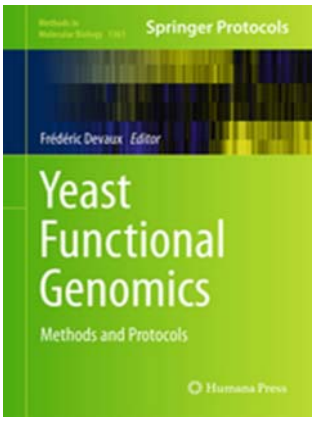
# CEREBROSPINAL FLUID SIGNALS CONTROL THE BEHAVIOR OF STEM CELLS IN THE BRAIN

Stem cells are unprofessional cells occur in diverse tissues. They have the ability to produce precise cells in the body. In the mature brain, neural stem cells produce neurons during life. The stem cells are in exceptional settings, named niches which deliver crucial indications that control stem cell self-regeneration and differentiation. Stem cells in the mature brain interact with ventricles, holes occupied with cerebrospinal fluid (CSF) that washes and supports the brain. The CSF is created by the choroid network. Scholars have revealed that the choroid network is a crucial constituent of the niche, whose possessions alter during the life and distress stem cell activities. Scientists revealed that the choroid network discharges a wide range of vital indicating elements in the CSF, which are crucial for stem cell control through life. During maturation, the rate of stem cell separation and creation of fresh neurons decline. They also announced that while stem cells are still existing in the old brain, and have the capability to amplify, they do this fewer. As a result, stem cells take dissimilar indication and are less talented to form fresh neurons through maturation.

**Reference:** https://www.sciencedaily.com/releases/2016/07/160721143450.htm

# Book Alert

## YEAST FUNCTIONAL GENOMICS




**Publisher:** Springer international publishing

**Author:** Frederic Devaux

**Publication Date:** 2016

**ISBN:** 978-1-4939-3079-1

## FRONTIER DISCOVERIES AND INNOVATIONS IN INTERDISCIPLINARY MICROBIOLOGY

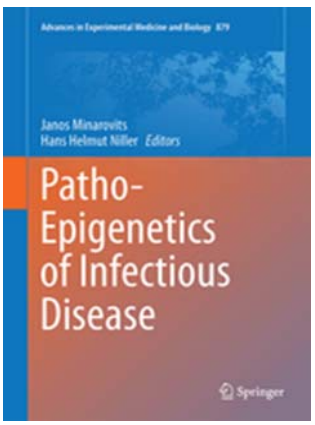

**Publisher:** Springer international publishing

**Author:** Pratyoosh Shukla

**Publication Date:** 2016

ISBN: 978-81-322-2610-9

## PATHO-EPIGENETICS OF INFECTIOUS DISEASE




**Publisher:** Springer international publishing

**Authors:** Janos Minarovits and Hans H. Niller

**Publication Date:** 2016

**ISBN:** 978-3-319-24738-0

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**Impact Factor:** 3.571

**ISSN:** 0079-6336

# Announcements



http://www.imvacs.com/
http://www.esemconference.ae/



http://isehc2016.com/en/

# ONCOGENE

An oncogene is a gene that in definite conditions can alter a cell into a tumor cell. In tumor cells, they are usually altered or expressed at great levels. Most regular cells will experience an automatic form of quick cell death (apoptosis) when exigent utilities are changed. Triggered oncogenes can cause those cells chosen for apoptosis to stay alive and multiply as an alternative. Most oncogenes need an extra stage, e.g. mutations in alternative gene, or ecological elements, e.g. viral infection, to cause tumor. Since 1970s, lots of oncogenes have been recognized in humanoid tumors. Several tumor medications target the proteins coded by oncogenes. Oncoproteins are proteins created by an oncogene and they have a significant role in the control or production of proteins related to tumorigenic cell development.

**Reference:** https://en.wikipedia.org/wiki/Oncogene

# *RABIES* VIRUS

The rabies virus is a neurotropic virus that origins rabies in hominids and animals. Rabies diffusion can happen via the spit of animals and less usually via contact with humanoid spit. Rabies virus, similar to various *Rhabdoviruses*, has an enormously varied host range. In the nature it has been found contaminating several mammalian classes, though in the lab it has been found that birds can be diseased, in addition to cell cultures from animals, birds, reptiles and bugs. The rabies virus has a tubular structure and is the iconic class of the *Lyssavirus*, *Rhabdoviridae* family. These viruses are enclosed and have a single stranded RNA genome with negative-sense. The genetic material is wrapped as a ribonucleoprotein assembly in which RNA is firmly attached to the viral nucleoprotein. The RNA genome of the virus translates five genes whose arrangement is extremely preserved. These genes code for nucleoprotein, phosphoprotein, matrix protein, glycoprotein and the viral RNA polymerase. The whole genome orders vary from 11,615 to 11,966 nucleotides in size. All transcription and replication actions happen in the cytoplasm of a particular “virus factory”, the Negri body. These have 2-10 μm in length and are characteristic for a rabies infection and therefore have been applied as certain histological evidence of this infection.

**Reference:** https://en.wikipedia.org/wiki/Rabies_virus

# MACROPHAGE

Macrophages are a sort of white blood cell that gulps and ingests cellular fragments, external materials, germs, tumor cells, and whatever else that does not have the forms of proteins explicit of vigorous body cells on its superficial in a procedure named phagocytosis. These huge phagocytes are available in all tissues, where they watch for possible pathogens by amoeboid movement. They show different forms in the body, but all are part of the mononuclear phagocyte organization. In addition to phagocytosis, they have a crucial role in common protection and furthermore aid initiate specific protection system by employing other immune cells such as lymphocytes. For instance, they are essential as antigen presenters to T-cells. In hominids, unhealthy macrophages cause acute ailments, e.g. chronic granulomatous that cause many infections.

**Reference:** https://en.wikipedia.org/wiki/Macrophage