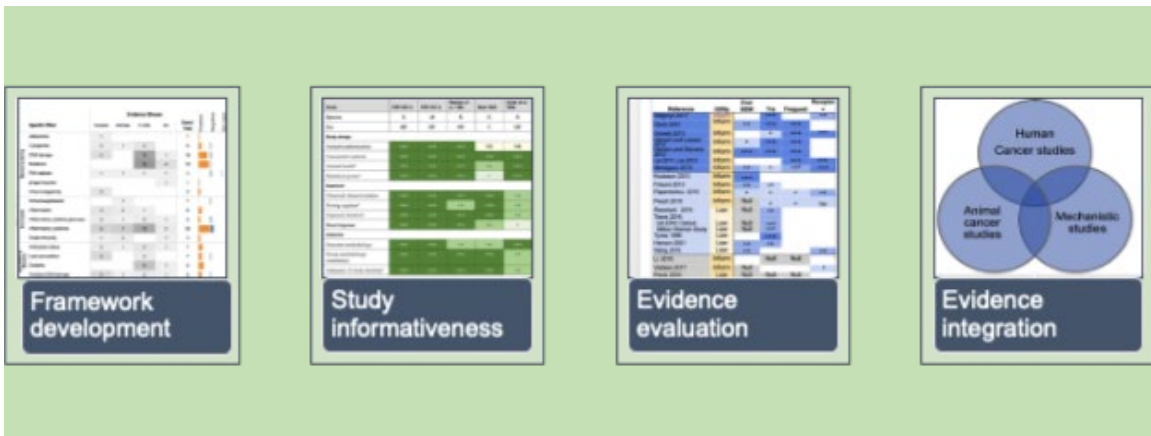




Handbook for Preparing Report on Carcinogens Monographs

Standard Search Strings for Literature Database Searches for Preparing Report on Carcinogens Monographs

Updated July 26, 2023



Foreword

National Institute of Environmental Health Sciences (NIEHS) is one of 27 institutes and centers of the National Institutes of Health, part of the U.S. Department of Health and Human Services. The NIEHS mission is to discover how the environment affects people in order to promote healthier lives. NIEHS works to accomplish its mission by conducting and funding research on human health effects of environmental exposures, developing the next generation of environmental health scientists, and providing critical research, knowledge, and information to citizens and policymakers, to help in their efforts to prevent hazardous exposures and reduce the risk of preventable disease and disorders connected to the environment. NIEHS is a foundational leader in environmental health sciences and committed to ensuring that its research is directed toward a healthier environment and healthier lives for all people. Division of the Translational Toxicology (DTT) at NIEHS. NIEHS/DTT scientists conduct innovative toxicology research that aligns with real world public health needs and translates scientific evidence into knowledge that can inform individual and public health decision-making.

The National Toxicology Program prepares the Report on Carcinogens (RoC), a science-based public health document, for the Secretary, Department of Health and Human Services. The Report on Carcinogens staff is responsible for carrying out this activity within DTT/NIEHS and prepares a monograph for each substance evaluated for listing in the RoC (i.e., a candidate substance). The monograph is a literature-based review document that captures the cancer hazard evaluation.

The [Handbook for Preparing the Report on Carcinogens Monographs](#) (RoC Handbook) describes systematic review and evidence integration methods for conducting a cancer hazard evaluation of an agent, substance, mixture, or exposure circumstance (collectively referred to as a “substance”) selected for review for possible listing in the Report on Carcinogens (RoC). This living document provides a series of standardized citation database search strings for the key topic areas addressed in the cancer hazard evaluation: human exposure, human cancer studies, cancer studies in experimental animals, mechanistic studies and other relevant data (such as absorption, distribution, metabolism and excretion, ADME), which complement the literature search strategy described in the RoC Handbook. The purpose of standardized search strings is to ensure that the searches for all candidate substances are consistent, reproducible, and transparent. The search strings were originally posted on the NTP website in 2016. This update provides new terms for search terms selected characteristics of carcinogens (including epigenetics changes, receptor mediated effects, and chronic information and immune modulation), metabolomics, and human exposure. This document will serve as a living document, being updated periodically as standard search strings are changed or added.

About This Report

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1. Introduction

This document provides a series of standardized citation database search strings for the key topic areas addressed in the cancer hazard evaluation: human exposure, human cancer studies, cancer studies in experimental animals, mechanistic studies, and absorption, distribution, metabolism, and excretion, ADME), which complement the literature search strategy described in the Handbook for Preparing Report on Carcinogens Monographs. The search terms that make up the strings were collected by an information specialist and reviewed and edited by the subject matter experts of RoC and other NIEHS staff before being structured into appropriate syntax for each database and tested.

For each substance under review, a unique search string is created to identify literature associated with the substance. In some cases, the literature on a candidate substance is limited and it is simpler to evaluate and categorize all the associated literature. However, in most cases the literature pool is large, and narrowing searches are used to help focus on the data more relevant for evaluating potential cancer hazards. This narrowing is accomplished by combining the candidate substance search in various ways with the standardized search strings to retrieve the intersection of potentially relevant results (see Figure 1).

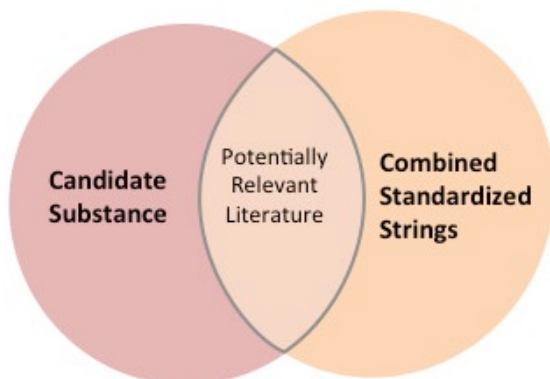


Figure 1. Intersection of search strings to identify potentially relevant literature.

Searches for cancer studies in humans and experimental animals are conducted using standardized search strings for epidemiologic (human) studies (section 2.3) and experimental animal studies (section 2.4) in combination with the cancer search strings (section 2.2) prior to combining with the candidate substance search strings. The human exposure (section 2.1), ADME Search Strings (section 2.5), and searches for mechanistic data (Section 2.6) would not normally be combined with the Cancer search, but are intersected directly with the candidate substance.

2. The Searches

2.1. Human Exposure

The search terms below are used as part of the Human Exposure section of the document. These search terms are combined with the substance specific search terms.

These terms were added to the search string document in June 2022.

2.1.1. Exposure Search Strings

PubMed

((environmental[tiab] OR occupational[tiab]) AND (exposure[tiab] OR monitoring[tiab] OR biomonitoring[tiab] OR pollution[tiab])) OR “indoor air”[tiab] OR “air pollution”[tiab] OR “prevention”[tiab] OR “intervention”[tiab] OR (air pollution, indoor[mesh]) OR (occupational exposure[mesh]) OR (environmental pollutants[Mesh]) OR (environmental pollution[Mesh]) OR (biomarkers[mesh]) OR (prevention and control[sh]) OR (climate change [Mesh]))

Scopus

TITLE-ABS-KEY((environmental or occupational) and (exposure or monitoring or biomonitoring or pollution) or (indoor and air) or (occupational and exposure) OR (air pollution) OR (environmental pollut*) OR (biomarker*) OR (prevention) OR (intervention) OR (climate change))

Web of Science

TS=((environmental or occupational) and (exposure or monitoring or biomonitoring or pollution) or (indoor and air) or (occupational and exposure) OR (air pollution) OR (environmental pollut*) OR (biomarker*) OR (prevention) OR (intervention) OR (climate change))

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2.2. Cancer

The goal of this search is to provide a set of “narrowing” terms to focus on cancer topics as opposed to other adverse effects or health outcomes. In some cases, it may be used directly against the results of the search for the candidate substance. It is generally used in combination with the human (epidemiology), or the experimental animal studies search strings.

This search string was developed primarily by removing terms from the PubMed Cancer filter to make it more focused on the topics of interest for cancer hazard literature-based evaluations captured in the RoC monographs. It still returns a broad literature set associated with cancer.

Types of terms removed from the PubMed Cancer Filter include:

- Cancer testing/screening methods
- Cancer treatment methods
- Caregivers/Medical specialty (Oncologist, Oncology, etc.)
- Journal names
- Oncogenic virus names (can be searched specifically when applicable)
- Organization names

2.2.1. Cancer Search Strings

PubMed

((("angiogenesis inducing agents"[mh] OR "myelodysplastic-myeloproliferative diseases"[mh] OR "neoplasms"[mh] OR "carcinogenicity tests"[mh] OR "carcinogens"[mh] OR (sentinel-lymph-node[tiab] NOT biopsy[tiab]) OR (ASCO[tiab] NOT fungi[tiab]) OR (WAGR[tiab] AND syndrome[tiab]) OR 5q-syndrome[tiab] OR leukostasis[tiab])) OR ((acanthoma[tiab] OR acanthomas[tiab] OR acrochordon[tiab] OR acrochordons[tiab] OR acrospiroma[tiab] OR acrospiromas[tiab] OR adamantinoma[tiab] OR adamantinomas[tiab] OR adenoacanthoma[tiab] OR adenoacanthomas[tiab] OR adenoameloblastoma[tiab] OR adenoameloblastomas[tiab] OR adenocanthoma[tiab] OR adenocanthomas[tiab] OR adenocarcinoma[tiab] OR adenocarcinomas[tiab] OR adenofibroma[tiab] OR adenofibromas[tiab] OR adenolipoma[tiab] OR adenolipomas[tiab] OR adenolymphoma[tiab] OR adenolymphomas[tiab] OR adenoma[tiab] OR adenomas[tiab] OR adenomatosis[tiab] OR adenomatous[tiab] OR adenomyoepithelioma[tiab] OR adenomyoepitheliomas[tiab] OR adenomyoma[tiab] OR adenomyomas[tiab] OR adenosarcoma[tiab] OR adenosarcomas[tiab] OR adenositis[tiab] OR aesthesioneuroblastoma[tiab] OR aesthesioneuroblastomas[tiab] OR ameloblastoma[tiab] OR ameloblastomas[tiab] OR amyloidoses[tiab] OR amyloidosis[tiab] OR anaplasia[tiab] OR androblastoma[tiab] OR androblastomas[tiab] OR angioblastoma[tiab] OR angioblastomas[tiab] OR angioendothelioma[tiab] OR angioendotheliomas[tiab] OR angioendotheliomatosis[tiab] OR angiofibroma[tiab] OR angiofibromas[tiab] OR angiofibrosarcoma[tiab] OR angiokeratoma[tiab] OR angiokeratomas[tiab] OR angioleiomyoma[tiab] OR angioleiomyomas[tiab] OR

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angiomyxomas[tiab] OR angioreticuloma[tiab] OR angioreticulomas[tiab] OR
angiosarcoma[tiab] OR angiosarcomas[tiab] OR apudoma[tiab] OR apudomas[tiab] OR
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astrocytoma[tiab] OR astrocytomas[tiab] OR astroglioma[tiab] OR astrogliomas[tiab] OR
baltoma[tiab] OR basiloma[tiab] OR basilomas[tiab] OR blastoma[tiab] OR
blastomas[tiab] OR Buschke-Lowenstein[tiab] OR cancer[tiab] OR cancerous[tiab] OR
cancers[tiab] OR carcinogen[tiab] OR carcinogenesis[tiab] OR carcinogenic[tiab] OR
carcinogenicity-test*[tiab] OR carcinogens[tiab] OR carcinoid[tiab] OR carcinoma[tiab]
OR carcinomas[tiab] OR carcinomatosis[tiab] OR carcinosarcoma[tiab] OR
carcinosarcomas[tiab] OR cavernoma[tiab] OR cavernomas[tiab] OR cementoma[tiab]
OR cementomas[tiab] OR ceruminoma[tiab] OR ceruminomas[tiab] OR
chemodectoma[tiab] OR chemodectomas[tiab] OR cherubism[tiab] OR chloroma[tiab]
OR chloromas[tiab] OR cholangiocarcinoma[tiab] OR cholangiocarcinomas[tiab] OR
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chondroblastoma[tiab] OR chondroblastomas[tiab] OR chondroma[tiab] OR
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chordoma[tiab] OR chordomas[tiab] OR chorioadenoma[tiab] OR chorioadenomas[tiab]
OR chorioangioma[tiab] OR chorioangiomas[tiab] OR choriocarcinoma[tiab] OR
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chorionepithelioma[tiab] OR chorionepitheliomas[tiab] OR choristoma[tiab] OR
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CLL[tiab] OR cocarcinogenesis[tiab] OR collagenoma[tiab] OR collagenomas[tiab] OR
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rhabdomyosarcomas[tiab] OR rhabdosarcoma[tiab] OR rhabdosarcomas[tiab] OR
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schwannomas[tiab] OR schwannomatosis[tiab] OR seminoma[tiab] OR seminomas[tiab]
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somatostatinomas[tiab] OR somatotropinoma[tiab] OR somatotropinomas[tiab] OR
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OR teratomas[tiab] OR thecoma[tiab] OR thecomas[tiab] OR thymolipoma[tiab] OR
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TS=(acanthoma OR acanthomas OR acrochordon OR acrochordons OR acrospiroma OR acrospiromas OR adamantinoma OR adamantinomas OR adenoacanthoma OR adenoacanthomas OR adenoameloblastoma OR adenoameloblastomas OR adenocanthoma OR adenocanthomas OR adenocarcinoma OR adenocarcinomas OR adenofibroma OR adenofibromas OR adenolipoma OR adenolipomas OR adenolymphoma OR adenolymphomas OR adenoma OR adenomas OR adenomatosis OR adenomatous OR adenomyoepithelioma OR adenomyoepitheliomas OR adenomyoma OR adenomyomas OR adenosarcoma OR adenosarcomas OR adenosis OR aesthesioneuroblastoma OR aesthesioneuroblastomas OR ameloblastoma OR ameloblastomas OR anaplasia OR androblastoma OR androblastomas OR angioblastoma OR angioblastomas OR angioendothelioma OR angioendotheliomas OR angioendotheliomatosis OR angiofibroma OR angiofibromas OR angiofibrosarcoma OR angiokeratoma OR angiokeratomas OR angioleiomyoma OR angioleiomyomas OR angioliipoma OR angioliipomas OR angioma OR angiomas OR angiomatosis OR angiomyoliipoma OR angiomyoliipomas OR angiomyoma OR angiomyomas OR angiomyxoma OR angiomyxomas OR angioreticuloma OR angioreticulomas OR angiosarcoma OR angiosarcomas OR apudoma OR apudomas OR argentaffinoma OR argentaffinomas OR arrhenoblastoma OR arrhenoblastomas OR astroblastoma OR astroblastomas OR astrocytoma OR astrocytomas OR astroglioma OR astrogliomas OR baltoma OR basiloma OR basilomas OR blastoma OR blastomas OR “Buschke-Lowenstein” OR carcinoid OR carcinoma OR carcinomas OR carcinomatosis OR carcinosarcoma OR carcinosarcomas OR cavernoma OR cavernomas OR cementoma OR cementomas OR ceruminoma OR ceruminomas OR chemodectoma OR chemodectomas OR cherubism OR chloroma OR chloromas OR cholangiocarcinoma OR cholangiocarcinomas OR cholangiohepatoma OR cholangioma OR cholangiomas OR cholangiosarcoma OR cholesteatoma OR cholesteatomas OR chondroblastoma OR chondroblastomas OR chondroma OR chondromas OR chondrosarcoma OR chondrosarcomas OR chordoma OR chordomas OR chorioadenoma OR chorioadenomas OR chorioangioma OR chorioangiomas OR choriocarcinoma OR choriocarcinomas OR chorioepithelioma OR chorioepitheliomas OR chorionepithelioma OR chorionepitheliomas OR choristoma OR choristomas OR chromaffinoma OR chromaffinomas OR CLL OR cocarcinogenesis OR collagenoma OR collagenomas OR comedocarcinoma OR comedocarcinomas OR condyloma OR condylomas OR

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Scopus

TITLE-ABS ("acanthoma" OR "acanthomas" OR "acrochordon" OR "acrochordons" OR "acrospiroma" OR "acrospiromas" OR "adamantinoma" OR "adamantinomas" OR "adenoacanthoma" OR "adenoacanthomas" OR "adenoameloblastoma" OR "adenoameloblastomas" OR "adenocanthoma" OR "adenocanthomas" OR

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OR "oligodendrogliomas" OR "oncocytoma" OR "oncocytomas" OR OR "opsoclonus-
myoclonus" OR "orchioblastoma" OR "orchioblastomas" OR "osteoblastoma" OR
"osteoblastomas" OR "osteochondroma" OR "osteochondromas" OR
"osteochondrosarcoma" OR "osteochondrosarcomas" OR "osteoclastoma" OR
"osteoclastomas" OR "osteofibrosarcoma" OR "osteoma" OR "osteomas" OR
"osteosarcoma" OR "osteosarcomas" OR "pancreatoblastoma" OR "pancreatoblastomas"

OR "papilloma" OR "papillomas" OR "papillomata" OR "papillomatosis" OR
"parachordoma" OR "parachordomas" OR "paraganglioma" OR "paragangliomas" OR
"paraneoplastic" OR "perineurioma" OR "perineuriomas" OR "peutz jehgers " OR
"phaeochromocytoma" OR "phaeochromocytomas" OR "pheochromoblastoma" OR
"pheochromoblastomas" OR "pheochromocytoma" OR "pheochromocytomas" OR
"pilomatrixoma" OR "pilomatrixomas" OR "pilomatrixoma" OR "pilomatrixomas" OR
"pinealblastoma" OR "pinealoblastoma" OR "pinealoblastomas" OR "pinealoma" OR
"pinealomas" OR "pineoblastoma" OR "pineoblastomas" OR "pineocytoma" OR
"pineocytomas" OR "plasmacytoma" OR "plasmacytomas" OR "pneumoblastoma" OR
"pneumoblastomas" OR "pneumocytoma" OR "polyembryoma" OR "polyembryomas"
OR "polyhistioma" OR "polyhistiomas" OR "polyposis" OR "porocarcinoma" OR
"porocarcinomas" OR "poroma" OR "poromas" OR "precancer" OR "precancerous" OR
"reninoma" OR "reninomas" OR "reticuloendothelioma" OR "reticuloendotheliomas" OR
"reticulohistiocytoma" OR "reticulohistiocytomas" OR "retinoblastoma" OR
"retinoblastomas" OR "rhabdomyoma" OR "rhabdomyomas" OR "rhabdomyosarcoma"
OR "rhabdomyosarcomas" OR "rhabdosarcoma" OR "rhabdosarcomas" OR "sarcoma"
OR "sarcomas" OR "sarcomatosis" OR "schwannoma" OR "schwannomas" OR
"schwannomatosis" OR "seminoma" OR "seminomas" OR "seminomatous" OR "sezary
syndrome" OR "somatostatinoma" OR "somatostatinomas" OR "somatotropinoma" OR
"somatotropinomas" OR "spermatocytoma" OR "spiradenoma" OR "spiradenomas" OR
"spongioblastoma" OR "spongioblastomas" OR "steatocystoma" OR "steatocystomas"
OR "struma ovarii" OR "subependymoma" OR "subependymomas" OR "syringadenoma"
OR "syringadenomas" OR "syringocystadenoma" OR "syringocystadenomas" OR
"syringoma" OR "syringomas" OR "teratocarcinoma" OR "teratocarcinomas" OR
"teratoma" OR "teratomas" OR "thecoma" OR "thecomas" OR "thymolipoma" OR
"thymolipomas" OR "thymoma" OR "thymomas" OR "trichilemmoma" OR
"trichilemmomas" OR "trichoadenoma" OR "trichoblastoma" OR "trichoblastomas" OR
"trichodiscoma" OR "trichodiscomas" OR "trichoepithelioma" OR "trichoepitheliomas"
OR "trichofolliculoma" OR "trichofolliculomas" OR "tricholemmoma" OR
"tricholemmomas" OR "tumor" OR "tumorigenesis" OR "tumorigenic" OR
"tumorigenesis" OR "tumorigenic" OR "tumorigenesis" OR "tumorigenic" OR "tumors"
OR "tumour" OR "tumours" OR "vipoma" OR "vipomas" OR "waldenstrom" OR
"waldenstroms" OR "xanthoastrocytoma" OR "xanthoastrocytomas" OR "xanthofibroma"
OR "xanthofibromas" OR "xanthogranuloma" OR "xanthogranulomas" OR "xanthoma"
OR "xanthomas" OR "xanthosarcoma" OR "xanthosarcomas" OR ("sentinel-lymph-
node" AND NOT biopsy) OR (asco AND NOT fungi) OR (wagr W/3 syndrome) OR
"5q-syndrome") OR KEY ("angiogenesis inducing agents" OR "myelodysplastic-
myeloproliferative diseases" OR "neoplasms")

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2.3. Human Cancer Studies

The goal of the search for the human cancer monograph section is to identify human studies (primarily epidemiologic) that have assessed exposure to a specific candidate substance and a cancer outcome. The Epidemiological (Human) Studies Search Strings (below) would be used in combination with the Cancer Search String (Section 2.2) to focus on the most relevant literature.

Epidemiological (Human) Studies Search Strings (below) are intended to identify an exhaustive list of epidemiologic studies in humans fitting the following types:

- Case reports and case series
- Cohort studies
- Case-control and case-referent studies
- Ecological studies
- Meta-analysis
- Workers (some epidemiological studies are defined in the title, abstract, and key words as studies of workers rather than by a specific study design)

Note that the search strings provided here are not the only method by which human studies may be identified for the RoC. The mechanistic searches, mining the citations of reviews and other studies, and specially targeted searches are additional methods of identifying human/epidemiologic studies.

The focus of the search string is to collect epidemiological or clinical studies of human subjects and not necessarily other types of studies with humans. Therefore, various terms that might be expected (such as age groups) are not included.

These search terms were updated in June 2022.

2.3.1. Epidemiological (Human) Studies Search Strings

PubMed

((("Epidemiologic Studies"[mh] OR "epidemiology"[sh] OR "Meta-Analysis"[pt] OR "Case Reports"[pt] OR workmen*[tiab] OR Worker*[tiab] OR Seroepidemiologic-Stud*[tiab] OR retrospective-stud*[tiab] OR prospective-stud*[tiab] OR Mortality[tiab] OR longitudinal-stud*[tiab] OR follow-up stud*[tiab] OR ecological-study[tiab] OR ecological-studies[tiab] OR Cross-Sectional Stud*[tiab] OR Correlation-stud*[tiab] OR cohort*[tiab] OR case-control*[tiab] OR cancer-registr*[tiab] OR case-series[tiab] OR case-referent[tiab] OR record-link*[tiab])) OR ((metaanalysis[tiab] OR case-report*[tiab] OR metaanalyses[tiab] OR meta-analysis[tiab]) OR ("randomized controlled trial"[tiab]) OR ("case-crossover"[tiab]) OR ("systematic review"[pt])))

Web of Science

TS=("Epidemiologic Stud*" OR Meta-Analysis OR workmen* OR Worker* OR "Seroepidemiologic Stud*" OR "retrospective stud*" OR "prospective stud*" OR Mortality OR "longitudinal stud*" OR "follow-up stud*" OR "ecological study" OR "ecological studies" OR "Cross-Sectional Stud*" OR "Correlation stud*" OR cohort* OR "case control*" OR "cancer registr*" OR metaanalysis OR metaanalyses OR "case

report*" OR "Case series" OR "Case referent" OR "record-link*" OR "randomized controlled trial" OR "case-crossover" OR "systematic review")

Scopus

TITLE-ABS-KEY ("Epidemiologic Stud*" OR "Meta-Analysis" OR workmen* OR worker* OR "Seroepidemiologic Stud*" OR "retrospective stud*" OR "prospective stud*" OR mortality OR "longitudinal stud*" OR "follow-up stud*" OR "ecological study" OR "ecological studies" OR "Cross-Sectional Stud*" OR "Correlation stud*" OR cohort* OR "case control*" OR "cancer registr*" OR metaanalysis OR metaanalyses OR "meta- analyses" OR "case report*" OR "Case series" OR "Case referent" OR "record-link*" OR "randomized controlled trial" OR "case-crossover" OR "systematic review")

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2.4. Cancer in Experimental Animals

The goal of the literature search for the animal cancer section of a RoC Monograph is to identify studies that inform whether a substance causes cancer in experimental animals. The Experimental Animals Studies Search Strings (below) are used in combination with the Cancer Search Strings (Section 2.2) to focus on the most relevant literature.

Note, however, that the search strings provided here are not the only methods by which animal studies may be identified. The mechanistic searches, mining the citations of reviews and other studies, and specially targeted searches are additional methods of identifying cancer studies in experimental animals.

The terms for the Experimental Animals Search Strings were selected to focus on experimental studies with the following characteristics:

- In vivo
- Non-human mammalian subjects

2.4.1. Experimental Animals Studies Search Strings

PubMed

("Animals, Genetically Modified"[mh] OR "Animals, Inbred Strains"[mh] OR "Chimera"[mh] OR "Animals, Laboratory"[mh]) OR (animal-stud*[tiab] OR wood-mouse[tiab] OR murinae[tiab] OR muridae[tiab] OR cricetinae[tiab] OR rodentia[tiab] OR rodent[tiab] OR rodents[tiab] OR ferrets[tiab] OR ferret[tiab] OR polecat*[tiab] OR mustela-putorius[tiab] OR cavia[tiab] OR callithrix[tiab] OR marmoset*[tiab] OR chinchilla*[tiab] OR jird[tiab] OR jirds[tiab] OR merione[tiab] OR meriones[tiab] OR cats[tiab] OR cat[tiab] OR felis[tiab] OR canis[tiab] OR sheep[tiab] OR sheeps[tiab] OR goats[tiab] OR goat[tiab] OR capra[tiab] OR saguinus[tiab] OR tamarin*[tiab] OR leontopithecus[tiab] OR ape[tiab] OR apes[tiab] OR pan-paniscus[tiab] OR bonobo*[tiab] OR pan-troglodytes[tiab] OR gibbon*[tiab] OR siamang*[tiab] OR nomascus[tiab] OR symphalangus[tiab] OR chimpanzee*[tiab] OR orangutan*[tiab] OR horse[tiab] OR horses[tiab] OR equus[tiab] OR cow[tiab] OR cows[tiab] OR chicken[tiab] OR chickens[tiab] OR wistar[tiab] OR balb[tiab] OR C57[tiab] OR C57bl[tiab] OR quail[tiab] OR long-evans[tiab] OR guppy[tiab] OR medaka[tiab] OR zebrafish[tiab] OR flying-fox[tiab] OR Fruit-bat[tiab] OR non-human-primate*[tiab] OR capuchin*[tiab] OR rhesus[tiab] OR macaque*[tiab] OR cattle[tiab] OR bovine[tiab] OR pigs[tiab] OR pig[tiab] OR swine[tiab] OR swines[tiab] OR piglet*[tiab] OR Sprague-Dawley[tiab] OR vervet*[tiab]) OR (mice[tiab] OR mouse[tiab] OR murine[tiab] OR rats[tiab] OR rat[tiab] OR hamster[tiab] OR hamsters[tiab] OR guinea-pig*[tiab] OR gerbil*[tiab] OR rabbits[tiab] OR rabbit[tiab] OR dogs[tiab] OR dog[tiab] OR monkey[tiab] OR monkeys[tiab] OR pongo-pygmaeus[tiab] OR sow[tiab] OR sows[tiab] OR boar[tiab] OR boars[tiab])

Web of Science

TS=("mice" OR "mouse" OR "rats" OR "rat" OR "hamster" OR "hamsters" OR "guinea pig*" OR "gerbil*" OR "rabbits" OR "rabbit" OR "dogs" OR "dog" OR "monkey" OR "monkeys" OR "pongo pygmaeus" OR "sow" OR "sows" OR "boar" OR "boars" OR "animal-stud*" OR "murine" OR "wood-mouse" OR "murinae" OR "muridae" OR "cricetinae" OR "rodentia" OR "rodent" OR "rodents" OR "ferrets" OR "ferret" OR

"polecat*" OR "mustela putorius" OR "cavia" OR "callithrix" OR "marmoset*" OR "chinchilla*" OR "jird" OR "jirds" OR "merione" OR "meriones" OR "cats" OR "cat" OR "felis" OR "canis" OR "sheep" OR "sheeps" OR "goats" OR "goat" OR "capra" OR "saguinus" OR "tamarin*" OR "leontopithecus" OR "ape" OR "apes" OR "pan-paniscus" OR "bonobo*" OR "pan troglodytes" OR "gibbon*" OR "siamang*" OR "nomascus" OR "symphalangus" OR "chimpanzee*" OR "orangutan*" OR "horse" OR "horses" OR "equus" OR "cow" OR "cows" OR "chicken" OR "chickens" OR "wistar" OR "balb" OR "C57" OR "C57bl" OR "quail" OR "long-evans" OR "guppy" OR "medaka" OR "zebrafish" OR "flying fox" OR "Fruit bat" OR "non-human-primate*" OR "capuchin*" OR "rhesus" OR "macaque*" OR "cattle" OR "bovine" OR "pigs" OR "pig" OR "swine" OR "swines" OR "piglet*" OR "Sprague-Dawley" OR "vervet*" OR "chimera")

Scopus

KEY ("Animals, Genetically Modified" OR "Animals, Inbred Strains" OR "Chimera" OR "Animals, Laboratory") OR TITLE-ABS ("mice" OR "mouse" OR "rats" OR "rat" OR "hamster" OR "hamsters" OR "guinea pig*" OR "gerbil*" OR "rabbits" OR "rabbit" OR "dogs" OR "dog" OR "monkey" OR "monkeys" OR "pongo pygmaeus" OR "sow" OR "sows" OR "boar" OR "boars" OR "animal-stud*" OR "murine" OR "wood-mouse" OR "murinae" OR "muridae" OR "cricetinae" OR "rodentia" OR "rodent" OR "rodents" OR "ferrets" OR "ferret" OR "polecat*" OR "mustela putorius" OR "cavia" OR "callithrix" OR "marmoset*" OR "chinchilla*" OR "jird" OR "jirds" OR "merione" OR "meriones" OR "cats" OR "cat" OR "felis" OR "canis" OR "sheep" OR "sheeps" OR "goats" OR "goat" OR "capra" OR "saguinus" OR "tamarin*" OR "leontopithecus" OR "ape" OR "apes" OR "pan-paniscus" OR "bonobo*" OR "pan troglodytes" OR "gibbon*" OR "siamang*" OR "nomascus" OR "symphalangus" OR "chimpanzee*" OR "orangutan*" OR "horse" OR "horses" OR "equus" OR "cow" OR "cows" OR "chicken" OR "chickens" OR "wistar" OR "balb" OR "C57" OR "C57bl" OR "quail" OR "long-evans" OR "guppy" OR "medaka" OR "zebrafish" OR "flying fox" OR "Fruit bat" OR "non-human-primate*" OR "capuchin*" OR "rhesus" OR "macaque*" OR "cattle" OR "bovine" OR "pigs" OR "pig" OR "swine" OR "swines" OR "piglet*" OR "Sprague-Dawley" OR "vervet*")

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2.5. ADME

The goal of the ADME search is to provide supporting literature for use within the ADME or Disposition and Toxicokinetics section of the monograph. The intent of these sections is to ensure that the processes are adequately understood to provide clarification and support to understanding the carcinogenic effects of the candidate substance.

2.5.1. ADME Search Strings

PubMed

(Volume-of-Distribution[tiab] OR Toxicokinetics[mh] OR tissue-distribut*[tiab] OR "Renal Elimination"[mh] OR protein-bound[tiab] OR protein-bind*[tiab] OR plasma-protein[tiab] OR Pharmacokinetics[mh] OR Metabolism[mh] OR kinetic[tiab] OR "Intestinal Elimination"[mh] OR "Hepatobiliary Elimination"[mh] OR Hepatobiliary[tiab] OR enterohepatic[tiab] OR entero-hepatic[tiab] OR Distribution-volume[tiab] OR cellular-clearance[tiab] OR cell-clearance[tiab] OR Biotransformation[tiab] OR bioavailability[tiab] OR ADME[tiab] OR absorptive[tiab] OR (Skin[tiab] AND absorption[tiab]) OR (Oral[tiab] AND absorption[tiab]) OR (Injection[tiab] AND absorption[tiab]) OR (Gavage[tiab] AND absorption[tiab]) OR (Dietary[tiab] AND absorption[tiab]) OR (Dermal[tiab] AND absorption[tiab]) OR urine[tiab] OR Urination[tiab] OR toxicokinetic*[tiab] OR Pharmacokinetic*[tiab] OR Metabolite*[tiab] OR metabolism[tiab] OR Metabolic* [tiab] OR feces[tiab] OR fecal[tiab] OR excretion[tiab] OR defecation[tiab] OR biliary[tiab] OR Bile[tiab])

Web of Science

TS=(Hepatobiliary OR enterohepatic OR "entero hepatic" OR bioavailability OR absorptive OR (Skin AND absorption) OR (Oral AND absorption) OR (Injection AND absorption) OR (Gavage AND absorption) OR (Dietary AND absorption) OR (Dermal AND absorption) OR "Volume of Distribution" OR "tissue distribut*" OR "protein bound" OR "protein bind*" OR "plasma-protein" OR "Distribution volume" OR urine OR Urination OR feces OR fecal OR excretion OR defecation OR biliary OR Bile OR "Renal Elimination" OR "Intestinal Elimination" OR "Hepatobiliary Elimination" OR "cellular clearance" OR "cell clearance" OR toxicokinetic* OR Pharmacokinetic* OR kinetic OR ADME OR Metabolite* OR metabolism OR Metabolic* OR Biotransformation)

Scopus

TITLE_ABS(Hepatobiliary OR enterohepatic OR "entero hepatic" OR bioavailability OR absorptive OR (Skin AND absorption) OR (Oral AND absorption) OR (Injection AND absorption) OR (Gavage AND absorption) OR (Dietary AND absorption) OR (Dermal AND absorption) OR "Volume of Distribution" OR "tissue distribut*" OR "protein bound" OR "protein bind*" OR "plasma-protein" OR "Distribution volume" OR urine OR Urination OR feces OR fecal OR excretion OR defecation OR biliary OR Bile OR "Renal Elimination" OR "Intestinal Elimination" OR "Hepatobiliary Elimination" OR "cellular clearance" OR "cell clearance" OR toxicokinetic* OR Pharmacokinetic* OR kinetic OR ADME OR Metabolite* OR metabolism OR Metabolic* OR Biotransformation)

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2.6. Mechanisms

The goal of the literature search for the mechanism monograph section is to ensure that the selected biological processes are adequately explored to provide clarification and support to an understanding of the carcinogenic effects of the candidate substance, and biological plausibility for the effects observed in humans or experimental animals.

Search strings for the following concepts pertain to this section: Key Characteristics of Carcinogens (KCCs), Metabolomics, and General Mechanistic Terms.

2.6.1. Key Characteristics of Carcinogens Search Strings

The search strings provided below each target a characteristic of carcinogens as defined in Smith *et al.* (2016) and Zhang *et al.* (2023). These searches are intended to locate literature relevant to the Mechanistic and Genotoxicity sections of a monograph. They are not generally used in conjunction with the Cancer Search Strings. To search for two or more KCCs simultaneously, combine the searches with the Boolean operator OR. The terms included for each KCC are not mutually exclusive, as some mechanistic concepts are relevant to more than one of the KCCs.

The ten Key Characteristics of Carcinogens:

1. act as an electrophile either directly or after metabolic activation
2. be genotoxic
3. alter DNA repair or cause genomic instability
4. induce epigenetic alterations
5. induce oxidative stress
6. induce chronic inflammation
7. be an immunomodulator
8. modulate receptor-mediated effects
9. cause immortalization
10. alter cell proliferation, cell death, or nutrient supply

Act as an electrophile either directly or after metabolic activation

PubMed

adduct-formation[tiab] OR "DNA Adducts"[mh] OR DNA-Adduct*[tiab] OR electrophile[tiab] OR electrophilic[tiab]

Web of Science

Ts=("adduct formation" OR "DNA Adduct*" OR electrophile OR electrophilic)

Scopus

TITLE-ABS-KEY ("adduct formation" OR "DNA Adduct*" OR electrophile OR electrophilic)

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Be genotoxic

PubMed

adduct-formation[tiab] OR "DNA Adducts"[mh] OR DNA-Adduct*[tiab] OR dna-alkylating-agent*[tiab] OR "Comet Assay"[mh] OR "germ-line mutation"[MeSH Terms] OR "Mutagenesis"[mh] OR "Mutagenicity tests"[mh] OR "Sister-chromatid exchange"[mh] OR "Mutation"[mh] OR Ames-Assay[tiab] OR Ames-test[tiab] OR Bacterial-Reverse-Mutation-Assay[tiab] OR Clastogen*[tiab] OR DNA-Repair*[tiab] OR Genetic-toxicology[tiab] OR hyperploid[tiab] OR micronucleus-test[tiab] OR tetraploid[tiab] OR Chromosome-aberrations[tiab] OR DNA damage[tiab] OR Mutation[tiab] OR chromosome-translocations[tiab] OR DNA protein crosslinks[tiab] OR DNA-damag*[tiab] OR DNA-inhibit*[tiab] OR Micronuclei[tiab] OR Micronucleus[tiab] OR Mutagens[tiab] OR Strand-break*[tiab] OR Unscheduled-DNA-synthes*[tiab] OR chromosomal-aberration[tiab] OR chromosome-aberration[tiab] OR chromosomal-aberrations[tiab] OR chromosomal-abnormalit*[tiab] OR chromosome-abnormalit*[tiab] OR genotoxic[tiab] OR "sos response, genetics"[MeSH Terms] OR (DNA[tiab] AND Crosslink[tiab]) OR gene-activation[tiab] OR Comet-assay[tiab] OR Mutagenic[tiab] OR Mutagenicity[tiab] OR mutations[tiab] OR chromosomal-aberration-test[tiab] OR Sister-chromatid-exchange[tiab] OR SOS-response[tiab] OR gene-expression[tiab] OR DNA-damage[tiab] OR DNA-protein-crosslink*[tiab] OR "Polyploidy"[mh] OR "Genomic Instability"[mh] OR "Aneuploidy"[mh] OR microsatellite-instability[tiab] OR chromosomal-instability[tiab] OR binucleation[tiab] OR binucleated[tiab] OR Polyploid*[tiab] OR Genomic-Instability[tiab] OR Aneuploid*[tiab]

Web of Science

TS=("adduct formation" OR "DNA Adduct*"OR"DNA Adducts" OR "Sister-chromatid exchange" OR "SOS Response Genetics" OR "dna alkylating agent*" OR "Germ line mutation*" OR mutagenesis OR "Mutagenicity test*" OR mutation OR "Ames Assay" OR "Ames test" OR "Bacterial Reverse Mutation Assay*" OR clastogen* OR "DNA Repair*" OR "Genetic toxicology" OR hyperploid OR "micronucleus test*" OR tetraploid OR "Chromosome aberration*" OR "chromosome translocation*" OR "DNA damag*" OR "DNA inhibit*" OR micronuclei OR micronucleus OR mutagens OR "Strand break*" OR "Unscheduled DNA synthes*" OR "chromosomal aberration" OR "chromosome aberration" OR "chromosomal aberrations" OR "chromosomal abnormalit*" OR "chromosome abnormalit*" OR genotoxic OR "Comet assay" OR mutagenic OR mutagenicity OR mutations OR "chromosomal aberration test*" OR "Sister chromatid exchange" OR "chromosomal instability" OR binucleation OR binucleated OR "SOS response" OR "DNA damage" OR "DNA protein crosslink*" OR "Polyploidy" OR Polyploid* OR Aneuploid* OR "Aneuploidy" OR "Genomic Instability" OR (DNA AND Crosslink) OR "microsatellite instability")

Scopus

TITLE-ABS-KEY("adduct formation" OR "DNA Adduct*" OR "Germ line mutation*" OR mutagenesis OR "Mutagenicity test*" OR mutation OR "Ames Assay" OR "Ames test" OR "Bacterial Reverse Mutation Assay*" OR clastogen* OR "DNA Repair*" OR "Genetic toxicology" OR hyperploid OR "micronucleus test*" OR tetraploid OR "Chromosome aberration*" OR "chromosome translocation*" OR ("DNA protein" W/2 crosslink*) OR "DNA damag*" OR "DNA inhibit*" OR micronuclei OR micronucleus

OR mutagens OR "Strand break*" OR "Unscheduled DNA syntheses*" OR "chromosomal aberration" OR "chromosome aberration" OR "chromosomal aberrations" OR "chromosomal abnormality*" OR "chromosome abnormality*" OR genotoxic OR "Comet assay" OR mutagenic OR mutagenicity OR mutations OR "chromosomal aberration test*" OR "Sister chromatid exchange" OR "DNA damage" OR "DNA protein crosslink*" OR "chromosomal instability" OR "SOS response" OR "Polyploidy" OR Polyploid* OR Aneuploid* OR "Aneuploidy" OR "Genomic Instability" OR "microsatellite instability" OR binucleation)

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Alter DNA repair or cause genomic instability

PubMed

"Mutation"[mh] OR OR DNA-Repair*[tiab] OR chromosome-aberration[tiab] OR DNA damage[tiab] OR Mutation[tiab] OR chromosome-translocations[tiab] OR DNA protein crosslinks[tiab] OR DNA-damag*[tiab] OR DNA-inhibit*[tiab] OR Micronuclei[tiab] OR Micronucleus[tiab] OR Mutagens[tiab] OR Strand-break*[tiab] OR Unscheduled-DNA-synthes*[tiab] OR chromosomal-aberration[tiab] OR chromosome-aberration[tiab] OR chromosomal-aberrations[tiab] OR chromosomal-abnormalit*[tiab] OR chromosome-abnormalit*[tiab] OR (DNA[tiab] AND Crosslink[tiab]) OR "Polyploidy"[mh] OR "Genomic Instability"[mh] OR "DNA Repair"[mh] OR "Aneuploidy"[mh] OR microsatellite-instability[tiab] OR chromosomal-instability[tiab] OR binucleation[tiab] OR binucleated[tiab] OR OR Polyploid*[tiab] OR Genomic-Instability[tiab] OR DNA-Repair*[tiab] OR Aneuploid*[tiab]

Web of Science

TS=(mutation OR "DNA Repair*" OR "Chromosome aberration*" OR "chromosome translocation*" OR "DNA damag*" OR "DNA inhibit*" OR micronuclei OR micronucleus OR mutagens OR "Strand break*" OR "Unscheduled DNA syntheses*" OR "chromosomal aberration" OR "chromosome aberration" OR "chromosomal aberrations" OR "chromosomal abnormality*" OR "chromosome abnormality*" OR "microsatellite instability" OR "chromosomal instability" OR binucleation OR binucleated OR polyploid* OR "Genomic Instability" OR "DNA Repair*" OR aneuploid*)

Scopus

Title-Abs-Key("DNA Repair*" OR "Chromosome aberration*" OR "chromosome translocation*" OR ("DNA protein" W/2 crosslink*) OR "DNA damag*" OR "DNA inhibit*" OR micronuclei OR micronucleus OR mutagens OR "Strand break*" OR "Unscheduled DNA syntheses*" OR "chromosomal aberration" OR "chromosome aberration" OR "chromosomal aberrations" OR "chromosomal abnormality*" OR "chromosome abnormality*" OR mutations OR binucleation OR binucleated OR polyploid* OR "Genomic Instability" OR "DNA Repair*" OR aneuploid*)

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Induce epigenetic alterations

PubMed

("Epigenesis, genetic"[mh] OR "Epigenomics"[mh] OR epigen*[tiab] OR epitranscriptome [tiab] OR epiallel*[tiab] OR epimutat*[tiab] OR "epigenetic mark*" OR Genomic imprinting[mh] OR (imprint*[tiab] AND (gene[tiab] OR genes[tiab] OR genetic[tiab] OR genomic[tiab] OR loci[tiab])) OR dna-modification[tiab] OR Gene silencing[mh] OR "gene silencing"[tiab] OR "gene silencer"[tiab] OR "gene activation"[tiab] OR "gene inactivation"[tiab] OR "Polycomb group proteins" OR "PcG silencing") OR ("DNA Methylation"[mh] OR "DNA Methylation"[tiab] OR "Promoter methylation" OR ((DNA[mh] OR DNA[tiab]) AND (genome, human[mh] OR "genome wide association study"[mh] OR epigenesis, genetic[mh] OR epigenomics[mh] OR genome-wide*[tiab] OR GWAS[tiab] OR genome-scale[tiab] OR *Genome*[tiab] OR "epigenome-wide"[tiab] OR EWAS[tiab] OR "whole genome"[tiab] OR Methylation-profil*[tiab] OR methylation-pattern*[tiab] OR Methylom*[tiab] OR ("CpG islands"[mh] OR CpG[tiab] OR CpGs[tiab] OR CPG's[tiab] OR non-CG[tiab] OR non-CPG[tiab]) AND (methylat*[tiab])) OR methylat*[tiab] OR hemimethylat*[tiab] OR hypermethylat*[tiab] OR hypomethylat*[tiab] OR demethylat*[tiab] OR nonmethylat*[tiab] OR remethylat*[tiab] OR unmethylat*[tiab] OR Methyltransferases[mh] OR "DNA modification methylases"[mh] OR methylas*[tiab] OR demethylas*[tiab] OR methyltransferase*[tiab] OR methyl-transferase*[tiab] OR 5-methylcytosine[mh] OR "5-methylcytosine"[tiab] OR 5-methyl-cytosine[tiab] OR 5mc[tiab] OR 5meC[tiab] OR "5 hydroxymethylcytosine"[tiab] OR 5hmc[tiab] OR Hydroxymethylat*[tiab] OR 5-hydroxymethylcytosine[tiab] OR 5-hydroxy-methylcytosine[tiab] OR 5-hydroxymethyl-cytosine[tiab] OR 5hmC[tiab] OR "5-Formylcytosine" OR "5-Carboxylcytosine" OR Methyladenine [tiab] OR Methylcytosine [tiab] OR Hydroxymethylcytosine [tiab] OR Formylcytosine [tiab] OR Carboxylcytosine [tiab] OR methyladenosine OR methylcytosine OR methylguanosine OR ((nucleotide*[tiab] OR cytosine[mh] OR cytosine*[tiab] OR Alu[tiab] OR genes[tiab] OR genom*[tiab]) AND (methylat*[tiab]))) OR ((RNA[mh] OR RNA[tiab]) AND (Queuosine OR Pseudouridine OR Methyladenosine OR Methylcytidine OR Methylguanosine OR Methylinosine OR Methyluridine OR Ribosyladenosine OR Ribosylguanosine OR Formyladenosine OR Formylcytidine OR methylcytosine OR cap methylation OR uridylation OR inosine editing)) OR (histone marks OR histone markers OR histone-tail-modification [tiab] OR histone-tail-modifications [tiab] OR methylation-associated-silencing [tiab] OR "histone modification"[tiab] OR ((Histones[mh] OR Histone code[mh] OR histone* [tiab]) AND (methylat*[tiab] OR methylase*[tiab] OR hypermethyl*[tiab] OR hypomethyl*[tiab] OR acetylation[mh] OR acetylase*[tiab] OR acetyl*[tiab] OR acetyltransferases[mh] OR acetyltransferase*[tiab] OR acetyl-transferase*[tiab] OR deacetylases[mh] OR deacetyla*[tiab] OR de-acetyl*[tiab] OR HDAC[tiab] OR ubiquitination[tiab] OR ubiquitination[mh] OR proteasome OR ubiquitins[mh] OR "phosphorylation" OR phosphorylation [MeSH] OR "lysine crotonylation" OR lysine [MeSH] OR butyrylation OR butylation OR propionylation OR ("tyrosine hydroxylation" OR Tyrosine [mesh]) AND (Hydroxylation [mesh])) OR "biotinylation" OR Biotin [mesh] OR Biotinylation [mesh] OR "neddylation" OR NEDD8 Protein [mesh] OR Sumoylation [mesh] OR SUMO-1 Protein [Mesh] OR "O-Linked N-acetylglucosamine" OR "O-GlcNAc" OR Acetylglucosamine [mesh] OR N-Acetylglucosaminyltransferases [mesh] OR ((ADP-Ribosylation [mesh] OR "Adenosine Diphosphate" [mesh]) AND Ribose [mesh]) OR ("proline isomerization" OR Proline

[mesh]) AND Isomerism [mesh]) OR "citrullination" OR "imination" OR Citrulline [mesh] OR Protein-Arginine Deiminases [mesh] OR Citrullination [mesh] OR "N-formylation")) OR (((Chromatin[mh] OR chromatin[tiab] OR nucleosom*[tiab]) AND (remodel*[tiab])) OR ("chromatin-organization" [tiab] OR "Chromatin modification" OR "open chromatin") OR (("Euchromatin"[MeSH Terms] OR "Euchromatin") OR (open AND ("Chromatin"[MeSH Terms] OR "Chromatin"))) OR (("Chromatin"[MeSH Terms] OR "Chromatin") AND relax*) OR ("Heterochromatin"[MeSH Terms] OR "Heterochromatin") OR (("Chromatin"[MeSH Terms] OR "Chromatin") AND compact*) OR (("Chromatin"[MeSH Terms] OR "Chromatin") AND condens*) OR (("Heterochromatin"[MeSH Terms] OR "Heterochromatin") AND constitutive) OR (("Heterochromatin"[MeSH Terms] OR "Heterochromatin") AND facultative) OR (pericentromer* AND DNA) OR (satellite AND DNA) OR (DNA and "transposable elements") OR (tandem AND repeats) OR (interspersed AND repeats)) OR ("Non-coding RNA"[tiab] OR ncRNA*[tiab] OR "RNA Interference" [mh] OR "Guide RNA" OR "gRNA" OR "Ribonuclease P" OR "Rnase P" OR "Y RNA" OR "Telomerase RNA Component" OR "TERC" OR "Spliced Leader RNA" OR "SL RNA" OR lncRNA*[tiab] OR "lncRNA" OR "RNA, long noncoding" [MeSH] OR "short interfering RNA"[tiab] OR siRNA*[tiab] OR "small interfering RNA"[tiab] OR "RNA, Small Interfering" [mh] OR "RNA interference"[mh] OR "small silencing RNA"[tiab] OR "small inhibitory"[tiab] OR "small interfering"[mh] OR "small RNA" OR "smallRNA" OR "small inhibitory RNA*"[tiab] OR microRNAs[mh] OR miRNA*[tiab] OR microRNA*[tiab] OR "micro RNA"[tiab] OR "micro RNAs"[tiab] OR piRNA*[tiab] OR PiwiRNA* OR "piwi-interacting RNA"[tiab] OR "snRNA" OR "small nuclear RNA" OR "spliceosomal RNA" OR "snoRNA" OR "small nucleolar RNA" OR "SmY RNA" OR "Small-Cajal-body-specific RNA" OR "scaRNA" OR "RNA editing" OR "RNA splicing" OR "intron retention")

Web of Science

Ts= ("Epigenesis, genetic" OR "Epigenomics" OR epigen* OR epitranscriptome OR epiallel* OR epimutat* OR "epigenetic mark"* OR Genomic imprinting OR (imprint* AND (gene OR genes OR genetic OR genomic OR loci)) OR dna-modification OR Gene silencing OR "gene silencing" OR "gene silencer" OR "gene activation" OR "gene inactivation" OR "Polycomb group proteins" OR "PcG silencing") OR

Ts=("DNA Methylation" OR "DNA Methylation" OR "Promoter methylation" OR ((DNA OR DNA) AND (genome, human OR "genome wide association study" OR epigenesis, genetic OR epigenomics OR genome-wide* OR GWAS OR genome-scale OR Genome OR "epigenome-wide" OR EWAS OR "whole genome" OR Methylation-profil* OR methylation-pattern* OR Methylom*)) OR (("CpG islands" OR CpG OR CpGs OR CPG's OR non-CG OR non-CPG) AND (methylat*)) OR methylat* OR hemimethylat* OR hypermethylat* OR hypomethylat* OR demethylat* OR nonmethylat* OR remethylat* OR unmethylat* OR Methyltransferases OR "DNA modification methylases" OR methylas* OR demethylas* OR methyltransferase* OR methyl-transferase* OR 5-methylcytosine OR "5-methylcytosine" OR 5-methyl-cytosine OR 5mc OR 5meC OR "5 hydroxymethylcytosine" OR 5hmc OR Hydroxymethylat* OR 5-hydroxymethylcytosine OR 5-hydroxy-methylcytosine OR 5-hydroxymethyl-cytosine OR 5hmC OR "5-Formylcytosine" OR "5-Carboxylcytosine" OR Methyladenine OR Methylcytosine OR Hydroxymethylcytosine OR Formylcytosine OR Carboxylcytosine

OR methyladenosine OR methylcytosine OR methylguanosine OR ((nucleotide* OR cytosine OR cytosine* OR Alu OR genes OR genom*) AND (methylat*)) OR

Ts= ((RNA OR RNA) AND (Queuosine OR Pseudouridine OR Methyladenosine OR Methylcytidine OR Methylguanosine OR Methylinosine OR Methyluridine OR Ribosyladenosine OR Ribosylguanosine OR Formyladenosine OR Formylcytidine OR methyladenosine OR methylcytosine OR methylguanosine OR cap methylation OR pseudouridine OR uridylation OR inosine editing)) OR

Ts=(histone marks OR histone markers OR histone-tail-modification OR histone-tail-modifications OR methylation-associated-silencing OR "histone modification" OR ((Histones OR Histone code OR histone*) AND (methylat* OR methylase* OR hypermethyl* OR hypomethyl* OR acetylation OR acetylase* OR acetyl* OR acetyltransferases OR acetyltransferase* OR acetyl-transferase* OR deacetylases OR deacetyla* OR de-acetyl* OR HDAC OR ubiquitination OR ubiquitination OR proteasome OR ubiquitins OR "phosphorylation" OR phosphorylation OR "lysine crotonylation" OR lysine OR butyrylation OR butylation OR propionylation OR ("tyrosine hydroxylation" OR Tyrosine) AND (Hydroxylation)) OR "biotinylation" OR Biotin OR Biotinylation OR "neddylation" OR NEDD8 Protein OR Sumoylation OR SUMO-1 Protein OR " O-Linked N-acetylglucosamine" OR "O-GlcNAc" OR Acetylglucosamine OR N-Acetylglucosaminyltransferases OR ((ADP-Ribosylation OR "Adenosine Diphosphate") AND Ribose) OR (("proline isomerization" OR Proline) AND Isomerism) OR "citrullination" OR "imination" OR Citrulline OR Protein-Arginine Deiminases OR Citrullination OR "N-formylation")) OR

Ts= (((Chromatin OR chromatin OR nucleosom*) AND (remodel*)) OR "chromatin-organization" OR "Chromatin modification" OR "open chromatin" OR Euchromatin OR ((open OR relax* OR compact* OR condens* OR centromere*) AND chromatin) OR heterochromatin OR (heterochromatin AND (constitutive OR facultative)) OR ((pericentromer* OR satellite OR "transposable elements") AND DNA) OR (tandem AND repeats) OR (interspersed AND repeats) OR ("chromatin accessibility")) OR

Ts= ("Non-coding RNA" OR ncRNA* OR "RNA Interference" OR "Guide RNA" OR "gRNA" OR "Ribonuclease P" OR "Rnase P" OR "Y RNA" OR "Telomerase RNA Component" OR "TERC" OR "Spliced Leader RNA" OR "SL RNA" OR lncRNA* OR "lncRNA" OR "RNA, long noncoding" OR "short interfering RNA" OR siRNA* OR "small interfering RNA" OR "RNA, Small Interfering" OR "RNA interference" OR "small silencing RNA" OR "small inhibitory" OR "small interfering" OR "small RNA" OR "smallRNA" OR "small inhibitory RNA*" OR microRNAs OR miRNA* OR microRNA* OR "micro RNA" OR "micro RNAs" OR piRNA* OR PiwiRNA* OR "piwi-interacting RNA" OR "snRNA" OR "small nuclear RNA" OR "spliceosomal RNA" OR "snoRNA" OR "small nucleolar RNA" OR "SmY RNA" OR "Small-Cajal-body-specific RNA" OR "scaRNA" OR "RNA editing" OR "RNA splicing" OR "intron retention"))

Scopus

TITLE-ABS-KEY("Epigenesis, genetic" OR "Epigenomics" OR epigen* OR epitranscriptome OR epiallel* OR epimutat* OR "epigenetic mark"* OR "Genomic imprinting" OR (imprint* AND (gene OR genes OR genetic OR genomic OR loci)) OR dna-modification OR Gene silencing OR "gene silencing" OR "gene silencer" OR "gene

activation" OR "gene inactivation" OR "Polycomb group proteins" OR "PcG silencing")
OR

TITLE-ABS-KEY ("DNA Methylation" OR "DNA Methylation" OR "Promoter methylation" OR ((DNA OR DNA) AND (genome, human OR "genome wide association study" OR epigenesis, genetic OR epigenomics OR genome-wide* OR GWAS OR genome-scale OR Genome OR "epigenome-wide" OR EWAS OR "whole genome" OR Methylation-profil* OR methylation-pattern* OR Methylom*)) OR (("CpG islands" OR CpG OR CpGs OR CPG's OR non-CG OR non-CPG) AND (methylat*)) OR methylat* OR hemimethylat* OR hypermethylat* OR hypomethylat* OR demethylat* OR nonmethylat* OR remethylat* OR unmethylat* OR Methyltransferases OR "DNA modification methylases" OR methylas* OR demethylas* OR methyltransferase* OR methyl-transferase* OR 5-methylcytosine OR "5-methylcytosine" OR 5-methyl-cytosine OR 5mc OR 5meC OR "5 hydroxymethylcytosine" OR 5hmc OR Hydroxymethylat* OR 5-hydroxymethylcytosine OR 5-hydroxy-methylcytosine OR 5-hydroxymethyl-cytosine OR 5hmC OR "5-Formylcytosine" OR "5-Carboxylcytosine" OR Methyladenine OR Methylcytosine OR Hydroxymethylcytosine OR Formylcytosine OR Carboxylcytosine OR methyladenosine OR methylcytosine OR methylguanosine OR ((nucleotide* OR cytosine OR cytosine* OR Alu OR genes OR genom*) AND (methylat*)) OR

TITLE-ABS-KEY ((RNA OR RNA) AND (Queuosine OR Pseudouridine OR Methyladenosine OR Methylcytidine OR Methylguanosine OR Methylinosine OR Methyluridine OR Ribosyladenosine OR Ribosylguanosine OR Formyladenosine OR Formylcytidine OR methyladenosine OR methylcytosine OR methylguanosine OR cap methylation OR pseudouridine OR uridylation OR inosine editing)) OR

TITLE-ABS-KEY (histone marks OR histone markers OR histone-tail-modification OR histone-tail-modifications OR methylation-associated-silencing OR "histone modification" OR ((Histones OR Histone code OR histone*) AND (methylat* OR methylase* OR hypermethyl* OR hypomethyl* OR acetylation OR acetylase* OR acetyl* OR acetyltransferases OR acetyltransferase* OR acetyl-transferase* OR deacetylases OR deacetyla* OR de-acetyl* OR HDAC OR ubiquitination OR ubiquitination OR proteasome OR ubiquitins OR "phosphorylation" OR phosphorylation OR "lysine crotonylation" OR lysine OR butyrylation OR butylation OR propionylation OR ("tyrosine hydroxylation" OR Tyrosine) AND (Hydroxylation)) OR "biotinylation" OR Biotin OR Biotinylation OR "neddylation" OR NEDD8 Protein OR Sumoylation OR SUMO-1 Protein OR " O-Linked N-acetylglucosamine" OR "O-GlcNAc" OR Acetylglucosamine OR N-Acetylglucosaminyltransferases OR ((ADP-Ribosylation OR "Adenosine Diphosphate") AND Ribose) OR ("proline isomerization" OR Proline) AND Isomerism) OR "citrullination" OR "imination" OR Citrulline OR Protein-Arginine Deiminases OR Citrullination OR "N-formylation")) OR

TITLE-ABS-KEY (((Chromatin OR chromatin OR nucleosom*) AND (remodel*)) OR "chromatin-organization" OR "Chromatin modification" OR "open chromatin" OR Euchromatin OR ((open OR relax* OR compact* OR condens* OR centromere*) AND chromatin) OR heterochromatin OR (heterochromatin AND (constitutive OR facultative)) OR ((pericentromer* OR satellite OR "transposable elements") AND DNA) OR (tandem AND repeats) OR (interspersed AND repeats) OR ("chromatin accessibility")) OR

TITLE-ABS-KEY (("Non-coding RNA" OR ncRNA* OR "RNA Interference" OR "Guide RNA" OR "gRNA" OR "Ribonuclease P" OR "Rnase P" OR "Y RNA" OR "Telomerase RNA Component" OR "TERC" OR "Spliced Leader RNA" OR "SL RNA" OR lncRNA* OR "lncRNA" OR "RNA, long noncoding" OR "short interfering RNA" OR siRNA* OR "small interfering RNA" OR "RNA, Small Interfering" OR "RNA interference" OR "small silencing RNA" OR "small inhibitory" OR "small interfering" OR "small RNA" OR "smallRNA" OR "small inhibitory RNA*" OR microRNAs OR miRNA* OR microRNA* OR "micro RNA" OR "micro RNAs" OR piRNA* OR PiwiRNA* OR "piwi-interacting RNA" OR "snRNA" OR "small nuclear RNA" OR "spliceosomal RNA" OR "snoRNA" OR "small nucleolar RNA" OR "SmY RNA" OR "Small-Cajal-body-specific RNA" OR "scaRNA" OR "RNA editing" OR "RNA splicing" OR "intron retention"))

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Induce oxidative stress

PubMed

proteasome[tiab] OR "Free Radicals"[mh] OR "Reactive Oxygen Species"[mh] OR "Oxidative stress"[mh] OR "Electron Transport"[mh] OR Oxidative-damage*[tiab] OR reactive-nitrogen-species[tiab] OR superoxide-radical*[tiab] OR hydroxyl-radical[tiab] OR glutathione-deplet*[tiab] OR electron-transport-chain*[tiab] OR reactive-oxygen-species[tiab] OR Oxidative-stress*[tiab] OR free-radical*[tiab]

Web of Science

TS=(proteasome OR "Oxidative damage*" OR "reactive nitrogen species" OR "superoxide radical*" OR "hydroxyl radical" OR "glutathione depletion" OR "electron transport chain*" OR "reactive oxygen species" OR "Oxidative stress*" OR "free radical*")

Scopus

Title-Abs-Key(proteasome OR "Oxidative damage*" OR "reactive nitrogen species" OR "superoxide radical*" OR "hydroxyl radical" OR "glutathione depletion" OR "electron transport chain*" OR "reactive oxygen species" OR "Oxidative stress*" OR "free radical*")

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Induce chronic inflammation

PubMed

systemic inflamm*[tw] OR inflammatory condition*[tw] OR inflammatory potential[tw] OR inflammatory response*[tw] OR inflammatory stat*[tw] OR inflammatory index[tw] OR inflammatory foci[tw] OR markers of inflammation[tw] OR (chronic[tw] AND inflammation[tw]) OR chronic inflamm*[tw] OR tissue inflammation[tw] OR pyrogen*[tw] OR complement protein*[tw] OR inflammatory signal*[tw] OR inflammation[tw] OR pyroptos* OR leukocyt*[tw] OR lymphocyt*[tw] OR CD4[tw] OR CD4-Positive T-Lymphocytes[tw] OR peripheral-blood[tw] OR hematologic*[tw] OR T4 Lymphocyte[tw] OR T4 Cell*[tw] OR granulocyt*[tw] OR cytokine*[tw] OR CD8-Positive T-Lymphocytes[tw] OR C-reactive protein[mh] OR eosinophils[mh] OR

(fibrinogen[tiab] AND Inflammation[tiab]) OR chronic-inflammation[tiab] OR chronically-inflamed[tiab] OR infiltrating-leukocyt*[tiab] OR inflammatory-leukocyte[tiab] OR inflammatory-leukocytes[tiab] OR leukocyte-infiltrat*[tiab] OR pro-inflammatory[tiab] OR proinflammatory[tiab] OR C-reactive-protein*[tiab] OR eosinophil*[tiab] OR autoimmunity[tiab] OR "inflammatory marker*" [tiab] OR "inflammatory cytokine*" [tiab]

Web of Science

Ts(("C-reactive protein" OR C-reactive-protein OR systemic inflamm OR inflammatory condition OR inflammatory potential OR inflammatory response OR inflammatory marker OR inflammatory stat OR inflammatory-leukocyte OR inflammatory index OR inflammatory foci OR markers of inflammation OR (fibrinogen AND inflammation) OR chronic-inflammation OR chronically-inflamed OR (chronic AND inflammation) OR chronic inflamm OR infiltrating-leukocyt OR leukocyte-infiltrat OR pro-inflammatory OR tissue inflammation OR pyrogen OR complement protein OR inflammatory signal OR inflammation OR pyroptos OR leukocyt OR lymphocyt OR eosinophil OR CD4 OR CD4-Positive T-Lymphocytes OR peripheral-blood OR hematologic OR T4 Lymphocyte OR T4 Cell OR granulocyt OR cytokine OR CD8-Positive T-Lymphocytes OR eosinophils OR pro-inflammatory OR proinflammatory OR C-reactive-protein OR eosinophil OR autoimmunity))

Scopus

TITLE-ABS-KEY (("C-reactive protein") OR (C-reactive-protein) OR (systemic inflamm) OR (inflammatory condition) OR (inflammatory potential) OR (inflammatory response) OR (inflammatory marker) OR (inflammatory stat) OR (inflammatory-leukocyte) OR (inflammatory index) OR (inflammatory foci) OR (markers of inflammation) OR (fibrinogen AND inflammation) OR (chronic-inflammation) OR (chronically-inflamed) OR (chronic AND inflammation) OR (chronic inflamm) OR (infiltrating-leukocyt) OR (leukocyte-infiltrat) OR (pro-inflammatory) OR (proinflammatory) OR (tissue inflammation) OR (pyrogen) OR (complement protein) OR (inflammatory signal) OR (inflammation) OR (pyroptos) OR (leukocyt) OR (lymphocyt) OR (eosinophil) OR (CD4) OR (CD4-Positive T-Lymphocytes) OR (peripheral-blood) OR (hematologic) OR (T4 Lymphocyte) OR (T4 Cell) OR (granulocyt) OR (cytokine) OR (CD8-Positive T-Lymphocytes) OR (eosinophils) OR (infiltrating-leukocyt) OR (Autoimmunity))

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Be an immunomodulator

PubMed

("Antigenic Modulation"[tw] OR autoimmun*[tw] OR "B-Cell Activating Factor" [tw] OR "Cytotoxicity, Immunologic"[tw] OR cell-mediated immunity[tw] OR humoral immunity[tw] OR immun*[tw] OR "Immunologic Factors"[tw] OR immune competence[tw] OR immune dysregulation[tw] OR immune function*[tw] OR immune impairment[tw] OR immune respons*[tw] OR immune stat*[tw] OR immune system[tw] OR immunotox* OR "macrophage-recruitment"[tw] OR Killer Cells, Natural[TW] OR Natural Killer[tw] OR NF-kappaB[tw] OR nk[tw] OR TNF- α [tw] OR immunostim*[tw] OR immunophenotyp*[tw] OR "t cell activation"[tw] OR "t cell proliferation"[tw] OR T-Lymphocytes, Cytotoxic[tw] OR "systems immunology"[tw] OR leukocyt*[tw] OR

lymphocyt*[tw] OR eosinophil*[tw] OR CD4[tw] OR CD4-Positive T-Lymphocytes[tw] OR peripheral-blood[tw] OR hematologic*[tw] OR T4 Lymphocyte[tw] OR T4 Cell*[tw] OR granulocyt*[tw] OR cytokine*[tw] OR CD8-Positive T-Lymphocytes[tw] OR "macrophage-recruitment"[mh] OR "Antigenic Modulation"[mh] OR "Cytotoxicity, Immunologic"[mh] OR Immunologic Factors[mh] OR Immunomodulation[mh] OR B-Cell Activation Factor Receptor[mh] OR b-cell-activation[tiab] OR immune surveillance[tiab] OR immune-suppress*[tiab] OR immunostimulant[tiab] OR immune-activation[tiab] OR immunodeficien*[tiab] OR somatic-hypermutation[tiab] OR immune-activation[tiab] OR immune-system-activation[tiab] OR Chronic-antigenic-stimulation[tiab] OR immunosuppress*[tiab] OR Immunomodulation[tiab] OR Immune-modulation[tiab])

Web of Science

Ts(("Antigenic Modulation" OR autoimmun OR "B-Cell Activating Factor" OR "B-Cell Activation Factor Receptor" OR b-cell-activation OR "Cytotoxicity, Immunologic" OR cell-mediated immunity OR humoral immunity OR immun OR "Immunologic Factors" OR "Immunomodulation" OR immune competence OR immune dysregulation OR immune function OR immune impairment OR immune respons OR immune stat OR immune system OR immunosuppress OR Immunosuppression OR immunotox OR "macrophage-recruitment" OR Killer Cells, Natural OR Natural Killer OR NF-kappaB OR nk OR somatic-hypermutation OR TNF- α OR immunostim OR immune activation OR immunophenotyp OR "t cell activation" OR "t cell proliferation" OR T-Lymphocytes, Cytotoxic OR "systems immunology" OR leukocyt OR lymphocyt OR eosinophil OR CD4 OR CD4-Positive T-Lymphocytes OR peripheral-blood OR hematologic OR T4 Lymphocyte OR T4 Cell OR granulocyt OR cytokine OR CD8-Positive T-Lymphocytes OR chronic-antigenic-stimulation OR macrophage-recruitment OR Cytotoxicity, Immunologic OR b-cell-activation OR immune surveillance OR immune-suppress* OR immunostimulant OR immune-activation OR immunodeficien* OR immune-system-activation OR Chronic-antigenic-stimulation OR Immune-modulation))

Scopus

Title-abs-key(("Antigenic Modulation") OR (autoimmun) OR ("B-Cell Activating Factor") OR ("B-Cell Activation Factor Receptor") OR (b-cell-activation) OR ("Cytotoxicity, Immunologic") OR (cell-mediated immunity) OR (humoral immunity) OR (immun) OR ("Immunologic Factors") OR ("Immunomodulation") OR (immune competence) OR (immune dysregulation) OR (immune function) OR (immune impairment) OR (immune respons) OR (immune stat) OR (immune system) OR (immunosuppress) OR (Immunosuppression) OR (immunotox) OR ("macrophage-recruitment") OR (Killer Cells, Natural) OR (Natural Killer) OR (NF-kappaB) OR (nk) OR (somatic-hypermutation) OR (TNF- α) OR (immune surveillance) OR (immunostim) OR (immune activation) OR (immunodeficien) OR (immunophenotyp) OR ("t cell activation") OR ("t cell proliferation") OR (T-Lymphocytes, Cytotoxic) OR ("systems immunology") OR (chronic-antigenic-stimulation) OR (leukocyt) OR (lymphocyt) OR (eosinophil) OR (CD4) OR (CD4-Positive T-Lymphocytes) OR (peripheral-blood) OR (hematologic) OR (T4 Lymphocyte) OR (T4 Cell) OR (granulocyt) OR (cytokine) OR (CD8-Positive T-Lymphocytes) OR (immune-suppress) OR (immunostimulant) OR (immunodeficient) OR (immune-system-activation) OR (Immune-modulation))

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Modulate receptor-mediated effects

PubMed

(Androgen Antagonists[Mesh:NoExp] OR Androgen Receptor Antagonists[Mesh:NoExp] OR Estrogen Antagonists[MH] OR "Estrogen Antagonist*" [tw] OR Estrogen Receptor Modulators[MH:NoExp] OR "Estrogen Receptor*" [tw] OR Gonadal Hormones[MH] or Thyroid Hormones[MH] or "Thyroid Hormones" OR Melatonin[MH] OR Endocrine Disruptors[MH] OR "Endocrine Disruptor*" [tw] OR Receptors, Steroid[MH] OR Receptors, Cytoplasmic and Nuclear[MH] OR Receptors, Aryl Hydrocarbon[MH] OR Endocrine disrupt*[tw] OR (Peroxisome Proliferator-Activated Receptor[tw]) OR PPAR[tw] OR (constitutive androstane receptor [tw]) OR (farnesoid X-activated receptor[tw]) OR (liver X receptor[tw]) OR (Retinoid X receptor[tw]) OR (Aryl hydrocarbon receptor[tw]) OR (Ah receptor[tw]) OR (androgen receptor* [tw]) OR triiodothyronine*[tw] OR Thyroxine*[tw] OR (Thyroid stimulating hormone*[tw]) OR (tsh[tw]) OR Thyrotropin[tw] OR Thyrotropin[MH] OR "Transcriptional Activation"[mh] OR receptor-mediat*[tiab] OR transcription-factor*[tiab] OR transcriptional-activat*[tiab] OR Xenobiotic-sensor*[tiab] OR xenosensor*[tiab])

Web of Science

TS=((androgen AND antagonists) OR (androgen AND receptor AND antagonists) OR (estrogen AND antagonists) OR "Estrogen Antagonist" OR (estrogen AND receptor AND modulators) OR "Estrogen Receptor*" OR (gonadal AND hormones) OR (thyroid AND hormones) OR "Thyroid Hormones" OR melatonin OR (endocrine AND disruptors) OR "Endocrine Disruptor" OR(receptors AND steroid) OR (receptors AND cytoplasmic AND nuclear) OR (receptors AND aryl AND hydrocarbon) OR (endocrine AND disrupt) OR (peroxisome AND proliferator-activated AND receptor) OR ppar OR (constitutive AND androstane AND receptor) OR (farnesoid AND x-activated AND receptor) OR (liver AND x AND receptor) OR (retinoid AND x AND receptor) OR (aryl AND hydrocarbon AND receptor) OR (ash AND receptor) OR (androgen AND receptor) OR triiodothyronine OR thyroxine OR (thyroid AND stimulating AND hormone) OR (tsh) OR thyrotropin OR thyrotropin OR "Aryl-hydrocarbon receptor*" OR "receptor mediat*" OR "transcription factor*" OR "transcriptional activat*" OR "Xenobiotic sensor*" OR xenosensor* OR "Ah-receptor*")

Scopus

TITLE-ABS-KEY((androgen AND antagonists) OR (androgen AND receptor AND antagonists) OR (estrogen AND antagonists) OR "Estrogen Antagonist" OR (estrogen AND receptor AND modulators) OR "Estrogen Receptor*" OR (gonadal AND hormones) OR (thyroid AND hormones) OR "Thyroid Hormones" OR melatonin OR (endocrine AND disruptors) OR "Endocrine Disruptor" OR(receptors AND steroid) OR (receptors AND cytoplasmic AND nuclear) OR (receptors AND aryl AND hydrocarbon) OR (endocrine AND disrupt) OR (peroxisome AND proliferator-activated AND receptor) OR ppar OR (constitutive AND androstane AND receptor) OR (farnesoid AND x-activated AND receptor) OR (liver AND x AND receptor) OR (retinoid AND x AND receptor) OR (aryl AND hydrocarbon AND receptor) OR (ash AND receptor) OR (androgen AND receptor) OR triiodothyronine OR thyroxine OR (thyroid AND stimulating AND hormone) OR (tsh) OR thyrotropin OR thyrotropin OR "Aryl-

hydrocarbon receptor*" OR "receptor mediat*" OR "transcription factor*" OR
"transcriptional activat*" OR "Xenobiotic sensor*" OR xenosensor* OR "Ah-receptor*")

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Cause immortalization

PubMed

Micronuclei[tiab] OR Micronucleus[tiab] OR alternative-lengthening-of-telomere*[tiab]
OR cellular-Immortalization[tiab] OR p53-inactivat*[tiab] OR p53-inhibit*[tiab] OR
p53-delet*[tiab] OR pRb-inactivat*[tiab] OR pRb-inhibit*[tiab] OR pRb-delet*[tiab] OR
Rb/p16INK4a inactiv*[tiab] OR retinoblastoma-protein[tiab] OR senescent[tiab] OR
senescence[tiab]

Web of Science

TS=(micronuclei OR micronucleus OR "alternative lengthening of telomeres" OR
"cellular immortalization" OR "p53 inactivation" OR "p53 inhibition" OR "p53 deletion"
OR "pRb inactivation" OR "pRb inhibition" OR "pRb deletion" OR "Rb/p16INK4a
inactiv*" OR "retinoblastoma protein" OR senescent OR senescence)

Scopus

Title-Abs-Key(micronuclei OR micronucleus OR "alternative lengthening of telomeres"
OR "cellular immortalization" OR "p53 inactivation" OR "p53 inhibition" OR "p53
deletion" OR "pRb inactivation" OR "pRb inhibition" OR "pRb deletion" OR
"Rb/p16INK4a inactiv*" OR "retinoblastoma protein" OR senescent OR senescence)

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Alter cell proliferation, cell death, or nutrient supply

PubMed

"Angiogenesis Modulating Agents"[mh] OR "Angiogenesis Inducing Agents"[pa] OR
"Angiogenesis Inducing Agents"[mh] OR angiogenesis[tiab] OR angiogenic[tiab] OR
"Apoptosis"[mh] OR Apoptosis[tiab] OR "Autolysis"[mh] OR autolysis[tiab] OR
"autophagy"[mh] OR autophagy[tiab] OR Caspases[mh] OR "Cell Hypoxia"[mh] OR
"Cell Proliferation"[mh] OR cell-cycle-control*[tiab] OR cell-hypoxia[tiab] OR Cellular-
Proliferat*[tiab] OR cellular-replication*[tiab] OR Cyclin-Dependent Kinase Inhibitor
Proteins[mh] OR "Cyclin-Dependent Kinases"[mh] OR cyclin-dependent-kinase*[tiab]
OR cyclin-dependent-kinase-inhibit*[tiab] OR Cytogenesis[tiab] OR Cytogenic[tiab] OR
"Cytotoxicity, Immunologic"[mh] OR Cytotoxin[tiab] OR hepatocellular-
proliferation[tiab] OR "homeostasis"[mh] OR hyperplasia[tiab] OR hypoxic-cell*[tiab]
OR mitogen[tiab] OR mitogenesis[tiab] OR mitogens[mh] OR Mitogens[pa] OR
mitogens[tiab] OR mitotic-checkpoint*[tiab] OR necrosis [mh] OR Neoplasia[tiab] OR
Neovascularization, Pathologic[mh] OR survivin[tiab]

Web of Science

TS=("cell-cycle control*" OR "mitotic-checkpoint*" OR "hepatocellular proliferation"
OR "immunologic cytotox*" OR "pathologic neovascularization" OR cytogenesis OR
cytogenic OR "cellular replication*" OR hyperplasia OR neoplasia OR mitogenesis OR
"cellular homeostasis" OR "Cell Proliferat*" OR "Cellular Proliferat*" OR "cyclin

dependent kinase*" OR mitogens OR mitogen OR angiogenic OR "cellular energetics"
OR "hypoxic cell*" OR "cell hypoxia" OR "cellular hypoxia" OR survivin OR cytotoxin
OR caspases OR apoptosis OR autophagy OR necrosis OR autolysis)

Scopus

Title-Abs-Key("angiogenesis" OR cytogenesis OR cytogenic OR "cellular replication*"
OR hyperplasia OR neoplasia OR mitogenesis OR "cellular homeostasis" OR "Cell
Proliferat*" OR "Cellular Proliferat*" OR "cyclin dependent kinase*" OR mitogens OR
mitogen OR angiogenic OR "hypoxic cell*" OR "cell hypoxia" OR "cellular hypoxia"
OR survivin OR cytotoxin OR caspases OR apoptosis OR autophagy OR necrosis)

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2.6.2. Metabolomics Search Terms

This search string captures terms related to metabolomics, a developing field. Articles on metabolomics are of interest if they provide mechanistic context, either by a formal pathway analysis, or from content or analyses showing the metabolites are relevant to cancer. Articles listing metabolites without context relevant to cancer mechanisms would not be of interest.

These search terms are used in combination with the substance specific search terms with the Boolean operator “AND”. This search string is not used in conjunction with the cancer search string.

PubMed

("Metabolomic*" [tiab] OR "Metabolom*" [tiab] OR "Metabolic profile" [tiab] OR "Epimetabolite*" [tiab] OR "Metabolic fingerprint" [tiab] OR "Metabolon" [tiab] OR "metabolome wide association" [tiab] OR "MWAS" [tiab] OR (Metabolomics [MeSH]) OR (Metabolome [MeSH]))

Web of Science

Ts=("Metabolomic*" OR "Metabolom*" OR "Metabolic profile" OR "Epimetabolite*" OR "Metabolic fingerprint" OR "Metabolon" OR "metabolome wide association" OR "MWAS")

Scopus

TITLE-ABS-KEY ("Metabolomic*" OR "Metabolom*" OR "Metabolic profile" OR "Epimetabolite*" OR "Metabolic fingerprint" OR "Metabolon" OR "metabolome wide association" OR "MWAS")

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2.6.3. General Mechanistic Terms Search Strings

This search is a limited set of terms designed to supplement the Characteristics of Carcinogens Search Strings and uses terms not included in that search. It will generally be used to gain an initial grasp of the best-understood mechanistic information associated with the candidate substance. This search is not generally used in conjunction with the Cancer Search Strings.

Some additional information about the mechanism of action for a material can be collected from general data sources, mining the citations of reviews and other studies, and specially targeted searches.

PubMed

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((("etiology"[sh] OR "Causality"[mh] OR "tumor markers, biological"[mh] OR "oncogene fusion"[mh] OR "tumor necrosis factors"[mh] OR adverse-outcome-pathway*[tiab] OR biological-marker[tiab] OR biological-markers[tiab] OR biomarkers[tiab] OR biomarker[tiab] OR Biotransformation[tiab] OR etiology[tiab] OR Key Event*[tiab] OR Mechanism-of-action[tiab] OR Mechanisms-of-action[tiab] OR Mode-of-action[tiab] OR modes-of-action[tiab] OR Molecular-Initiating-Event*[tiab] OR neoplastic-cell-transform*[tiab] OR Phosphorylation[tiab] OR Toxicity-Pathway*[tiab] OR toxicokinetic*[tiab] OR toxic-pathway*[tiab]) AND (Cancer[sb])) OR (tumor-inhibit*[tiab] OR tumor-promot*[tiab] OR tumour-inhibit*[tiab] OR tumour-promot*[tiab] OR Oncogenes[tiab] OR Oncogenesis[tiab] OR Oncogenic[tiab] OR pathogenesis[tiab]))
```

Web of Science

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((TS=(Cancer* OR Neopla* OR Tumor* OR Tumour*)) AND (TS=("adverse outcome pathway*" OR "biological marker" OR "biological markers" OR "biomarkers" OR "biomarker" OR "tumor marker" OR "tumor markers" OR "oncogene fusion" OR "Biotransformation" OR "etiology" OR "Key Event*" OR "Mechanism of action" OR "Mechanisms of action" OR "Mode of action" OR "modes of action" OR "Molecular Initiating Event*" OR "neoplastic cell transform*" OR "Phosphorylation" OR "Toxicity Pathway*" OR "toxicokinetic*" OR "toxic pathway*"))) OR (TS=("tumor-inhibit*" OR "tumor-promot*" OR "tumour-inhibit*" OR "tumour-promot*" OR "tumor necrosis factor*" OR Oncogenes OR Oncogenesis OR Oncogenic OR pathogenesis))
```

Scopus

```
((TITLE-ABS-KEY (cancer* OR neopla* OR tumor* R tumour*) AND TITLE-ABS-KEY ("adverse outcome pathway*" OR "biological marker" OR "biological markers" OR "biomarkers" OR "biomarker" OR "tumor marker" OR "tumor markers" OR "oncogene fusion" OR "Biotransformation" OR "etiology" OR "Key Event*" OR "Mechanism of action" OR "Mechanisms of action" OR "Mode of action" OR "modes of action" OR "Molecular Initiating Event*" OR "neoplastic cell transform*" OR "Phosphorylation" OR "Toxicity Pathway*" OR "toxicokinetic*" OR "toxic pathway*"))) OR TITLE-ABS-KEY ("tumor-inhibit*" OR "tumor-promot*" OR "tumour-inhibit*" OR "tumour-promot*" OR "tumor necrosis factor*" OR oncogenes OR oncogenesis OR oncogenic OR pathogenesis))
```

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References

Smith MT, Guyton KZ, Gibbons CF, Fritz JM, Portier C, Rusyn I, et al. 2016. Key characteristics of carcinogens as a basis for organizing data on mechanisms of carcinogenesis. *Environ Health Perspect* 124(6): 713-721. DOI: <http://dx.doi.org/10.1289/ehp.1509912>.

Zhang L, Louie A, Rigutto G, Guo H, Zhao Y, Ahn S, Dahlberg S, Sholinbeck M, Smith MT. 2023. A systematic evidence map of chronic inflammation and immunosuppression related to per- and polyfluoroalkyl substance (PFAS) exposure. *Environ Res* 220: 115188. PMID: <https://pubmed.ncbi.nlm.nih.gov/36592815>. DOI: <http://dx.doi.org/10.1016/j.envres.2022.115188>.