Approach to Evaluating Health-Related Scientific Evidence and Expert Opinion to Support Disability Benefit Decision-Making

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1. Introduction

This note documents my approach to support disability benefit entitlement decision-making when a VAC decision-maker consults me to provide them with an opinion when they are dealing with uncertainty in health-related expert opinion and scientific evidence.

1a. Background

Eligible serving and former service members can apply to Veterans Affairs Canada (VAC) for entitlement to disability benefits, which are a key gateway to financial awards and a variety of supports. Entitlement to disability pensions and disability awards requires that the person have a medical diagnosis of a health condition connected to military service and a related permanent medical disability.

VAC's authority for disability benefit entitlement decision-making is established in federal legislation: the *Pension Act* (entered into force in 1919) and the *Canadian Forces Members and Veterans Re-establishment and Compensation Act* (New Veterans Charter; entered into force in 2006):

> Pension Act: "*21(1) In respect of service rendered during World War I, service rendered during World War II other than in the non-permanent active militia or the reserve army, service in the Korean War, service as a member of the special force, and special duty service, a) where a member of the forces suffers disability resulting from an injury or disease or an aggravation thereof that was attributable to or was incurred during such military service, a pension shall, on application, be awarded to or in respect of the member in accordance with the rates for basic and additional pension set out in Schedule I...*"
>
> Pension Act: "*21(2) In respect of military service rendered in the non-permanent active militia or in the reserve army during World War II and in respect of military service in peace time, (a) where a member of the forces suffers disability resulting from an injury or disease or an aggravation thereof that arose out of or was directly connected with such military service, a pension shall, on application, be awarded to or in respect of the member in accordance with the rates for basic and additional pension set out in Schedule I...*"
>
> Canadian Forces Members and Veterans Re-establishment and Compensation Act: "*2. "service-related injury or disease" means an injury or a disease that (a) was attributable to or was incurred during special duty service; or (b) arose out of or was directly connected with service in the Canadian Forces ... 45(1) The Minister may, on application, pay a disability award to a member or a veteran who establishes that they are suffering from a disability resulting from (a) a service-related injury or disease; or (b) a non-service-related injury or disease that was aggravated by service.*"
>
> The Veterans Review and Appeal Board interpreted "*attributable to*" as "*caused by*".

Both acts define *disability* as "*the loss or lessening of the power to will and to do any normal mental or physical act*". Entitlement combines both the presence of a medical diagnosis of illness or injury and related impairments on the one hand, and disability that occurs when a person encounters barriers preventing normal functioning on the other. *Medical diagnosis* is a

health condition for which an eligible person is claiming entitlement to disability benefits. Physical and mental health conditions often confer some form of physical and/or mental *impairment* that can affect function. *Disability* clinically means not being able to function as a result of encountering barriers, either internal adaptive coping or external social and physical barriers. People who have no health conditions can encounter barriers that *dis-able* them, such as being unable to get a well-paying job without appropriate education, or being unable to walk outside a space vehicle. These barriers can be overcome with education or technology that *enables* the person. Disability is more likely to occur when a person has physical or mental impairment due to a health condition, and disability is likely to be more severe when the impairment is more severe.

Entitlement may be provided if there is sufficient evidence of a medical diagnosis related to service, and then degree of disability is assessed to determine compensation. In keeping with both legislation and current clinical thinking, VAC approaches disability compensation in two steps:

1. Step one *entitlement*: Determine whether the health condition (medical diagnosis) was incurred during, or aggravated by, or attributable to, or directly connected with service, and whether the health condition resulted in a permanent disability.
2. Step two *assessment*: Determine the degree of disability.

In certain circumstances (*the insurance principle*), it is sufficient to demonstrate only that a condition was incurred during certain types of service, such as while serving in a Special Duty Area. In other cases, such as when a condition arises during service that is not special duty (*the compensation principle*), or when a condition arises years after special duty service, it is necessary to determine whether the condition or aggravation of the condition was caused by military service activity.

Adjudicators, policy writers and program developers working on disability benefit issues must weigh a variety of types of evidence, including *health-related expert opinion and scientific evidence*. New scientific evidence is being published worldwide at an increasingly high volume and rate, often is technically challenging to evaluate, and characterized by inconsistency and uncertainty, so often it is difficult to explain reasons for decisions. Good disability benefit entitlement decision-making is *timely, legally sound, medically sound, fair, consistent, efficient and transparent inside and outside VAC*. VAC tools to help decision-makers deal with this type of evidence include legislation, the Table of Disabilities, policies and the Eligibility Entitlement Guidelines. These tools require ongoing maintenance as new scientific information emerges, and cannot cover all the questions that arise. Expert legal and medical assistance is routinely required at VAC to help them deal with this type of evidence.

2. Application

2a. Examples of Applications

This document explains the approach I use to formulate an opinion to support decision-making in the following VAC activities:

- Case-by-case decision-making for questions of disability entitlement and assessment.
- Decision-making about criteria used in the Entitlement Eligibility Guidelines and the Table of Disabilities.

- Decision-making about evidence-based statements in policies related to disability entitlement and assessment.
- Decision-making about evidence-based principles used in developing programs and services related to disability entitlement and assessment.

Many factors of military service have been claimed over the years (see section 3a), and a very large variety of physical and mental health conditions have been found related to military service by VAC *for the purposes of disability benefit entitlement*[1].

There is considerable variability in the kinds of questions that prompt referral by a VAC decision-maker. When an application hinges on causality, the decision-maker has to consider whether a health condition was caused or aggravated by a factor encountered in the applicant's service. This means the decision-maker considers evidence for:

1. Whether factor A causes condition B, or whether condition A causes condition B;
2. Whether the person was exposed in a sufficient manner to factor A to have caused condition B, or whether the person had condition A in manner that would cause condition B; and
3. Whether the latency period between exposure to factor A, or whether the presence of condition A and onset of the health condition was appropriate.

I also use this approach for dealing with questions related to the insurance principle, for example whether symptom A that was incurred in special duty service was part of condition B that developed later in life.

3. Terminology

3a. Evidence

Evidence: Any form of proof that is offered to substantiate a claim and/or to establish the existence or non-existence of any fact in dispute.

Health-Related Expert Opinion and Scientific Evidence: Health-related expert opinion and scientific evidence is a special type of evidence that is considered by decision-makers when they make a decision on a client's claim for disability benefit entitlement, or develop a guideline, policy or program. Expert advisors specialize in assisting decision-makers dealing with uncertainty in this type of evidence.

Scientific evidence can include results of scientific studies, critical reviews of multiple scientific studies, a client's health records and file reviews, depending on the nature of the question.

Expert opinion is informed judgement that fills gaps in scientific evidence. Examples include letters from client's health care practitioners, committee reports, professional guidelines, lists of risk factors and textbook entries based on author judgement.

Uncertainty: Uncertainty is the existence of doubt, controversy or lack of clarity in evidence.

[1] Pedlar DJ, Thompson JM. Research in the life courses of Canadian military Veterans and their families. In: A Aiken & SAH Bélanger (eds.): *Shaping the Future, Military and Veteran Health Research*. Kingston, Ontario: Canadian Defence Academy Press; 2011. p15-31.

At VAC, decision-makers consider all the available evidence when considering a claim for disability benefit entitlement, or when developing a guideline, policy and program related to disability benefit entitlement. An expert advisor's opinion about a body of health-related expert opinion and scientific evidence contributes to the decision, but is not the only determinant.

3b. Exposure and Latency

Decision-making for claims often revolves around whether exposure to a factor of military service caused the Veteran's health condition later in life.

Exposure has two meanings relevant to VAC policy: (1) a *hazard*, and (2) *contact with a hazard*.

With respect to the first meaning (*hazard*), a variety of factors have been connected to health and disability, including but not limited to:

- Weapons.
- Mechanical hazards.
- Physical, biological, chemical and radiological hazards.
- Environmental stress.
- Psychological stress (psychological trauma).
- Social stress.
- Illnesses and injuries that occur in military service (an illness or injury service can cause or aggravate certain conditions later in life).

The VAC exposure policy is limited to four hazard types: physical, biological, chemical and radiation[2].

With respect to the second meaning (*contact with a hazard*), exposure is characterized by *mode, extent, timing and biological effects*. *Mode* describes how the person was exposed, including *source* and the *route* or *pathway* taken by an exposure when it affects a person. *Extent* considers the *amount, frequency* and *duration* of exposure to the factor. *Timing* includes *latency*, which refers to the delay that occurs between exposure to a factor and manifestation of the health condition. "*Biological effects"* considers how body chemistry reacts to the exposure factor, including protective and adverse effects and variation between individuals.

3c. Association and Causality

There are two steps in evaluating evidence for causality between a factor and a health condition:

First, is there evidence of *association* between the factor and the condition?

Second, is there evidence of *causality* in the association between the factor and the condition?

Association means that a factor and a health outcome are said to be associated when the two appear to occur together. Associations can be explained by *chance*, *bias*, *confounding*, or *causality*:

[2] VAC Policy "*Hazardous Material and Radiation Exposure*", 2012.

- *Chance*: The association was due to random variation.
- *Bias*: The association was due to flaws in study design, sample recruitment, data collection, analysis or interpretation which led to favouring conclusions that deviate from the truth.
- *Confounding*: The association was due to the presence of unrecognized variables related to the factor and/or the health outcome.
- *Causality*: The relating of causes to the effects they produce; a relationship between a factor and a health condition, where exposure to the factor earlier in life results in the health condition later in life, as in a "causal relationship". The association was due to a causal relationship between the factor and the health condition such that the factor caused or aggravated the health condition. The term "causal association" is inappropriate. While there is debate about the definition of causality, several authorities have pointed to the importance of having this type of practical definition when public policy solutions are required[3].

Criteria for Causality

Several criteria drawing on multiple lines of evidence need to exist to support the conclusion that causality exists. In the 1960s, a set of principles for determining causality call the "Hill criteria" emerged and were widely accepted. Since then, thinking about criteria for causality have been refined and evolved (Table 1)[4,5,6,7,8,9,10,11].

[3] Parascandola M, Weed DL. Causation in epidemiology. J Epidemiol Community Health. 2001 Dec;55(12):905-12.
[4] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.
[5] Susser MW. What is a cause and how do we know one? A grammar for pragmatic epidemiology. Am J Epidemiolg 1991; 133:635-648.
[6] Samet JM, Bodurow CC. Improving the presumptive disability decision-making process for Veterans. Committee on evaluation of the presumptive disability decision-making process for Veterans. Institute of Medicine. 2007 Aug;789p.
[7] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Human & Experimental Toxicology 2005;24:161-201.
[8] Hill AB. The environment and disease: association or causation? Proceedings of the Royal Society of Medicine. 1965;58:295-300.
[9] Lynch RM, Henifin MS. Causation in occupational disease: Balancing epidemiology, law and manufacturer conduct. Risk: Health & Environment. Summer 1998;259-270.
[10] Ward JD, Donal KJ. Statements of Principles: evidence-based compensation for Australian Veterans and serving defence personnel. ADF Health. 2004;5:89-93.
[11] Kaldor J. Critical appraisal and causal inference. In: Proceedings of the 2008 Repatriation Medical Authority Forum, Canberra, Australia. 2008;45-56.

Table 1. Criteria for Causality.

Epidemiological evidence:

- *Temporality*: Exposure to the exposure factor precedes onset of the health condition.
- *Numerical strength*: Statistical measures of association such as relative risk and odds ratios are sufficiently strong. When assessing causation, statistics based on *incidence* provide a better estimate of risk than *prevalence* where disease duration is combined with risk.
- *Lack of confounding:* Whether any other exposure factor explains the association.
- *Presence of dose-response:* Whether more people have the health condition when exposed to more of the exposure factor.
- *Specificity*: Whether the exposure factor causes only the health effect. Lack of specificity does not rule out causality.
- *Experimental control*: Whether randomized controlled trials and other types of direct evidence show that exposure to the factor causes the health condition. This type of evidence also rules out *reverse causality* where the health condition causes the exposure factor. Experimental control evidence is rarely available for Veterans' entitlement questions, for obvious reasons.

***Existing knowledge*:**

- *Coherence:* Whether causality fits with existing theory.
- *Biological and mechanistic plausibility*: Whether it makes sense biologically that the exposure factor could cause the health condition. This type of evidence comes from clinical, laboratory and animal research.

Strength of evidence:

- *Quality, Quantity and Consistency*: The degree to which studies are methodologically sound and adequately control for chance, bias and confounding, and expert opinion is well informed, qualified, reliable and credible. A sufficient number of good quality studies support rather than refute causality.

3d. Risk Factors

Risk factor can have two meanings: a factor *associated* with increased probability of an outcome but not necessarily causal[12]; or a factor that *causes* the increased probability of an outcome, also called a *determinant*[13,14]. The term "risk factor" is loosely used and often it is not clear whether there is sufficient evidence for a causal relationship. The criteria for causation described above can be used to differentiate between these meanings.

4. Epidemiological Studies

Different health study designs generally lie on a hierarchy of evidence for causality based on causality criteria (section 3b), from strongest to most limited:

[12] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.
[13] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.
[14] Porta M. A Dictionary of Epidemiology, 5th Edition. Edited for the International Epidemiological Association. Oxford University Press, 2008.

1. Randomized controlled trial (RCT).
2. Cohort study.
3. Case-control study.
4. Multiple time series of cross-sectional studies.
5. Individual cross-sectional study.

4a. Randomized Controlled Trial

Randomized controlled trials meet the most criteria for causality. Subjects are followed over time to establish temporality. The RCT design allows measures of risk using *incidence* (new cases in a population over a defined period). The experimental nature of RCTs allows for several levels of exposure to the factors of interest, and evaluation of a treatment or other intervention. The quality of a RCT is assessed by looking at eligibility criteria (whether the findings generalize to the Veteran population of interest); the use of appropriate statistics to eliminate chance as responsible for the association; and the limitation of bias through the use of blind controls and placebos, minimal loss to follow-up, and random selection from the eligible subjects to ensure similarity between the treated and control groups.

4b. Cohort Study

Cohort studies account for fewer criteria for causality than RCTs. Subjects are followed over longitudinally over time to establish temporality, and this design allows measures of risk using *incidence* (new cases in a population over a defined period). The design often includes several levels of exposure to the factors of interest. The quality of a cohort study is assessed by looking at the eligibility criteria (does this generalize to the Veteran population of interest?); the use of appropriate statistics to eliminate chance as being responsible for the association; design that limits bias through the use of minimal loss to follow-up; and measures of confounders (age, sex, socio-economic status, smoking) to ensure similarity between the groups of differing exposures.

4c. Case-Control Study

Case-control studies meet even fewer criteria for causality. This design is not the best for establishing temporality, since it provides a retrospective history of exposure to the factors of interest. The selection of cases determines whether a case-control study measures *prevalence* (existing cases in a population at a point in time), or *incidence* (new cases in a population over a defined period). The quality of a case-control study is assessed by looking at the eligibility criteria for both cases and controls (Are they the same? Do both cases and controls generalize to the Veteran population of interest?); the use of appropriate statistics to eliminate chance as responsible for the association; design that limits bias through the use of blind controls; addressing recall bias since the exposure is retrospective; and measures of confounders (e.g., age, sex, socio-economic status, or smoking) to ensure similarity between the groups of differing outcomes. In spite of this design's short-comings, it is appropriate for rare conditions, chronic diseases and other long term effects of exposure to the factors of interest. Case-control studies are often used to study cancer; if cases are selected from a suitable cancer registry, this will allow the study to measure risk as incidence, which is more useful than prevalence in understanding causation.

4d. Cross-Sectional Study

Cross-sectional studies, by far the most common type of epidemiological study, meet the least criteria for causality. This design does not establish temporality, but provides a snapshot in time.

A series of cross-section studies conducted over time can provide some indication of temporality but not proof. This design measures *prevalence* (existing cases in a population at a point in time), which is a measure of burden, not risk. The quality of a cross-sectional study is assessed by looking at the eligibility criteria and measures of confounders (whether the findings generalize to the Veteran population of interest), and the use of appropriate statistical methods to eliminate chance as responsible for the association.

5. Dealing with Uncertainty in Health-Related Expert Opinion and Scientific Evidence

Consider the fictitious finding of a statistical association where more people with cigarette-stained fingers had lung cancer than those with unstained fingers. Does this mean that staining of fingers by cigarette smoke causes lung cancer? Or does it mean that the association is not causal, occurring instead merely as a result of bias, chance, or confounding?

When decision-makers are uncertain about a question related to disability benefit entitlement or assessment, they can turn to advisors to help clarify a body of expert opinion and scientific evidence. The expert advisor contributes a review of health-related expert opinion and scientific evidence to the process, but does not make the final decision.

5a. The "Q-4As" Model

A solution common to Veterans' and workers' compensation agencies in Canada and around the world has been developed to deal with uncertainty. Standard approaches encourage standard practices for conducting reviews of bodies of health-related expert opinion and scientific evidence, and using language for expert advisors to communicate subjective judgements about the strength of evidence and certainty of opinion. There are five steps in the process of dealing with uncertainty in expert opinion and scientific evidence[15]:

1. *Question:* The VAC decision-maker frames a question (adjudication, policy or program development) about disability benefit entitlement or assessment and communicates it to the expert. The decision-maker and expert might work together to refine the question.
2. *Acquire*: The expert gathers a body of health-related expert opinion and scientific evidence relevant to the question. The expert decides how much and what type of evidence is necessary for them to draw a conclusion and form their opinion.
3. *Assess*: The expert weighs the strength of evidence using standard principles of epidemiology and evidence review.
4. *Adapt*: The expert draws conclusions to form an opinion sufficient to answer the question, makes a subjective judgement about the strength of evidence and degree of certainty, and then communicates this opinion to the VAC decision-maker.
5. *Apply*: The VAC decision-maker considers all the evidence and makes the decision. The decision-maker can consult the advisor during this stage if clarification about the nature of health-related expert opinion and scientific evidence is required.

[15] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.

5b. Question: Clarify the Question

The advisor is asked for their opinion about conclusions that can be drawn from a body of health-related expert opinion and scientific evidence relevant to a question, and the degree of certainty. Typical disability benefit entitlement questions posed to advisors deal with *causation, exposure* and *latency*. In some cases the question posed might deal with only a narrow aspect, such as whether factor A causes condition B, or whether a person was exposed sufficiently to factor A to have caused condition B. In other cases the question might be more comprehensive, such as whether this person's condition B was caused by exposure to factor A.

Getting the question clear is the first step. In routine adjudication cases, questions might follow standard formats and usually require no clarification. For complex questions that are not routine, and for supporting decision-making tools like the Entitlement Eligibility Guidelines and the Tables of Disabilities, and for policy and program development, it might be necessary to revisit the question both before and during the work.

5c. Acquire: Search for Expert Opinion and Scientific Evidence

The kind and amount of evidence that will be acquired depends on the nature and context of the question, and the expert's own familiarity with the related field.

Expert opinion. If expert opinion is required for the task, options range from verbally checking with an expert in the field, to searching for published expert opinions from agencies like the U.S. Institute of Medicine Committees, specialty associations, or scientific panels at workers' compensation boards.

Scientific evidence usually is confined to peer-reviewed publications in credible scientific journals and credible textbooks based on such literature. In rapidly advancing fields, textbooks can be out of date by several years at publication. Scientific papers include reports of single studies, or meta-analyses and critical reviews of multiple studies.

Search methods. In most routine case-by-case decision-making methods for searching for expert opinion and scientific evidence might be very limited. Questions that are less routine questions or have broach program and policy implications might require more formal and exhaustive approaches. Systematic searches for expert opinion and scientific evidence have the following characteristics[16]:

- *Goal*. The goal should fit the question.
- *Inclusion criteria*: Depending on the task, searches might be limited to peer-reviewed papers published in credible journals, and to formally developed, reviewed and published expert consensus opinions from credible organizations.
- *Exclusion criteria*: Searches might for example exclude websites that lack credibility and reliability, outdated textbooks, and unpublished manuscripts.
- *Search strategy*: Searches can include checking local reference collections, conducting computer-assisted searches opportunistically or systematically, or engaging a professional librarian. Search strategies can be opportunistic or exhaustive. Search strategies can include checking current textbooks, one-time literature searches using an

[16] Liberati A et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Ann Int Med. 2009.

online citation database, or a step-wise methodology, depending on the nature of the question posed and availability of evidence.

5d. Assess: Evaluate the Evidence

The next step is to assess each piece of evidence individually for both findings and strength of evidence. A body of evidence might include several individual studies, one or more published literature reviews, and various forms of expert opinion. There are important quality considerations to consider for each.

5d1. Evaluating Individual Studies

Evaluating a body of health-related expert opinion and scientific evidence begins by reviewing each piece of evidence separately. This is not always necessary when sound alternative approaches are available, such when a good literature review is available, or when the expert is very familiar with the subject.

The goal is to evaluate the strength of evidence represented by the study. Reviewers evaluate the key elements of *relevance*, *study design*, and *quality*[17] and, for causality questions, *strength of association*[18].

Relevance:

Are the study's research questions relevant to the question posed to the expert? The review begins with determining the relevance of the study to the question posed. Sometimes a title or abstract might suggest that the study is relevant, but closer reading shows this is not the case.

How were outcomes and exposures measured? Were they relevant to the research questions? In many epidemiological studies, exposure to a factor of interest is assessed by self-report or proxy, rather than direct measures. Strong studies use direct, quantified measures of both outcomes and exposures that are relevant to the study's research questions.

Do the eligibility (inclusion and exclusion) criteria allow for generalization to the Veteran population of interest? The study would be less relevant to the question asked of the expert if it was done on a different population, so the findings would be less likely to apply to the question.

Study Design:

What study design was used? Understanding the quality of the study is different for each study design (section 4d). For the question of causation being asked, the design has important implications. The RCT design rarely can be used to establish causation, since it is unethical to deliberately expose subjects to suspected hazards. The case-control design is most useful for questions of causation if incidence is measured, and the exposure to the hypothesized factor is more frequent among cases than controls when other factors are held constant[19]. The cross-

[17] GRADE Working Group. Grading quality of evidence and strength of recommendations. BMJ. 2004 Jun 19;328:8 p.
[18] Kaldor J. Critical appraisal and causal inference. In: Proceedings of the 2008 Repatriation Medical Authority Forum, Canberra, Australia. 2008;45-56.
[19] Evans AS. Causation and disease: The Henle-Koch postulates revisited. Yale J Biol Med 1976; 49:175-195.

sectional design can be used to generate hypotheses for causality based on the criteria in Table 1 if the prevalence of disease is higher among those exposed to the hypothesized cause than in those not exposed.

Study Quality:

Was there good control for bias? Bias is systematic error introduced into study. For example, do the eligibility criteria introduce selection bias? There are many other types of bias to consider.

Was there good control for chance? Appropriate statistical methods control for chance. Statistics calculate the probability (*P* value) that the results observed by the study could have occurred by chance under the null hypothesis of "no difference". Statistical significance is often designated by $P < 0.05$ in many studies. Alternately, the precision of clinically relevant rates are designated by the *95% confidence interval* that estimates the 95% probability that the true value of the rate is contained within the interval's range.

Was there good control for confounding? Good studies take into account other potential factors that could explain the association between outcomes and exposure to a factor. Were measures for outcomes and exposures used that account for confounding? Studies that use modeling analysis to account for the influence of many variables at the same time are better able to control for confounding than studies that describe a list of variables one at a time.

Were the study's conclusions supported by the findings? Problems can arise if the authors use a study design that was limited for the conclusions they drew.

Strength of Association:

If a statistically significant association was detected, what was the strength of association between exposure and outcome? This is usually calculated as a statistic generated by regression modelling that controls for confounding variables. The two most common are *relative risk* and *odds ratio*[20].

Relative risk (RR) is the ratio of the risk of disease among the exposed to the risk among the unexposed. RR is calculated for RCT and cohort studies using incidence of disease, and calculated for cross-sectional studies using prevalence of disease. It is not calculated for case-control studies.

Odds ratio (OR) is the ratio of two odds, usually generated by a logistical regression model. Use of OR is most appropriate when calculated for case-control studies of a rare outcome, where the odds of exposure in cases compared to controls is an approximate estimate of the RR. For cohort and cross-sectional studies the OR is difficult to interpret, in part since it may be calculated using odds of exposure, disease or prevalence.

Risk Factor does not provide information on the strength of association, or the criteria considered for causality. Generally, risk factors based on incidence are more likely to be causal factors than those based on prevalence.

[20] Porta M. A Dictionary of Epidemiology, 5th Edition. Edited for the International Epidemiological Association. Oxford University Press, 2008.

5d2. Evaluating Multiple Studies

When several research studies are applicable to the question, the expert advisor pools the information from all of them. Most methods for evaluating the strength of a body of expert opinion and scientific evidence for questions of causality consider the *relevance* of the evidence to the question and the *quality, quantity and consistency* of the evidence[21,22,23]

Relevance refers to the degree to which the studies pertain to the question.

Quality of individual studies is evaluated as described in section 5d1.

Quantity refers to the number of research studies available. For example, multiple high quality studies add to the strength of evidence, while a few low quality studies may indicate insufficient evidence. There is no magic metric for evaluating quantity in making a judgement about causality and strength of evidence.

Consistency refers to the degree to which the findings or opinions in a body of evidence are similar. In the case of scientific evidence, consistency refers to the degree of conformity between the findings of studies conducted by different investigators under different circumstances. Say there are six papers applicable to a causality question, where the first step is to determine whether there is an association. Two report relative risks below 1 (exposure to the factor appears protective), one reports a relative risk of about 1 (exposure to the factor appears not associated with the outcome), and three reports relative risks above 1 (exposure to the factor appears hazardous). This suggests a degree of inconsistency in the evidence about association. However, the advisor might assign more weight to the finding of hazardous risk if the three studies finding a relative risk above 1 were of much higher quality than the studies finding no association or a protective association.

Quality, quantity and consistency all need to be considered together, not in isolation. Finding RR or OR exceeding 1 is not in itself sufficient evidence of causality. It is important to consider effect size (the degree to which 1 was exceeded), the quality of the studies that produced the measures (section 5d1), and other criteria of causality (Table 1).

The principles of evaluating the quality of literature reviews (section 5d3) apply to conducting reviews of multiple studies. Advisors rarely need to conduct comprehensive reviews that strictly follow those principles.

5d3. Evaluating Critical Reviews

There are principles for evaluating published critical reviews of a body of scientific evidence. High quality reviews use systematic methods to gather, weigh, analyse and synthesize scientific evidence, and make statements about strength of evidence. The U.S. Institute of Medicine (IOM) committees produce such reports on a variety of issues related to Veterans' health issues.

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[21] GRADE Working Group. Grading quality of evidence and strength of recommendations. BMJ. 2004 Jun 19;328:8 p

[22] Agency for Healthcare Research and Quality. Systems to rate the strength of scientific evidence. US Department of Health and Human Services. Evidence Report/Technology Assessment Number 47.

[23] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.

There are two broad types of critical reviews: meta-analyses and literature reviews. Meta-analysis combines statistical data from several studies to perform a new analysis. Literature reviews evaluate a body of publications.

Literature Reviews

Like epidemiological studies, literature reviews range in the strength of evidence they represent. Reviews can be limited by the way they were conducted, even if there are strong research publications for the authors to review. Literature reviews that opportunistically gather studies and review them using a narrative methodology are more limited evidence than reviews that are conducted and analyzed using a more rigorous methodology.

These are the types of questions to ask in evaluating the strength of a literature review for questions of causality[24,25]:

1. What were the research questions? Were they relevant to the question posed to the expert and to the objectives of the literature reviewers?
2. What was the search strategy and how rigorous was it? Were inclusion and exclusion criteria specified? Was a computer search method used? Was the search exhaustive and systematic, or opportunistic? What supplementary search methods used?
3. Was a systematic approach used to evaluate studies and weigh and grade them? Were the principles of evaluating individual studies adhered to systematically? Were appropriate metrics used to quantify findings? Were the findings presented in a systematic and transparent manner?
4. Was a systematic approach used to synthesize the body of evidence? Were alternative conclusions considered?
5. Was the methodology replicable?
6. Were the conclusions supported by the findings?
7. Was a statement of strength of evidence and degree of certainty provided?
8. Was potential conflict of interest disclosed?

Meta-Analyses

In meta-analysis, researchers use statistical methods to pool findings from multiple similar studies. Individual studies might have small sample sizes, for example. While this might seem to be a compelling way to overcome limitations in small studies, for example when a particular health condition or exposure is rare, meta-analyses are subject to all the limitations of the individual studies, and to problems inherent in combining heterogeneous studies that have a variety of different problems controlling for chance, bias and confounding, and have varying relevance[26]. There are specialized techniques for evaluating the quality of meta-analyses[27].

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[24] Agency for Healthcare Research and Quality. Systems to rate the strength of scientific evidence. US Department of Health and Human Services. Evidence Report/Technology Assessment Number 47.
[25] Mullen PD, Ramírez G. The promise and pitfalls of systematic reviews. Annu Rev Public Health. 2006;27:81-102.
[26] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.
[27] The Cochrane Collaboration. Systematic reviews: CRD's guidance for undertaking reviews in health care. Centre for Reviews and Dissemination, Published by CRD, University of York, 2009;294 p. Cochrane Handbook for Systematic Reviews of Interventions 4.2.6. Updated September 2006;257 p.

5d4. Evaluating Expert Opinion

In questions of causality, exposure and latency, an expert sometimes has to weigh the opinions of other experts. For example, expert committees and textbook authors typically use qualitative judgement categories to communicate their evaluation of the strength of evidence for questions of association and causality. Risk factors listed in textbooks are qualitative judgements about whether a factor might cause a disorder. An individual expert like a client's health care practitioner might submit an opinion about causality, exposure or latency. While another expert can independently evaluate the scientific evidence considered by such experts, he or she cannot know exactly how they arrived at these judgements.

The weight that can be assigned to expert opinion varies considerably. The opinion of a client's physician might be based only on personal experience, at best citing only one or two "cherry-picked" references supporting the opinion. This opinion would have much lower weight than the consensus opinion of a formally convened panel of independent experts who used standard procedures to acquire, analyze and synthesize a body of evidence.

Judgements about expert opinion consider *relevance, credibility, reasonableness* and *reliability*[28].

- *Relevance* refers to whether the opinion answers the question posed and applies to the person's claim, or the population of interest.
- *Credibility* refers to the believability and plausibility of the expert's *opinion*, not the *person*. Credibility is judged for example by considering whether the opinion fits with other proven facts, and by assessing the scientific and other evidence considered by the expert.
- *Reasonableness* refers to the quality of being rational and having sound thinking and judgement.
- *Reliability* refers to the quality of being reliable, meaning trustworthiness and dependability. Reliability is judged by:
    a. Credibility and reasonableness;
    b. Whether evidence was given in a setting allowing questioning of the expert, like a hearing or a peer-reviewed publication process; and
    c. Assessment of the expert's objectivity, potential conflicts of interest, and degree of authority, (expertise, qualifications, special skill and knowledge).

5e. Adapt: Synthesize the Evidence and Communicate Opinion

In this stage, the expert adapts the evidence review to the decision maker's context, and communicates their opinion in language the decision-maker can use.

Synthesis is the process of distilling the analysis to draw a conclusion from available expert opinion and scientific evidence in response to the question, and to make a subjective judgement about the weight of evidence and degree of certainty[29,30].

[28]Toombs. Legislative Framework, Adjudication: Disability pension/award program. VAC Legal Services, Charlottetown. 08 May 2007;12 p.
[29] Guzelian PS, Victoroff MS, Halmes NC, James RC, Guzelian CP. Evidence-based toxicology: a comprehensive framework for causation. Hum Exp Toxicol. 2005 Apr;24(4):161-201.

The first step is to determine whether there is a statistical association between a factor and a health outcome, using the principles described in section 5d. The second step, depending on the question posed by the decision-maker, is to determine whether there is sufficient evidence for causality (Table 1, section 3b), or sufficient degree of exposure, or appropriate latency.

5e1. Subjective Judgements about Strength of Evidence and Degree of Certainty

Synthesis includes communicating degree of certainty about the conclusion in a manner that can be understood by VAC decision-makers, either for case-by-case claims adjudication, or for development of policies and programs. When dealing with questions of causality, the expert makes a *subjective judgement* about degree of certainty based on accumulation of criteria for causality.

At VAC, the subjective judgement categories shown in Table 2 are used to characterize the strength of health-related expert opinion and scientific evidence and certainty of conclusions about causality between a factor and a health condition[31,32]. These categories allow the author to express his conclusions and opinion in a way that makes sense to VAC decision-makers.

My opinion is not binding on the decision-maker.

Table 2. Categories of strength of evidence and degrees of certainty.

1. *More probable than not or greater that causality exists.*
   Health-related expert opinion and scientific evidence supports causality with a degree of certainty of more probable than not or greater.

2. *At least as likely as not that causality exists.*
   On balance, health-related expert opinion and scientific evidence is equally for and against causality and it cannot be determined which is stronger.

3. *Insufficient to support causality.*
   Health-related expert opinion and scientific evidence is not sufficient to conclude that causality exists without speculating; possible but not probable.

4. *More probable than not that causality does not exist.*
   Health-related expert opinion and scientific evidence supports the lack of causality with a degree of certainty of more probable than not or greater.

(Source: VAC Policy "Assessing and Categorizing Health-Related Expert Opinion and Scientific Evidence" 2012)

5e2. Background to the Four Categories

Principles for evaluating the strength and use of scientific evidence in decision-making have been evolving for more than 100 years. Since the 1950s, experts have used a variety of

[30] Samet JM, Bodurow CC. Improving the presumptive disability decision-making process for Veterans. Committee on evaluation of the presumptive disability decision-making process for Veterans. Institute of Medicine. 2007 Aug;789p.
[31] VAC Policy "*Assessing and Categorizing Health-Related Expert Opinion and Scientific Evidence"* 2012.
[32] VAC Policy "*Hazardous Material and Radiation Exposure*" 2012.

subjective categories for conveying strength of evidence and degree of certainty for questions of both causality and the efficacy and safety of interventions[33].

United States. In the U.S., the 1994 U.S. Institute of Medicine (IOM) "Veterans and Agent Orange" Committee used four categories of strength of evidence for association. Since then, more thinking has clarified that the question is about causation, not mere association. Subsequent IOM Committees have increasingly considered causality. The 2004 U.S. Surgeon General's report on smoking and 2006 IOM Committee on asbestos used four categories describing strength of evidence for causal relationships, not association. The 2007 IOM Committee on Veterans' presumptive disability benefit entitlement decision-making conducted a comprehensive review and concluded by consensus that four categories should be used to convey judgements about strength of evidence and degree of certainty for causation in questions of Veterans' disability questions. The Committee recommended that "equipoise" (at least as likely as not) be used as the threshold of evidence to infer causality and resolve reasonable doubt in favour of an applicant for this purpose.

Australia. In Australia, the Repatriation Medical Authority (RMA) establishes Statements of Principle that bind decision-makers. The Australian RMA uses two standards for two different types of Statements of Principles used by DVA entitlement adjudicators. Their "reasonable hypothesis" SOPs are used for operational and hazardous duty and have a lower threshold than the SOPs used for other types of service, which are based explicitly on balance of probability ("more probable than not")[34]. Their "reasonable hypothesis" legal standard is approximately equivalent to our "at least as likely as not". The legal meaning of "hypothesis" is not synonymous with the scientific meaning, and clarification of "reasonable hypothesis" occurred over several cases heard in Australia's federal courts. The test for reasonable hypothesis is that the evidence "indicates" that the hypothesis is true. "Indicate" is not the same as conclusive proof, allowing generous latitude in judgement. Under Australian law, to be "reasonable" in this instance means there must be something pointing to the hypothesis which appears to be true, using all the available evidence together.

Canada. In Canada, the categories shown in Table 2 correlate with legal standards of evidence that range from higher to lower degrees of certainty:

- Criminal law: beyond reasonable doubt.
- Civil law: more probable than not.
- Lower threshold: at least as likely as not.

Canadian Veterans' legislation allows finding in favour of an applicant when it is *at least as likely as not* that a service activity caused the health condition after considering all the evidence together. Canada does not have two evidentiary thresholds, instead recognizing hazardous duty by allowing for health conditions to have arisen in special duty service without requiring they be caused by service activities (the insurance principle versus the compensation principle).

[33] Samet JM, Bodurow CC. Improving the presumptive disability decision-making process for Veterans. Committee on evaluation of the presumptive disability decision-making process for Veterans. Institute of Medicine. 2007 Aug;789p

[34] Ward JD, Donal KJ. Statements of Principles: evidence-based compensation for Australian Veterans and serving defence personnel. ADF Health. 2004;5:89-93.

5f. Apply: Make a Decision

A VAC decision-maker adjudicates a claim for entitlement, not me. My opinion contributes to the evidence that may be considered by a decision-maker in a given client's case or when formulating policy. My opinion does not decide questions; rather my opinion is only one of the pieces of evidence considered by a VAC decision-maker.

Exposure Reference Guide for Adjudicating Exposure Claims

Contents

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Agent Orange and other Unregistered US Military Herbicides

Veterans Affairs Canada grants entitlement to conditions associated with Agent Orange exposure following the VAC Agent Orange Policy: Exposure to Agent Orange and Other Unregistered US Military Herbicides. Only conditions listed in the policy are granted entitlement. Any other conditions are declined entitlement based on exposure to Agent Orange.

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of Agent Orange exposure claims.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

Preamble

From 1962 to 1971, the U.S. military sprayed herbicides over Vietnam to strip the thick jungle canopy. Canadian military served in Vietnam during this time, mostly as members of the International Commission for Control and Supervision. Mixtures of **2,4-D** (2,4-dichlorophenoxyacetic acid), **2,4,5-T** (2,4,5-trichlorophenoxyacetic acid) , picloram, and cacodylic acid (collectively, the "chemicals of interest" or COIs) made up the bulk of the herbicides sprayed. Herbicides were identified by the color of a band on 55-gallon shipping containers and were called Agent Pink, Agent Green, Agent Purple, Agent Orange, Agent White, and Agent Blue.

The most-used chemical mixture sprayed was Agent Orange, a 50:50 mixture of 2,4-D and 2,4,5-T. At the time of the spraying, **TCDD** (2,3,7,8-tetrachlorodibenzo*p*-dioxin), the most toxic form of dioxin, was an unintended contaminant generated during the production of 2,4,5-T and so was present in Agent Orange as well as some of the other formulations sprayed in Vietnam. Two different formulations of Agent Orange were used in the course of military operations in Vietnam. All agents were liquid except Agent Blue, which was used in powder form in 1962–1964 and as a liquid in 1964–1971. Agent Pink, Agent Green, Agent Purple, Agent Orange, and Agent Orange II all contained 2,4,5-T and were contaminated to some extent with TCDD. Agent White contained 2,4-D and picloram. Agent Blue (powder and liquid) contained cacodylic acid.

The U.S. Military conducted spray testing of some of these herbicides in CFB Gagetown, New Brunswick in June 1966 and June 1967. In each of these years less than one barrel (55 gallons) was sprayed.

In 1994, the Institute of Medicine (IOM) produced Veterans and Agent Orange: Health Effects of Herbicides Used in Vietnam (1994). This was at the request of the US Congress to investigate a number of chronic conditions that were suspected to be linked to Agent Orange exposure in Vietnam. This document produced a list of conditions with sufficient or limited evidence of association with herbicide exposure.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Veterans Affairs Canada (VAC)'s policy Exposure to Agent Orange and Other Unregistered US Military Herbicides is based on the IOM report of 2012. This policy provides a list of illnesses/medical conditions recognized by VAC as being associated with exposure to Agent Orange and other herbicides for disability benefit purposes.

SDA (Indo-China) which includes service in Vietnam

1. VAC accepts that Veterans who served in Vietnam between January 9, 1962 and May 7, 1975 were exposed to Agent Orange.
2. For disability benefit claims related to service in Vietnam as part of SDA (Indo-China), the applicant must have an illness that VAC accepts as being associated with exposure to Agent Orange.

CFB Gagetown and Other Locations

Review with Disability Consultant prior to entitlement

Herbicide Use in Gagetown:
https://www.canada.ca/en/department-national-defence/corporate/reports-publications/health/use-of-herbicides-at-cfb-gagetown-from-1952-to-present-day.html

1. For disability benefit claims related to exposure outside of Vietnam, e.g., on a US military base or at CFB Gagetown, the applicant must have an illness that VAC accepts as being associated with exposure to Agent Orange (see policy conditions list below), and must provide evidence of exposure.

2. An individual's mere presence at CFB Gagetown from June 14-16, 1966 and/or from June 21-24, 1967, during the testing of unregistered US military herbicides, including Agent Orange, does not constitute exposure that would place an individual at an increased risk for long-term, irreversible health effects.
3. The applicant must provide reasonable evidence of service-related exposure. See Hazardous Material and Radiation Exposure policy.

Review with Disability Consultant prior to entitlement.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Illnesses/Medical Conditions Accepted by VAC as Associated with Agent Orange Exposure

Only those conditions included in the list should be entitled as due to Agent Orange exposure.

VAC recognizes the following illnesses/medical conditions as being associated with exposure to Agent Orange and other herbicides for disability benefit purposes:

a. Acute and Subacute Transient Peripheral Neuropathy

b. AL amyloidosis

c. B cell leukemias (See Annex A)

d. Chloracne

e. Chronic lymphocytic leukemia (CLL)

f. Diabetes Mellitus (Type 2)

g. Hodgkin's Disease

h. Ischemic Heart Disease

i. Multiple Myeloma

j. Non-Hodgkin's Lymphoma (See Annex B)

k. Parkinson's Disease

l. Porphyria Cutanea Tarda

m. Prostate Cancer

n. Respiratory Cancers – includes cancers of the lung, larynx, trachea and bronchus; and/or

o. Soft-Tissue Sarcomas

Hematological cancers, which include leukemias and lymphomas among others, have had changes in name and classification over the years. If a hematological cancer is not listed, Medical Advisory should be consulted for diagnosis verification and possible coverage under the policy.

Note: The following conditions are currently *not* included in the Policy:

Acute Myelogenous Leukemia (AML)

Chronic Myelogenous Leukemia (CML)

Monoclonal Gammopathy of undetermined significance (MGUS), IgM

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Verify Service	**SDA (Indo-China) which includes service in Vietnam** 9 January 1962 – 7 May 1975	**Regular Force** **Reserve Force**
Service Relationship	SDA (Indo-China) which includes service in Vietnam 9 June 1962 – 7 May 1975	Gagetown: • 14-16 June 1966 • 21-24 June 1967 • Review with Disability Consultant
High Risk Posting	SDA (Indo-China) which includes service in Vietnam 9 June 1962 – 7 May 1975	Gagetown: • 14-16 June 1966 • 21-24 June 1967 • Review with Disability Consultant
Entitlement Considerations	For conditions included in VAC Agent Orange policy, Entitle to SDA (Indo-China)	For conditions included in VAC Agent Orange policy, **and** Evidence of hazardous exposure to Agent Orange/ Agent Purple or similar agent, Entitle to Regular/Reserve Force Mere presence at CFB Gagetown is not sufficient.
Diagnosis	Accepted from Medical Practitioner	Accepted from Medical Practitioner
Assessment	Assessment provided by MA	Assessment provided by MA
Consult Medical Advisory	Diagnosis Clarification and/or Assessment Any Hematological Cancers/Malignancies not included In list, Annex A	Diagnosis Clarification and/or Assessment Any Hematological Cancers/Malignancies not included In list, Annex A

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Malignancies of the Hematopoietic and Lymphoid tissues included in Exposure to Agent Orange and Other Unregistered US Military Herbicides

The classification of leukemias and lymphomas has changed over the last few decades. For some specific neoplasms, it is difficult to ascertain whether they are now classified as a lymphoma or a leukemia, even if this term appears in the diagnosis.

The current NAS policy include Hodgkin's disease, non-Hodgkin's lymphoma and chronic B-cell leukemia, including hairy cell leukemia. Chronic lymphocytic leukemia and hairy cell leukemia are now considered to be classified with the lymphomas (therefore included in non-Hodgkin's lymphoma). The reports do not indicate that there is a link between the herbicides studied and leukemia.

Veterans Affairs Canada policy indicates "B cell leukemias" rather than chronic B-cell leukemia. Therefore, acute B-cell leukemia is included, giving the veteran the benefit of the most generous interpretation of the policy.

T-cell leukemias are not included under the VAC policy.

Myeloid leukemias are not included under the VAC policy.

For VAC adjudicative purposes, the policy includes all lymphomas included in Annex A. Any diagnosis indicating "lymphoma" but not included in Annex A should be sent to Medical Advisory for diagnosis clarification **if a hazardous exposure has occurred.**

The following descriptions and lists of conditions are **not** considered to be comprehensive. If the malignancy is indicated to be included, link to significant Agent Orange exposure can be made. For all others, the exact type of malignancy should be ascertained and usual adjudicative practices followed.

Some exclusions to the policy have been listed.

Hodgkin's Disease / Lymphoma (HL)

IC9-201 ICD_10-C81

Included in VAC policy

Non-Hodgkin's Lymphoma (NHL)

ICD-9 200.0–200.8, 202.0–202.2, 202.4, 202.7, 202.8; ICD-10 C82–85, C91.1-91.4

Included in VAC policy

- a general name for malignancies of the lymphatic system other than Hodgkin's Lymphoma (HL) or plasma cell dyscrasias

NHL consists of a large group of lymphomas that includes types of either B-cell or T-cell origin. Both types of lymphoma are included under VAC policy.

B-cell NHL includes Burkitt lymphoma, diffuse large B-cell lymphoma, follicular lymphoma, large-cell lymphoma, precursor B-lymphoblastic lymphoma, and mantle-cell lymphoma.

T-cell NHL includes mycosis fungoides and anaplastic large-cell lymphoma.

Precursor T-lymphoblastic lymphoma is not considered a type of NHL and is considered instead part of T-lymphoblastic lymphoma/leukemia by NAS. It would not be included in the VAC policy.

B cell Leukemias

Included in VAC policy: Leukemias listed under: ICD-9 204 ICD -10 C91

- Leukemia is divided into four primary types: acute and chronic lymphocytic leukemias and acute and chronic myeloid leukemias. B-cell leukemias are in the lymphocytic group.

The National Academy of Sciences, 2018, committee concluded that there is inadequate or insufficient evidence to determine whether there is an association between exposure to the studied herbicides and leukemias in general. An exception is the specific leukemia subtypes of chronic B-cell diseases, including Chronic Lymphocytic Leukemia (CLL) and Hairy Cell Leukemia (HCL), which are more appropriately grouped with lymphomas.

However, the Exposure to Agent Orange and Other Unregistered US Military Herbicides policy indicates the inclusion of “B cell Leukemias”. When applying the VAC policy “Agent Orange and other Unregistered US Military Herbicides” the following diagnoses are considered, for VAC adjudicative purposes, to be included under “B cell Leukemias” :

B cell Acute lymphoblastic/lymphocytic leukemia (B-ALL)

Precursor B lymphoblastic leukemia

B cell prolymphocytic leukemia (Listed with leukemia and NHL)

Chronic lymphocytic leukemia (CLL) (Listed with leukemia and NHL)

Hairy Cell Leukemia HCL) (Listed with leukemia and NHL)

NOT Included: T-cell leukemias, Chronic Myelogenous Leukemia, Acute Myelogenous leukemia

Multiple Myeloma

Included in VAC policy: Multiple Myeloma (ICD-9 203.0; ICD-10 C90.0)

- characterized by a proliferation of bone marrow cells that results in an excess of neoplastic plasma cells and in the production of excess immunoglobulin protein.

Included in VAC policy.

Monocolonal Gammopathy of Undetermined Significance (MGUS). MGUS is a precursor condition of multiple myeloma. An estimated 1% of MGUS cases progress to multiple myeloma each year. *This condition is **not** included in the VAC policy*.

Amyloid Light Chain Amyloidosis

AL amyloidosis is a rare condition that is a complication of multiple myeloma.

Included in VAC policy.

Annex A for Agent Orange

When applying the VAC policy "Agent Orange and other Unregistered US Military Herbicides" the following diagnoses are considered, for VAC adjudicative purposes, to be included under "B cell leukemias" :

Acute lymphoblastic/lymphocytic leukemia (ALL)
B cell prolymphocytic leukemia
Chronic lymphocytic leukemia (CLL)
Hairy cell leukemia
Precursor B lymphoblastic leukemia

Not included: Acute Myelogenous Leukemia (AML)

Chronic Myelogenous Leukemia (CML)

When applying the VAC policy "Agent Orange and other Unregistered US Military Herbicides" the following diagnoses are considered, for VAC adjudicative purposes, to be included under "Non-Hodgkin's Lymphoma" :

Anaplastic large cell lymphoma
B cell prolymphocytic leukemia
B cell prolymphocytic leukemia (B-PLL)
B cell type lymphoma
Burkitt's lymphoma (BL)
Chronic lymphocytic leukemia
Chronic small lymphocytic lymphoma
Diffuse large B cell lymphoma (DLBCL)
Follicular Lymphoma (FL)
Hairy cell leukemia
In situ follicular neoplasia

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Large B cell lymphoma, lymphomatoid granulomatosis type
Lymphomatoid granulomatosis
Lymphoplasmacytic lymphoma (LPL) plus/minus Waldenström macroglobulinemia
MALT Lymphoma (Extranodal marginal zone lymphoma of mucosa-associated lymphoid tissue)
Maltoma see MALT Lymphoma
Mantle cell lymphoma (MCL)
Marginal zone B cell lymphoma (MZL)
Mycosis Fungoides
Precursor B lymphoblastic lymphoma
Small Lymphocytic Lymphoma (SLL)
T cell lymphoma

Not included in NAS listing under NHL:

Precursor T-lymphoblastic lymphoma is not considered a type of NHL and is considered instead part of T-lymphoblastic lymphoma/leukemia, a precursor lymphoid neoplasm included with the broad group of "acute lymphoid leukemias," which can be of either T-cell or B-cell origin

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Amyotrophic Lateral Sclerosis / ALS

Amyotrophic lateral sclerosis (ALS), is a relentlessly progressive, presently incurable, neurodegenerative disorder that causes muscle weakness, disability, and eventually death. ALS initially causes weakness, and then paralysis, of the muscles resulting in difficulty/inability to perform all movements including arm movements, walking, talking, swallowing and breathing.

Entitlement:

VAC policy re ALS - Amyotrophic Lateral Sclerosis (ALS)

This policy indicates the link between rigorous exercise and increased incidence of ALS. Any diagnosis other than Amyotrophic Lateral Sclerosis/ALS is **not** included in this policy. (Primary Lateral Sclerosis (PLS) and Progressive Muscular Atrophy (PMA) have been accepted as variants of ALS for entitlement purposes.)

Assessment:

VAC directive re ALS Effective 2017-01-05. These clients are assessed at 100%. For assessment purposes, the PCT is not applied to the 100% assessment, regardless of other conditions (entitled or nonentitled).

Primary Lateral Sclerosis (PLS) and Progressive Muscular Atrophy (PMA)

Primary Lateral Sclerosis (PLS) and Progressive Muscular Atrophy (PMA) have been accepted as variants of ALS for entitlement purposes.

These conditions can be entitled under the ALS policy but are to be assessed on functional disability level by Medical Advisory. They are **not** assessed automatically at 100%.

In the case where PLS or PMA is initially diagnosed and entitled, and then the clinical picture of ALS arises and the diagnosis is confirmed, the client would also be entitled for ALS and the two conditions would be bracketed for assessment. The assessment would be at 100%.

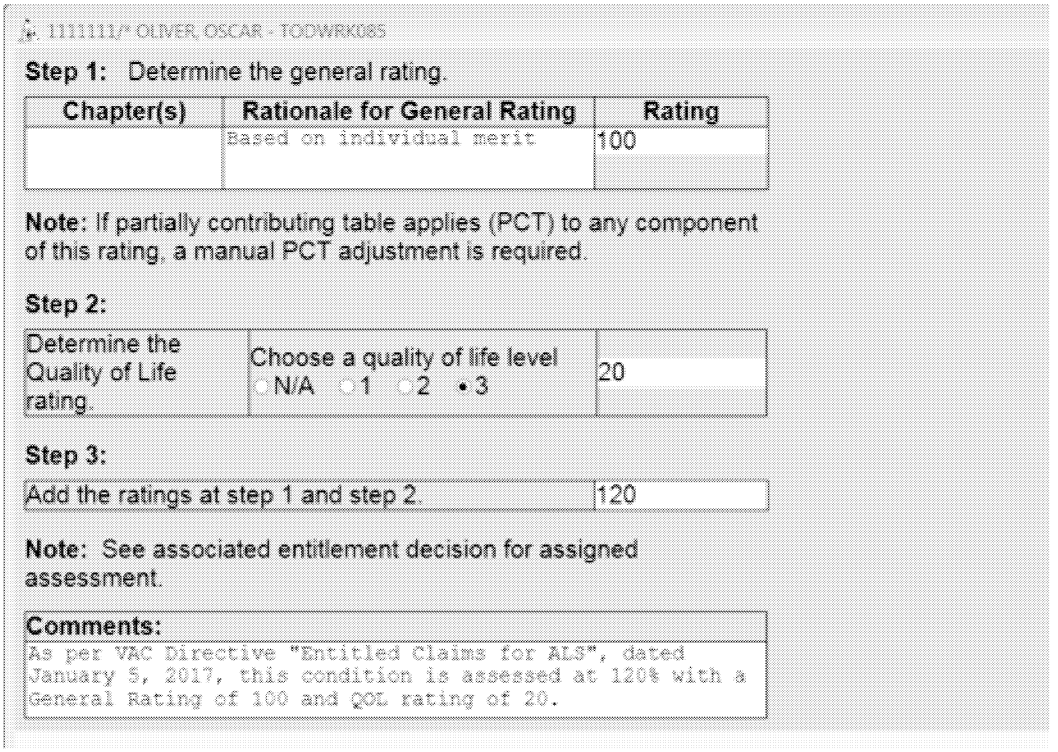
In adjudicating “death due to” claims for PLS and PMA, usual adjudicative practices should be applied.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Verify Service	**Active Force** **Merchant Navy** **Special Duty Area** **Special Duty Operation**	**Regular Force** **Reserve Force**	**RCMP**
Service Relationship	Initial onset or worsening of Signs/symptoms or diagnosis during Active Force Service or SDA/SDO service	Rigours of exercise to maintain level of fitness	Rigours of exercise to maintain level of fitness **Does not include civilian RCMP**
Diagnosis	Accepted from: Neurologist or ALS clinic Any other source: To Medical advisory for diagnostic clarification	Accepted from: Neurologist or ALS clinic Any other source: To Medical advisory for diagnostic clarification	Accepted from: Neurologist or ALS clinic Any other source: To Medical advisory for diagnostic clarification
Entitlement	Entitle to Active Force or SDA/SDO service	Regular/Reserve Force	Entitle to RCMP service
Assessment	**ALS**: Assessment provided by Exposure Adjudicator. See Sample Worksheet Below Diagnosis of either Primary Lateral Sclerosis (**PLS**) or Progressive Muscular Atrophy (**PMA**) to Medical Advisory		
Consult Medical Advisory	Diagnosis Clarification Assessment of Primary Lateral Sclerosis (PLS) and Progressive Muscular Atrophy (PMA)		

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Sample Worksheet for ALS



1111111/^ OLIVER, OSCAR - TODWRK08S

Step 1: Determine the general rating.

Chapter(s)	Rationale for General Rating	Rating
	Based on individual merit	100

Note: If partially contributing table applies (PCT) to any component of this rating, a manual PCT adjustment is required.

Step 2:

Determine the Quality of Life rating.	Choose a quality of life level ○ N/A ○ 1 ○ 2 • 3	20

Step 3:

Add the ratings at step 1 and step 2.	120

Note: See associated entitlement decision for assigned assessment.

Comments:

As per VAC Directive "Entitled Claims for ALS", dated January 5, 2017, this condition is assessed at 120% with a General Rating of 100 and QOL rating of 20.

Amyotrophic Lateral Sclerosis /ALS Variants Medical Directive

Currently, VAC entitles Amyotrophic Lateral Sclerosis under the ALS policy - Amyotrophic Lateral Sclerosis (ALS).

An ALS Medical Directive indicates the method of assessment for the confirmed diagnosis of ALS. **These clients are assessed at 100%.**

Primary Lateral Sclerosis (PLS) and Progressive Muscular Atrophy (PMA) have been accepted as variants of ALS for entitlement purposes.

These conditions can be entitled under the ALS policy but are to be assessed on functional disability level, not automatically at 100%.

In the case where PLS or PMA is initially diagnosed , and entitled, and then the clinical picture of ALS arises and the diagnosis is confirmed, the client would also be entitled for ALS and the two conditions would be bracketed for assessment. The assessment would be at a 100%.

Asbestos

Preamble

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of exposure claims. For many of the listed exposures, information regarding significance of the amount, frequency and duration of an exposure and/or the latency period to the onset of an illness is not included here and should be obtained from other sources as per usual adjudication practices.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

Asbestos

"Asbestos" is the name of a group of minerals that are shaped like long, thin fibers. For many years, asbestos was commonly used in insulation, car brakes, ships, ceiling tiles, fabrics, fireproofing, and many other materials. Since the 1970s, the health risks of asbestos have been known. The use of asbestos was phased out in construction since 1979 but some materials containing asbestos were still used until 1990-12-31.

Asbestos, left undisturbed, is not considered a major health risk. Asbestos fibers are a risk when they are disturbed and become airborne. This can occur with renovation or demolition.

Asbestos exposure is associated with lung diseases and multiple kinds of cancers.

Asbestos exposure can be a chronic, small exposure or a single massive exposure. Malignancies are associated with a smaller exposure than lung diseases. There is a 20-30 year latency period from the inhalation of asbestos fibers to the development of lung disease; the latency period for malignancies is 10-30 years. Exposure at a young age causes increased risk as there is more time for disease to develop. The risk of lung cancer is much higher in smokers than nonsmokers.

Asbestos related cancers

Except for Malignant Mesothelioma of the Pleura[i], includes carcinomas only. For other histological types, refer to Medical Advisory. For more information, see Cancer. The latency period for malignancies is 10-30 years.

Malignant Mesothelioma of the Pleura

(Malignant Mesothelioma of other sites **may** be related to asbestos; all should be referred to Medical Advisory)[ii]

Lung Cancer

Cancer of Larynx

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer of the Pharynx including the posterior one third of the tongue, the soft palate, the side and back walls of the throat and the tonsils.

For Details see Asbestos and Cancer of the Pharynx

Cancer of the Stomach

Cancer of the GE (gastroesophageal) junction(where the esophagus empties into the stomach)

Colorectal Cancer (Colon cancer, Rectal cancer) Note: Does not include small bowel: duodenum, jejunum or ileum. Cancer of the appendix: Refer to Medical Advisory

Cancer of the Ovary

Asbestos related Interstitial Lung diseases (nonmalignant)

***There is a 20-30 year latency period from the inhalation of asbestos fibers to the development of lung disease.**

Note: Interstitial Lung Disease is an umbrella term used for a large group of diseases that cause scarring /fibrosis of the lungs. It is not a specific diagnosis and is not acceptable for VAC adjudication purposes.

Asbestosis

Pulmonary Fibrosis

Interstitial Fibrosis

Asbestosis: Asbestosis specifically refers to the slowly progressive, diffuse pulmonary fibrosis caused by inhalation of asbestos fibers. The definitive diagnosis of asbestosis is based on a lung biopsy, but this is rarely obtained. There are characteristic findings on HRCT (high-resolution CAT scan) of the lungs which are more characteristic of asbestosis than other types of fibrosis. These include honeycombing, pleural plaques and rounded atelectasis. However, asbestosis on **HRCT** can have many appearances.

For VAC adjudication purposes, if it is determined that the client has had a significant asbestos exposure, the diagnosis of Pulmonary Fibrosis / Interstitial Fibrosis / Interstitial Pulmonary Fibrosis can be accepted as due to asbestos exposure **if** there is no other causative factor as confirmed by a respirologist. The diagnosis is not changed to Asbestosis. If the attending respirologist indicates a specific cause other than asbestos, refer to Medical Advisory.

The diagnosis of Asbestosis / Pulmonary Fibrosis / Interstitial Fibrosis is best provided by a respirologist with supporting investigative findings from HRCT. In some cases, it can be accepted from a general practitioner with supporting evidence that includes HRCT scan of the chest.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Asbestos Related Pleural Disease (nonmalignant)

This group of conditions includes asbestos related: pleural plaques, pleural effusion, diffuse pleural thickening and fibrothorax. When entitled due to asbestos exposure, the best diagnosis for VAC adjudicative purposes is **Asbestos Related Pleural Disease**. This condition includes all listed conditions.

Pleural Plaques: Pleural plaques are distinctive, smooth, white, raised lesions on the pleural surface. Plaques may be calcified. The diagnosis can be made on plain chest X-ray or CT scan. Generally pleural plaques do not cause any disability but large plaques/diffuse pleural thickening can cause some restrictive disease (fibrothorax) as seen on Pulmonary Function Tests (PFT's).

The presence of Pleural Plaques / Asbestos Related Pleural Disease does **not** confirm the diagnosis of Asbestosis. Claims are often submitted as "Asbestosis" when there is evidence of pulmonary plaques or other pleural diseases but no evidence of fibrosis of the lung tissue. Medical Advisory should be consulted in these cases to establish the correct diagnosis.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Conditions NOT related to asbestos exposure

COPD (Chronic Obstructive Pulmonary Disease) There is insufficient information in the literature to indicate that there is a causal relationship between asbestos exposure and the development of COPD.

Renal Cancer: For VAC entitlement purposes, as of 2017-03-07 Renal Cancer is no longer included in the list of cancers related to asbestos.[2]

Esophageal cancer, other than cancer of the gastroesophageal junction (where the esophagus empties into the stomach), is not related to asbestos exposure. If unsure, consult Medical Advisory.

Verify Service	**Active Force Merchant Navy Special Duty Area Special Duty Operations**	**Regular Force Reserve Force**	**RCMP**
Service Relationship	• World War II (WII) service in Europe, Africa or Asia • Korean War service if transported to Korea by ship • Navy service on a ship built prior to 1971 and/or no asbestos refit • Merchant Navy • Lancaster bomber service • Indoor firefighter • Fire inspector • High risk trade **See table below for list of occupations identified as confirmed or probable exposure to asbestos while in the performance of duty.	• Navy service on a ship built prior to 1971 and/or no asbestos refit • Memo to file Re: asbestos exposure • High risk trade • Indoor firefighter • Fire inspector **See table below for list of occupations identified as confirmed or probable exposure to asbestos while in the performance of duty.	• Memo to file Re: asbestos exposure • Working in the Mulock Building 1970s to March 1996 • Marine Branch service on a ship built prior to 1971 and/or no asbestos refit • Fire inspector • High risk job duties **See table below for list of occupations identified as confirmed or probable exposure to asbestos while in the performance of duty.
Diagnosis	Asbestosis Pulmonary Fibrosis/Interstitial Fibrosis indicated to be due to asbestos exposure • Accepted from a respirologist; accepted from other appropriate Medical Practitioners with supporting HRCT . In those not meeting this criteria, refer to Medical Advisory. Asbestos-Related Pleural Diseases: (Pleural Plaques) • Accepted from appropriate Medical Practitioners with supporting investigative findings (Chest X-Ray, CT scan). Cancer: • Accepted from an oncologist; accepted from other appropriate Medical Practitioners with supporting pathology report.	Asbestosis Pulmonary Fibrosis/Interstitial Fibrosis indicated to be due to asbestos exposure • Accepted from a respirologist; accepted from other appropriate Medical Practitioners with supporting HRCT . In those not meeting this criteria, refer to Medical Advisory. Asbestos-Related Pleural Diseases: (Pleural Plaques) • Accepted from appropriate Medical Practitioners with supporting investigative findings (Chest X-Ray, CT scan). Cancer:	Asbestosis Pulmonary Fibrosis/Interstitial Fibrosis indicated to be due to asbestos exposure • Accepted from a respirologist; accepted from other appropriate Medical Practitioners with supporting HRCT . In those not meeting this criteria, refer to Medical Advisory. Asbestos-Related Pleural Diseases: (Pleural Plaques) • Accepted from appropriate Medical Practitioners with supporting investigative findings (Chest X-Ray, CT scan). Cancer: • Accepted from an oncologist; accepted from other appropriate Medical Practitioners with supporting pathology report. See list for Cancers Related to Asbestos Exposure

	See list for Cancers Related to Asbestos Exposure	• Accepted from an oncologist; accepted from other appropriate Medical Practitioners with supporting pathology report. See list for Cancers Related to Asbestos Exposure	
Assessment	• Provided by Medical Advisory. • Cardiorespiratory Medical Questionnaire and **full** PFTs with all values required for lung conditions. • Malignant Questionnaire and system specific medical questionnaire(s) required for cancer. Full PFTs preferred for lung cancer.	• Provided by Medical Advisory. • Cardiorespiratory Medical Questionnaire and **full** PFTs with all values required for lung conditions. • Malignant Questionnaire and system specific medical questionnaire(s) required for cancer. Full PFTs preferred for lung cancer.	• Provided by Medical Advisory. • Cardiorespiratory Medical Questionnaire and **full** PFTs with all values required for lung conditions. • Malignant Questionnaire and system specific medical questionnaire(s) required for cancer. Full PFTs preferred for lung cancer.
Consult Medical Advisory	• Further guidance required regarding the diagnosis and/or entitlement. • For assessment. • Diagnosis Asbestosis / Pulmonary Fibrosis / Interstitial Fibrosis • Diagnosis of stand-alone pleural effusion	• Further guidance required regarding the diagnosis and/or entitlement. • For assessment. • Diagnosis Asbestosis / Pulmonary Fibrosis / Interstitial Fibrosis • Diagnosis of stand-alone pleural effusion	• Further guidance required regarding the diagnosis and/or entitlement. • For assessment. • Diagnosis Asbestosis / Pulmonary Fibrosis / Interstitial Fibrosis • Diagnosis of stand-alone pleural effusion

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

**List of occupations identified as confirmed or probable exposure to asbestos while in the performance of duty

(Please note that this list is not exhaustive. Other occupations may be considered. Please discuss with a disability consultant)	
A Aero Engine Technician (MOC 511) Aircraft Structures Technician (MOC 565) Air Frame Technician (MOC 512) Air Weapons System Technician (MOC 572) Armament Systems Technician (no MOC, with RAF in 1950's) Aviation Technician (MOC 513) Aviation Systems Technician (MOC 514) Avionic Technician (MOC 525) **B** Boatswain (MOC 181) **C** Carpenter Combat Engineer (MOC 043) Communications Technician (MOC 252, 224) Construction Engineering Technician (MOC 611) Construction Technician (MOC 648) Construction and Maintenance Technician (MOC 615) **D** Driver (no MOC, usually infantry; up to 1970) Driver Mechanic (became 411) **E** Electrician (MOC 614) Electrical Technician (MOC 331) Electro-Mechanical Technician (MOC 431) Electrical Construction Technician (MOC 622) Electrical Generation Systems Technician (MOC 643) **F** Field Engineer (MOC 041) Field Engineer Equipment Operator (MOC 042) Firefighter (MOC 651) Hull Technician (MOC 321)	**M** Machinist (MOC 562) Marine Engineering Mechanic (MOC 312) Marine Engineering Technician (MOC 313) Marine Engineering Artificer (MOC 314) Marine Electrician (MOC 332) Maritime Surface and Subsurface (MOC 71) Materials Technician (MOC 441) Metals Technician (MOC 561) Mobile Support Equipment Operator (MOC 935) **N** Naval Electronics Technician (MOC's 283, 284, 285, 286) **P** Pilot **-Active Force Only** Plumber Plumber Gas Fitter (MOC 613) Plumbing and Heating Technician (MOC 646) Pipefitters **R** Radio Technician (MOC 221) Radar Technician (MOC 231) Radar Systems Technician (MOC 523) Refinisher Technician (MOC 563) Refrigeration and Mechanical Technician (MOC 621) Refrigeration and Mechanical Systems Technician (MOC 641) **S** Safety Systems Technician (MOC 531) Stationary Engineer (MOC 623) Structures Technician (MOC 612) **T** Teletype Operator (MOC 212)

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

H Hull Technician (MOC 321) **I** Instrument Electrical Technician (MOC 551) **L** Lineman (MOC 052)	Terminal Equipment Technician (MOC 222) **V** Vehicle Technician (MOC 411) **W** Water, Sanitation and POL Technician (MOC 624) Weapons Technician (MOC 421) Weapons Technician Air (571)

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of exposure claims. For many of the listed exposures, information regarding significance of the amount, frequency and duration of an exposure and/or the latency period to the time of onset of a cancer/malignancy is not included here and should be obtained from other sources as per usual adjudication practices.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

The International Agency For Research On Cancer (IARC) annually publishes a list of cancers, by anatomical site, that indicates known hazardous risk factors. This list can be found here: Agents Classified by the IARC Monographs, Volumes 1–132 – IARC Monographs on the Identification of Carcinogenic Hazards to Humans (who.int). For exposures listed here, information regarding significance of the amount, frequency and duration of exposure and/or the latency period prior to the development of a cancer/malignancy should be obtained from other sources as per usual adjudication practices. (The latency period is the time from the first exposure to the development of a condition.) For exposures found on the IARC list but not included in this Exposure Reference Guide, consultation with Medical Advisory should occur.

There are many different types of cancer. Both the location of the cancer cells and their histological type are used to determine the specific cancer diagnosis. Cancers are classified in two ways: by the type of tissue in which the cancer originates (histological type) and by primary site where the cancer first developed.

All cancers fall into one of five broad categories:

- Carcinomas are tumors that appear in the tissues lining the body's organs. About 80% of all cancer cases are carcinomas. Carcinomas are divided into two major subtypes: adenocarcinoma, which develops in an organ or gland, and squamous cell carcinoma, which originates in the squamous epithelium.
- Sarcomas are tumors that originate in the body’s bone, muscle, cartilage, fibrous tissue or fat.
- Leukemia is a cancer of the blood or blood-forming organs.
- Lymphomas develop in the glands or nodes of the lymphatic system, a network of vessels, nodes, and organs (specifically the spleen, tonsils, and thymus). Lymphomas may also occur in specific organs such as the stomach, breast or brain.
- Myeloma is cancer that originates in the plasma cells of bone marrow. The plasma cells produce some of the proteins found in blood.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Precancerous conditions

Precancerous cells are abnormal cells that may develop into cancer. Some of these cells have mild changes that may disappear without any treatment. But some precancerous cells pass on genetic changes and gradually become more and more abnormal as they divide until they turn into cancer. It can take a long time for a precancerous condition to develop into cancer.

Precancerous changes can be mild to severe. There are different ways of describing precancerous changes based on how mild or severe the changes are. Hyperplasia, atypia and metaplasia are changes which may be due to causes other than precancer. They are not included under cancer for VAC adjudicative purposes.

Dysplasia means that cells are abnormal, the cells are growing faster than normal and they aren't arranged like normal cells. Dysplasia is a precancerous condition. **Carcinoma in situ** is the most severe type of precancerous change. The cells are very abnormal but have not grown into nearby tissue. Carcinoma in situ is usually treated because it has a high risk of developing into cancer.

Dysplasia and Carcinoma in Situ can be entitled using the same risk factors as a fully developed carcinoma. The client does not need further entitlement rulings for further development/extension of carcinoma in the same organ. The Medical Pension codes are the same and should provide the same treatment benefits. If the client develops carcinoma ,there may be a need for diagnosis expansion or adding the diagnosis of cancer and bracketing for assessment. This would be done if the client requests the entitlement.

This does not apply in the case of **skin cancer**. For Skin cancer, this would only apply for a skin cancer developing at the same site as the previously entitled precancerous lesion. For assessment purposes the following would be bracketed, regardless of cause:

-Dysplasia of a specific location/of the skin

-Carcinoma in Situ of a specific location / of the skin

-Basal Cell carcinoma of a specific location/of the skin

-Squamous Cell carcinoma of a specific location/ of the skin

Tumor Types

For VAC adjudication purposes, **the risk factors included for a cancer in a specific organ are for neoplasms arising from epithelial tissues, usually adenocarcinoma or squamous cell carcinomas**. Any other types should be referred to Medical Advisory.

For example, a cancer originating in the lung may be an adenocarcinoma or a squamous cell carcinoma. These cancers are considered to be linked to the risk factors listed. However, other cancers, such as a sarcoma, may develop within the lung. The sarcoma would **not** be included as a cancer linked to the risk factors for lung cancer. The following tumor types often cause confusion during entitlement.

Medical Advisory consult should be obtained to verify type of pathology and link to known exposures.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

- **Carcinoid tumors**
- **Lymphoma in a solid organ**
- **Melanoma not on the skin**
- **Neuroendocrine tumors**
- **Neurofibroma**
- **Small Cell carcinoma**
- **Sarcoma**
- **Schwannoma**
- **Unknown Primary**

Appendix A

Indicates diagnoses which should / should not be included in the diagnosis of cancer of a specific organ.

Site	Included	Excluded **MA consult required**
Bladder (Urinary)	Adenocarcinoma Squamous cell carcinoma Urothelial carcinoma (transitional cell carcinoma of the bladder) Clear cell carcinoma	Lymphoma Sarcoma Neuroendocrine Small cell Carcinoid
Colorectal/colon or rectal	Adenocarcinoma Squamous cell carcinoma	GIST (Gastrointestinal Stromal Tumor) Lymphoma Sarcoma Neuroendocrine Small cell Carcinoid Melanoma
Lung (Bronchogenic)	Adenocarcinoma Squamous cell carcinoma Non–small cell lung cancer (NSCLC) Oat cell carcinoma Large cell carcinoma	Lymphoma Sarcoma Neuroendocrine Small cell Carcinoid
Pleura	Malignant Mesothelioma of the Pleura[iii]	
Skin	Squamous cell carcinoma Basal Cell carcinoma Bowen's disease Melanoma	Lymphoma Sarcoma Neuroendocrine Small cell

		Carcinoid Mantleoma
Testes	Adenocarcinoma Squamous cell carcinoma Germ cell tumors of early childhood (infantile tumors, mainly mature teratoma, and yolk sac tumor) seminoma, nonseminomatous tumors combined tumors spermatocytic seminoma	Lymphoma Sarcoma Neuroendocrine Small cell Carcinoid

For direction on conditions included in a cancer entitlement versus those that would be consequential see:

Consequentials to Malignant Conditions

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Verify Service	**Active Force Merchant Navy Special Duty Area Special Duty Operation**	**Regular Force Reserve Force**	**RCMP**
Service Relationship	-Initial onset or worsening of Signs/symptoms or diagnosis during Active Force Service or SDA/SDO service -High risk posting, occupation or exposure	-High risk posting, occupation or exposure	-High risk posting, job duties or exposure
High Risk Posting (Includes but not limited to)	Active Force Indo - China (Vietnam) Korea Navy	Australia Chalk River Gagetown Navy Nevada	Mulock Building
Occupation (Includes but not limited to)	Firefighter Mechanic Painter Welder	Firefighter Mechanic Painter Welder	Fire Inspector Forensic Investigator (to MA)
Exposure (Includes but not limited to)	Agent Orange Asbestos Benzene Cadmium Diesel Fuel Exhaust Helicobacter Pylori Mustard Gas Radiation, Ionizing Solvents, POL's Sun Exposure TCE (Trichloroethylene)	Agent Orange Asbestos Benzene Cadmium Diesel Fuel Exhaust Helicobacter Pylori Mustard Gas Radiation, Ionizing Solvents, POL's Sun Exposure TCE(Trichloroethylene)	Asbestos Cadmium Fingerprint Powder Sun Exposure
Consider Cancer as consequential to previously entitled condition All should be referred to Medical Advisory	Cirrhosis COPD Crohn's Disease Cystic Fibrosis GERD Helicobacter Pylori infection Hepatitis B Hepatitis C HIV infection	Cirrhosis COPD Crohn's Disease Cystic Fibrosis GERD Helicobacter Pylori Infection Hepatitis B Hepatitis C HIV infection	Cirrhosis COPD Crohn's Disease Cystic Fibrosis GERD Helicobacter Pylori infection Hepatitis B Hepatitis C HIV infection

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

	Idiopathic Pulmonary Fibrosis Tuberculosis, Active Ulcerative Colitis	Idiopathic Pulmonary Fibrosis Tuberculosis, Active Ulcerative Colitis	Idiopathic Pulmonary Fibrosis Tuberculosis, Active Ulcerative Colitis
Diagnosis	Accepted from Appropriate Medical Practitioner	Accepted from Appropriate Medical Practitioner	Accepted from Appropriate Medical Practitioner
Entitlement	Entitle to Active Force or SDA/SDO service	If not related to Active Force/SDA/SDO service, entitle to Regular/Reserve Force	Entitle to RCMP service
Assessment	Assessment provided by Medical Advisory Skin cancer: adjudicators trained in skin cancer assessments	Assessment provided by Medical Advisory Skin cancer: adjudicators trained in skin cancer assessments	Assessment provided by Medical Advisory Skin cancer: adjudicators trained in skin cancer assessments
Consult Medical Advisory	-Diagnosis Clarification -Consequential conditions - immunosuppression* -solid organ transplantation -Radiation, ionizing	Diagnosis Clarification -Consequential conditions - immunosuppression* -solid organ transplantation -Radiation, ionizing	Diagnosis Clarification -Consequential conditions - immunosuppression* -solid organ transplantation -Radiation, ionizing

*Conditions that may cause immunocompromise includes, but is not limited to, transplant recipient , AIDS, HIV, chronic renal failure requiring hemodialysis, some types of chemotherapy, TNF-alpha inhibitors, diabetes, chronic steroids).

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer by Posting / Exposure/Occupation

Cancer by Posting

Active Force / World War II (WW II)

Asbestos

World War II (WII) service in Europe, Africa or Asia

Sun Exposure

Australia

Ionizing radiation if at test sites 1956 and 1967. Consult Disability consultant

Chalk River

Ionizing radiation during accidents 1952 and 1958

Gagetown* 14-16 June 1966 , 21-24 June 1967

*Please review with Disability Consultant before ruling

SDA Indo - China (which include Vietnam, Laos &Cambodia)

Indo China (Vietnam): 9 June 1962 – 7 May 1975

Agent Orange: **(as per Agent Orange policy)**

Cancers related to Agent Orange

p. AL amyloidosis
q. B cell leukemias
r. Cancer of the Lung
s. Cancer of the Larynx
t. Cancer of the trachea
u. Cancer of the Bronchus/Bronchi
v. Chronic lymphocytic leukemia (CLL)
w. Hodgkin's Disease
x. Multiple Myeloma
y. Non-Hodgkin's Lymphoma

z. Prostate Cancer

aa. Respiratory Cancers – includes cancers of the lung, larynx, trachea and bronchus; and/or

Soft Tissue Sarcomas

Korea 5 July 1950 – 30 April 1956 Link to Korea **Guide**

Asbestos

- Korean War service if transported to Korea by ship

Cancers included in Policy:

Special Force service (Korea) (July 5, 1950-October 31, 1953)

Regular Force service attached to the Special Force (Korea) (July 5, 1950-October 31, 1953)

Special Duty Service (SDA Korea) (November 1,1953-April30,1956)

Cancer: Primary malignant neoplasms (including "in situ" neoplasms) of the following sites:

i. Primary malignant neoplasms of the head and neck - includes only the following sites:
   - lip (excludes skin of the lip)
   - tongue
   - salivary glands
   - gums
   - mouth
   - tonsils
   - oropharynx
   - nasopharynx; and
   - hypopharynx

ii. Primary malignant neoplasms of the larynx

iii. Primary malignant neoplasms of the trachea

iv. Primary malignant neoplasms of the lung

v. Primary malignant neoplasms of the esophagus which includes:
   - gastroesophageal junction
   - squamous cell carcinoma of the cardia of the stomach (Consult Medical Advisory if uncertainty concerning anatomic site)

vi. Primary malignant neoplasms of the colon

vii. Primary malignant neoplasms of the rectum and anus (excludes skin of the anus)

viii. Primary malignant neoplasms of the prostate

ix. Malignant melanoma of the skin including the lip and anus

Cancer: Malignant melanomas of the following sites:

x. skin of the lip

xi. skin of the anus

Mulock Building **RCMP Service only**

Asbestos

All other exposures discuss with Disability Consultant responsible for exposure claims.

The Sir William Mulock Building, 241 Jarvis Street, Toronto, Ontario, was owned by the Federal Government and was the location of the "O" Division of the R.C.M.P. during the late seventies and through to March 1990.

This building was built in the 1880's and, is now used as a hotel.

Several investigations, assessments and designated substances surveys were completed, dated between 1986 and 1998. Many substances in the building were tested, examined, and assessed for amounts and levels of hazards. These included: friable and non-friable asbestos, PCB's, lead in paint and arsenic. Most conclusions indicated that there was evidence of friable asbestos-containing materials throughout the building but there were no health hazards from other substances investigated.

Navy (Ships & Submarines)

Asbestos

If ship was built prior to 1971, contained asbestos. Ships later refitted/refurbished may have had asbestos removed. Further investigation will be required.

https://readyayeready.com/ships/ provides data on dates of DND ships with construction and refurbishment dates.

Nevada

Ionizing radiation if at test sites 1955 and 1967

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer by Exposures

Agent Orange related cancers

(as per Agent Orange policy)

Link to Agent Orange Guide

Cancers related to Agent Orange

a. AL amyloidosis
b. B cell leukemias
c. Cancer of the Lung
d. Cancer of the Larynx
e. Cancer of the trachea
f. Cancer of the Bronchus/Bronchi
g. Chronic lymphocytic leukemia (CLL)
h. Hodgkin's Disease
i. Multiple Myeloma
j. Non-Hodgkin's Lymphoma
k. Prostate Cancer
l. Respiratory Cancers – includes cancers of the lung, larynx, trachea and bronchus
m. Soft Tissue Sarcomas

Asbestos related cancers

(N.B. does not include renal cancer)

Link to Asbestos Guide

High risk Postings: Mulock, Navy RCMP Marine Branch For high risk occupations see list in Asbestos Guide

Malignant Mesothelioma of the Pleura Mesothelioma (Malignant Mesothelioma of other sites may be related to asbestos; all should be referred to Medical Advisory.) [iv]

Lung Cancer

Cancer of Larynx

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer of the Pharynx including the posterior one third of the tongue, the soft palate, the side and back walls of the throat and the tonsils

> Note : Does not include the oral cavity. See Medical Directive re Asbestos and Carcinoma of the Pharynx

Cancer of the Stomach, including the cardia

Cancer of the GE (gastroesophageal) junction

Colon and Rectum Cancer (does not include small bowel cancers)

Cancer of the Ovary

Benzene related cancers

Acute Myelogenous Leukemia/ Acute Nonlymphocytic Leukemia

Acute Lymphocytic Leukemia

Chronic Lymphocytic Leukemia

Chronic Myelogenous Leukemia

Multiple Myeloma

Myelodysplastic Syndrome

Non-Hodgkin Lymphoma (excluding Extranodal marginal zone (MALT) lymphoma)[v]

Cadmium related cancers

(There is evidence of cadmium in fingerprint powder used by the RCMP(Forensic Investigator) in the 1960's and 1970's.)

Lung

Prostate

Renal (Kidney)

Diesel Fuel Exhaust related cancers

(N.B. does not include benzene related cancers)

Bladder (urinary)

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Lung

Gasoline Fuel Exhaust

Nil IARC review indicates that there is inadequate evidence in humans for the carcinogenicity of gasoline engine exhaust.

Helicobacter pylori (H. Pylori) infection [vi]

Gastric MALT lymphoma

Mustard Gas related cancers **Link to Mustard Gas Guide**

Chronic Myelogenous Leukemia

Cancer of the Larynx

Cancer of the Pharynx

Cancer of the Trachea

Cancer of the Lung

Cancer of the Bronchus/Bronchi

Respiratory cancers (laryngeal, pharyngeal, upper-respiratory-tract, and lung cancer)

Squamous Cell Carcinoma Skin at sites of patch test.

Radiation (Ionizing) related cancers

Ionizing radiation included in the 14th Report on Carcinogens as carcinogenic to humans are:

X-radiation (X-Ray), gamma radiation, neutrons, radon, and thorium dioxide.

Biological damage by ionizing radiation is related to dose and dose rate, which may affect the probability that cancer will occur. All exposure files concerning ionizing radiation should be referred to Medical Advisory, regardless of diagnosis.

Basal cell carcinoma of the Skin

Bladder (urinary)

Bone

Brain and CNS

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Breast

Colon

Esophagus

Kidney / Renal

Leukemia excluding CLL (Chronic Lymphocytic Leukemia, Chronic Non-Myelogenous Leukemia),

Lung

Ovary

Salivary gland

Stomach

Thyroid

Solvents, POL's related cancers

(Petroleums, oils,lubricants) For this group, specific exposure and the amount and timing of exposure must be identified.

May include

- Benzene
- TCE (Trichloroethylene)

Other possible solvent, POL exposures refer to Medical Advisory.

Sun Exposure related Cancers

Link to Sun Exposure Guide

Basal Cell Cancer of the Skin

Malignant Melanoma of the Skin

Squamous Cell Cancer of the Skin

Any other cancer type on the skin (ie. lymphoid), should be referred to Medical Advisory.

TCE (Trichloroethylene) related cancers

Liver/ Hepatocellular Cancer

Non Hodgkin Lymphoma

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Renal Cancer (kidney)

Occupational Exposures

Firefighter

Asbestos related cancers if significant exposure to structural fires. Not applicable to fighting forest fires only.

Non-Hodgkin Lymphoma[vii]

Prostate Cancer

Testes

Fire Inspector

Asbestos related cancers if significant exposure to structural fires

Mechanic

Benzene

Diesel Fuel Exhaust

Solvents, POL's

TCE

Painter

Bladder (urinary) Cancer

Lung

Malignant Mesothelioma of the Pleura [viii]

Welder

Lung Cancer

Melanoma of the Eye (based on UV exposure)

Renal Cancer (Kidney)

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Cancer by Site

Bladder (urinary)	Diesel Exhaust, Painter, Radiation (ionizing), Mustard Gas
Brain	Radiation (ionizing)
Colon and rectum	Asbestos, Crohn's Disease that involves the colon/rectum, Korea, Radiation (ionizing), Ulcerative Colitis with pancolitis,
Esophagus	Barrett's Esophagus(adenocarcinoma only), Korea, Radiation (ionizing), GERD greater than 5 years duration(adenocarcinoma only)
Gastroesophageal Junction	Asbestos
Kidney (Renal)	Cadmium, Radiation (ionizing), TCE(Trichloroethylene), Welding Fumes
Larynx	Agent Orange, Asbestos, Korea, Mustard Gas
Leukemia	Agent Orange, Benzene, Mustard Gas (CML), Radiation (ionizing), TCE(Trichloroethylene),
Liver and Bile Duct	Hepatitis B, Hepatitis C, Cirrhosis
Lung and bronchus	Asbestos, Agent Orange, Cadmium, COPD, Diesel Exhaust, HIV infection, Korea, Mustard Gas, Radiation (ionizing),including therapeutic radiation, Organ transplantation, Pulmonary Fibrosis, Tuberculosis(Active), Painter, Welder
Lymphoma	Agent Orange, Benzene, Firefighters(non-Hodgkin Lymphoma), Malaria (endemic): Burkitt Lymphoma, TCE(Trichloroethylene), (non-Hodgkin Lymphoma), Helicobacter Pylori (Gastric MALT lymphoma)
Malignant Mesothelioma of the Pleura[ix]	Asbestos, Painter
Oropharynx	Asbestos , Korea
Oral Cavity	Korea
Ovary	Asbestos, Radiation (ionizing)
Pancreas	
Pharynx	Asbestos, Korea, Mustard Gas for nasopharynx only Note : Does not include the oral cavity. See Medical Directive re Asbestos and Carcinoma of the Pharynx
Prostate	Agent Orange, Cadmium, Firefighter (structural fires), Korea
Rectum	Asbestos, Crohn's Disease involving colon/rectum, Radiation (ionizing), Ulcerative Colitits

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Skin	Non-Melanomatous Skin Cancer (SSC Squamous Cell Cancer of the Skin, BCC Basal Cell Carcinoma of the Skin)
	SCC Mustard Gas at site of skin patch testing
	BCC Radiation (ionizing)
	SCC and BCC Solar/Sun Exposure as per Sun Exposure Directive
	Melanoma of the Skin
	Solar/Sun Exposure as per Sun Exposure Directive
	Sun burn as per Sun Exposure Directive
Stomach /Gastric	Asbestos, Korea (cardia of the stomach), Radiation (ionizing)
Testis	Firefighter
Thyroid	Radiation (ionizing),

Cancer consequential to previously entitled conditions

Previously Entitled Condition	***Immediate positive entitlement decision may be considered based on policy and/or research. Always consider timelines and latency period.***	***Consider relationship Consult Medical Advisory***
Cirrhosis	Hepatocellular/Liver	
COPD	Cancer of the lung	
Crohn's Disease		With colon involvement: Cancer of the colon or rectum (note: not small bowel) With small bowel involvement: Cancer of the small bowel
Cystic Fibrosis	Cancer of the colon or rectum	
GERD / Barrett's esophagus		Adenocarcinoma of the esophagus : consult regarding latency Squamous cell carcinoma of the esophagus
Helicobacter Pylori Infection		Gastric Malt Lymphoma[x]
Hepatitis B	Hepatocellular/Liver	
Hepatitis C	Hepatocellular/Liver	
HIV infection		Cancer of the lung
Idiopathic Pulmonary Fibrosis	Cancer of the lung	

Tuberculosis, Active	Cancer of the lung	
Ulcerative Colitis with pancolitis		Cancer of the colon or rectum (note: not small bowel)

Chronic Obstructive Pulmonary Disease / COPD

Equivalent Diagnoses: Emphysema, Chronic Bronchitis, Chronic Obstructive Lung Disease

This diagnosis includes Emphysema, Chronic Bronchitis, Bronchiectasis, Asthma for assessment purposes.

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of exposure claims. For many of the listed exposures, information regarding significance of the amount, frequency and duration of an exposure and/or the latency period to the onset of an illness is not included here and should be obtained from other sources as per usual adjudication practices.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

Preamble

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. Chronic inflammation causes structural changes, small airways narrowing, and destruction of lung parenchyma. The most common respiratory symptoms include dyspnea, cough, wheezing, chest tightness and/or sputum production.

Note: Obstructive lung disease is an umbrella term used for a large group of diseases that cause blockage / restriction /inflammation of the respiratory airways. It is not a specific diagnosis and is not acceptable for VAC adjudication purposes. COPD is a type of obstructive lung disease.

Spirometry is required to make the diagnosis of COPD. The presence of a post-bronchodilator ratio of FEV1/FVC less than 0.70 confirms the presence of persistent airflow limitation.

Generally, COPD is caused by a prolonged exposure to a specific chemical, gas, vapor or dust. The most common cause of COPD is tobacco smoking.

The diagnosis of COPD includes its subtypes: emphysema, chronic bronchitis, and asthma. COPD also includes bronchiectasis.

Chronic bronchitis is defined as a chronic productive cough for three months in each of two successive years in a patient in whom other causes of chronic cough have been excluded.

Emphysema is a pathological term that describes some of the structural changes sometimes associated with COPD. These changes include abnormal and permanent enlargement of the airspaces distal to the terminal bronchioles that is accompanied by destruction of the airspace walls.

Bronchiectasis is a disorder of the major bronchi and bronchioles that is characterized by permanent abnormal dilatation and destruction of bronchial walls. The onset of bronchiectasis requires an infectious insult plus impairment of drainage/ airway obstruction.

The classic clinical manifestations of bronchiectasis are cough and the daily production of sputum lasting months to years. Less specific complaints include dyspnea (shortness of breath), hemoptysis, wheezing, and pleuritic chest pain. Bronchiectasis shares many clinical features with chronic obstructive pulmonary disease (COPD).

The diagnosis is established clinically on the basis of cough on most days with sputum production, often one or more exacerbations/year, and radiographically by the presence of bronchial wall thickening and airway dilatation on chest computed tomographic (CT) scans.

Pulmonary function testing is used for functional assessment of impairment due to bronchiectasis. Obstructive impairment (ie, reduced or normal FVC, low FEV_1, and low FEV_1/FVC) is the most frequent finding.

Asthma is a chronic inflammatory disorder of the airways. The diagnosis is based on symptoms and spirometry. Asthma in adults may be persistence of childhood-onset asthma (usually allergic) or may reflect new onset in adulthood (often nonallergic).

The chronic inflammation of asthma is associated with airway hyperresponsiveness that leads to recurrent episodes of wheezing, difficulty breathing, chest tightness, and coughing.

These episodes are usually associated with airflow obstruction within the lung that is **reversible** either spontaneously or with treatment. Spirometry is used to determine the presence of obstruction, and degree of reversibility (generally defined as combination of increase in forced expiratory volume in 1 second [FEV_1] > 200 mL and ≥ 12% from baseline after inhalation of short-acting bronchodilator).

Bronchial provocation with a methacholine challenge test can be considered to diagnose airway hyperresponsiveness . The diagnosis is less likely in the presence of a negative test.

Patients with asthma whose airflow obstruction is completely reversible are **not** considered to have COPD.

Patients with asthma whose airflow obstruction does **not remit completely** are considered to have COPD. In those entitled for asthma, the entitlement and assessment for COPD is included. If the asthma is partially entitled at less than 5/5, a consequential ruling for COPD can be done. If the asthma is fully entitled at 5/5, no further action is required.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

For VAC entitlement purposes:

The following are considered to be **causal** factors for COPD:

-Service in Korea from July 5, 1950 to April 30,1956

-Active Tuberculosis

-Asthma

- Firefighters If the firefighter has been involved in incidents that cause acute distress requiring medical attention within 48 hours *and* onset or worsening of COPD was within 10 years, can be seen to contribute to COPD

-**Diesel exhaust fumes** Chronic **daily** occupational exposure to diesel exhaust fumes for more than 15 years

-Mustard Gas exposure

-Shipboard Fires

-The shipboard fire on HMCS Kootenay 1969-10-23 In those who had evidence of lung irritation during and immediately following the incident, and who developed ongoing asthma or COPD, the fire incident would be considered as causal.

- The shipboard fire on HMCS Chicoutimi 2004-10-05 In those who had evidence of lung irritation during and immediately following the incident, and who developed ongoing asthma or COPD, the fire incident would be considered as causal.

-the shipboard fire on HMCS Protecteur 2014-02-27. A fire occurred in the engine room onboard the destroyer, the HMCS Protecteur on February 27, 2014. In those who had evidence of lung irritation during and immediately following the incident, and who developed ongoing asthma or COPD, the fire incident would be considered as causal.

Refer to Medical Advisory

Fumes associated with Spray Paint, Welding, Firefighting may be associated with COPD. Exposure, length of exposure and latency must be considered. Consult Medical Advisory

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

For VAC Disability Adjudication Purposes:

Asbestos exposure is not considered a risk factor for development of COPD.

COPD

Verify Service	**Active Force** **Merchant Navy** **Special Duty Area** **Special Duty Operation**	**Regular Force** **Reserve Force**	**RCMP**
Service Relationship	***Initial onset or worsening of Signs/symptoms or diagnosis during Active Force Service or SDA/SDO service*** ***-Onset of signs/symptoms post release: High risk posting, occupation or exposure***	High risk posting, occupation or exposure	High risk posting, job duties or exposure
High risk posting	*Mustard Gas* *Korea*	Mustard Gas Shipboard Fire incidents including: -HMCS Kootenay 1969-10-23 -HMCS Chicoutimi 2004-10-05 -HMCS Protecteur 2014-02-27	
Occupation: Consult Medical Advisory	Firefighter Painter (Spray Paint) Welder		
Research and/or Policy supports Causal Association with Exposure	Active Tuberculosis Asthma Korean Service 1950-07-05 to 1956-04-30 Mustard Gas Diesel exhaust for 15 years		
Consult Medical Advisory	Firefighter Spray Paint Vapor, Gas and Dust exposures not listed above Welder		

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Diagnosis	-Accepted from Respirologist or General Internist (PFT/spirometry not required) -General practitioner when supported by PFT/spirometry -If diagnosis from General practitioner and PFT/Spirometry unavailable, consult Medical Advisory
Assessment	Assessment provided by Medical Advisory Cardiorespiratory Questionnaire required Spirometry or PFT's if possible
Consult Medical Advisory	Diagnosis clarification and assessment If diagnosis from General practitioner and PFT/Spirometry not possible, consult Medical Advisory

Appendix A

Diesel Fuel Exhaust Effective June 19/18:

Exposure to diesel fuel exhaust, especially in an enclosed area is associated with an increased incidence of COPD in those with a 15 year diesel fuel exhaust exposure history.

Exposure to diesel exhaust is associated with COPD in those with a significant regular exposure to exhaust fumes over at least a 15 year period.

This association is based on a study of railroad workers which indicated that those who worked on the trains with prolonged exposure had an increased risk of COPD after 15 years. Those who worked in the train station did not have a similar increase in COPD incidence .

For VAC entitlement purposes, the types of occupations considered to have significant regular exposure to diesel exhaust fumes include railroad workers, vehicle mechanics, transportation, construction workers and motor vehicle operators.

For VAC purposes, those working regularly in an engine room are also included.

This includes diesel fuel exhaust only. It does not include gasoline exhaust or jet fuel exhaust.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Korea

Korean Service - As per VAC's Policy on Australia's Korean War Veterans Studies

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of exposure claims. For many of the listed exposures, information regarding significance of the amount, frequency and duration of an exposure and/or the latency period to the onset of an illness is not included here and should be obtained from other sources as per usual adjudication practices.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

Preamble

This flowchart applies to entitlement under VAC's policy on Australia's Korean War Veterans Studies found in the VS tool box at http://intranet.vac-acc.gc.ca/eng/operations/vs-toolbox/policies/policy/1445

Other than usual considerations such as the application of the Insurance Principle or exposure, Korean service between July 5, 1950 – April 30, 1956 provides eligibility for entitlement for a list of conditions provided in the current policy regarding Australia's Korean War Veterans Studies found in the VS tool box at http://intranet.vac-acc.gc.ca/eng/operations/vs-toolbox/policies/policy/1445

This policy is applicable to those Canadian Korean Veterans who served in Korea between July 5, 1950 and April 30, 1956. This includes Merchant Navy veterans (Chapter 10, Periods of Service, Adjudication Manual).

This includes those who served as Special Force Korea, Regular Force service attached to Special Force Korea, and SDA Korea. This policy provides a list of conditions which are linked to service in Korea between these dates. Clients are eligible for entitlement for these conditions because of their Korean service, during the specified time period of July 5, 1950 and April 30, 1956 .

For exposures related to Korean service but **not** included in the list in this policy, usual adjudication practices would apply.

The insurance principle applies for all Korean service. All Korean service is either wartime :(Special Force Service (Korea) or Regular Force attached to Special Force (Korea) July 5, 1950 to October 31,1953) **or** SDA/Special Duty Service Area (November 1, 1953-March 31,1981). SDA service includes service on ships as outlined in Disability Benefits In Respect Of Wartime And Special Duty Service.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Service in Korea differs from other wartime/SDA service areas in the following respect:

1. The dates of the veteran's service must be taken into consideration.
   Any veteran with Korean service up to, and including, 1953-10-31 would be provided a ruling under the Pension Act. This includes those with SDA Korea service combined with Korean wartime service, and/or Active Force service up to, and including, 1953-10-31 .

   SDA Korea service is from 1953-11-01 to 1981-03-31. Veterans with **only** SDA Korea service would be provided a ruling under the Veterans Well-being Act. In addition, the Australia's Korean War Veterans Studies Policy applies to SDA service 1953-11-01 to 1956-04-30

Dual Service Flow Chart: To aid adjudicators in selecting the correct legislation/ Act when providing decisions.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Elements of Claim	Finding Facts/Evidence/Decision
Verify Service For Application of Policy	Korean Service July 5,1950 and April 30, 1956 Includes: Special Force service (Korea) (July 5, 1950-October 31, 1953) Regular Force service attached to the Special Force (Korea) (July 5, 1950-October 31, 1953) Special Duty Service (SDA Korea) (November 1,1953-April 30,1956) Merchant Navy
Service Relationship	Service in Korea July 5, 1950 - April 30,1956
Entitlement as per VAC's Policy on Australia's Korean War Veterans Studies ***Korean Service July 5,1950 and April 30, 1956*** ***Entitlement for listed conditions and service dates only.*** ***For other conditions, this policy does not apply. Usual adjudication guidelines, including insurance principle would apply.*** ***For service outside these dates (SDA Korea November 1, 1953-March 31,1981), this policy does not apply. Usual adjudication guidelines, including insurance principle would apply.***	**Cancer: Primary malignant neoplasms** (including "in situ" neoplasms) of the following sites: xii. Primary malignant neoplasms of the head and neck - includes only the following sites: • lip (excludes skin of the lip) • tongue • salivary glands • gums • mouth • tonsils • oropharynx • nasopharynx • hypopharynx xiii. Primary malignant neoplasms of the larynx xiv. Primary malignant neoplasms of the trachea xv. Primary malignant neoplasms of the lung xvi. Primary malignant neoplasms of the esophagus which includes: • gastroesophageal junction • squamous cell carcinoma of the cardia of the stomach xvii. Primary malignant neoplasms of the colon xviii. Primary malignant neoplasms of the rectum and anus (excludes skin of the anus) xix. Primary malignant neoplasms of the prostate xx. Malignant melanoma of the skin xxi. **Cancer:** Malignant melanomas of the following sites: xxii. skin of the lip xxiii. skin of the anus

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

	Other General Medical Conditions: xxiv. Chronic obstructive lung disease (includes chronic bronchitis and emphysema)/ COPD xxv. Ischemic heart disease xxvi. Cerebrovascular disease
Policy Clarifications	Cerebrovascular Disease includes:[1] • Transient Ischemic Attacks • Stroke If uncertain that diagnosis included/excluded under policy, refer to Medical Advisory
Conditions NOT included Under Korea policy	Peripheral Vascular Disease[2] Valvular Heart Disease
Diagnosis	**Cancer** : Accepted from appropriate specialist or any Medical Practitioner with investigative evidence including pathology report **COPD** -Accepted from Respirologist or General Internist (PFT/spirometry not required) General practitioner when supported by PFT/spirometry -If diagnosis from General practitioner and PFT/Spirometry unavailable, consult Medical Advisory **Ischemic heart Disease** Accepted from appropriate specialist or any Medical Practitioner with investigative evidence **Cerebrovascular Disease** Accepted from appropriate specialist or any Medical Practitioner with investigative evidence
Assessment	Assessment provided by Medical Advisory
Consult Medical Advisory	Diagnosis Clarification Assessment

[1] As per direction by Policy at time of release of VAC's policy on Australia's Korean War Veterans Studies.
[2] As per direction by Policy at time of release of VAC's policy on Australia's Korean War Veterans Studies.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

Mustard Gas

This flowsheet indicates some occupations, postings and exposures which should be considered in the adjudication of exposure claims. For many of the listed exposures, information regarding significance of the amount, frequency and duration of an exposure and/or the latency period to the onset of an illness is not included here and should be obtained from other sources as per usual adjudication practices.

Any list provided should not be considered comprehensive. If an occupation, posting and/or exposure is not included in the list, it can/should still be considered using usual adjudication practices as outlined in VAC policies Hazardous Material and Radiation Exposure and Assessing and Categorizing Health-Related Expert Opinion(s) and Scientific Evidence.

Mustard gas, consisting of sulfur mustard, is also known as mustard agent, or Yperite (it was first used in Ypres, Belgium)," or by the military designations H, HD, and HT. It is a powerful irritant and blistering agent that damages the skin, eyes, and respiratory tract on contact. It is actually odorless but contaminants cause it to smell like mustard or garlic.

Nitrogen mustards were produced in the 1920s and 1930s as potential chemical warfare weapons. They are vesicants (or blister agents) similar to the sulfur mustards. The nitrogen mustards are also known by their military designations of HN-1, HN-2, and HN-3. The nitrogen mustards were never used in warfare. However, there is indication that nitrogen mustard was used in the testing during WWII.[3] HN-2 was designed as a military agent but was later used in cancer treatment. Other treatment agents now have replaced it.

Lewisite is also a blistering agent that contains organic arsenic. Purified Lewisite is a colorless, oily liquid at room temperature with a faint "geranium-like" odor. More volatile than sulfur mustard, this agent can be used as a vapor over large distances and has been mixed with sulfur mustard to achieve greater effectiveness in combat. It causes symptoms of exposure immediately.

- Sulfur mustard is a type of chemical warfare agent.
- It was introduced and used extensively in World War I.
- In WWII, it was stockpiled but rarely used. Since WWII, it has been used sporadically throughout the world; these events would be treated on a case by case basis for possibility of exposure. Sulfur mustard was tested on Canadian soldiers in Canada during WWII.
- Sulfur mustard is not found naturally in the environment.

How people can be exposed to sulfur mustard

- If sulfur mustard is released into the air as a vapor, people can be exposed through skin contact, eye contact, or breathing. Sulfur mustard vapor can be carried long distances by wind.

[3] The Use of Human Subjects in Chemical Warfare Agent Experiments: An Ethical Perspective By/par Clément H. Laforce May 2006 https://www.cfc.forces.gc.ca/259/281/278/laforce.pdf

- If sulfur mustard is released into water, people can be exposed by drinking the contaminated water or getting it on their skin.
- People can be exposed to liquid sulfur mustard by eating it or getting it on their skin.
- Sulfur mustard can last from 1 to 2 days in the environment under average weather conditions and from weeks to months under very cold conditions.
- Sulfur mustard breaks down slowly in the body, so repeated exposure may have a cumulative effect (that is, it can build up in the body).
- Sulfur mustard vapor is heavier than air, so it will settle in low-lying areas.

Immediate signs and symptoms of sulfur mustard exposure

- Exposure to sulfur mustard usually is not fatal. When sulfur mustard was used during World War I, it killed fewer than 5% of the people who were exposed and received medical care.
- People may not know right away that they have been exposed, because sulfur mustard may not have a smell or have a smell that might not cause alarm.
- Typically, signs and symptoms do not occur immediately. Depending on the severity of the exposure, symptoms may not occur for up to 24 hours. Some people are more sensitive to sulfur mustard than are other people, and may have signs and symptoms sooner.
- Sulfur mustard can have the following effects on specific parts of the body:
    - *Skin*: redness and itching of the skin may occur 2 to 48 hours after exposure and may eventually change to yellow blistering of the skin.
    - *Eyes*: irritation, pain, swelling, and tearing may occur within 3 to 12 hours of a mild to moderate exposure. A severe exposure may cause signs and symptoms within 1 to 2 hours and may include the symptoms of a mild or moderate exposure plus light sensitivity, severe pain, or blindness lasting up to 10 days.
    - *Respiratory tract*: runny nose, sneezing, hoarseness, bloody nose, sinus pain, shortness of breath, and cough within 12 to 24 hours of a mild exposure and within 2 to 4 hours of a severe exposure.
    - *Digestive tract*: abdominal pain, diarrhea, fever, nausea, and vomiting.
    - *Bone marrow*: decreased formation of blood cells (aplastic anemia) or decreased red or white blood cells and platelets (pancytopenia) leading to weakness, bleeding and infections.
- Showing these signs and symptoms does not necessarily mean that a person has been exposed to sulfur mustard.

RCMP service is not known to be related to Mustard Gas exposure.

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

References: List of Health Conditions for Sufficient and Insufficient Causal Relationships to Mustard Gas Agent Exposures

Verify Service	**Active Force** **Merchant Navy** **SDA/SDO Service**	**Regular Force** **Reserve Force**
Service Relationship	Exposure to Mustard Gas WWII confirmed with documentation usually found in posting sheets	Exposure to Mustard Gas Regular Force confirmed in posting sheets
Conditions related to Mustard Gas Exposure	• Respiratory Cancers • Cancer Larynx • Cancer Nasopharynx • Cancer Upper Respiratory Tract (4) • Cancer Lungs • Leukemia (all types) (1) • Cancer Urinary Bladder (Transitional cell carcinomas) (2) • Squamous Cell Carcinoma Skin at sites of patch test • Skin conditions at sites of patch test ○ Pigmentation abnormalities of the skin ○ Chronic skin ulcerations ○ Scar formation • Asthma • Bronchiectasis (3) • Chronic Obstructive Pulmonary Disease/COPD includes Chronic Bronchitis and Emphysema • Pulmonary Fibrosis/ Interstitial Fibrosis (3) • Laryngitis • Eye conditions: ○ Recurrent corneal ulcerative disease ○ Corneal opacities ○ Delayed recurrent Keratitis ○ Chronic conjunctivitis Psychological disorders -mood disorders, anxiety disorders (PTSD), other traumatic stress disorder responses. These	• Respiratory Cancers • Cancer Larynx • Cancer Nasopharynx • Cancer Upper Respiratory Tract (4) • Cancer Lungs • Leukemia (all types) (1) • Cancer Urinary Bladder (Transitional cell carcinomas) (2) • Squamous Cell Carcinoma Skin at sites of patch test • Skin conditions at sites of patch test ○ Pigmentation abnormalities of the skin ○ Chronic skin ulcerations ○ Scar formation • Asthma • Bronchiectasis (3) • Chronic Obstructive Pulmonary Disease/COPD includes Chronic Bronchitis and Emphysema • Pulmonary Fibrosis/ Interstitial Fibrosis (3) • Laryngitis • Eye conditions: ○ Recurrent corneal ulcerative disease ○ Corneal opacities ○ Delayed recurrent Keratitis ○ Chronic conjunctivitis

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

	may result from traumatic or stressful features of the exposure experience, not a toxic effect of the agents themselves • Sexual Dysfunction - as a result of genital scarring which prevents or inhibits normal sexual performance or activity	Psychological disorders -mood disorders, anxiety disorders (PTSD), other traumatic stress disorder responses. These may result from traumatic or stressful features of the exposure experience, not a toxic effect of the agents themselves • Sexual Dysfunction - as a result of genital scarring which prevents or inhibits normal sexual performance or activity
Diagnosis	Accepted from appropriate Medical Practitioner	Accepted from appropriate Medical Practitioner
Entitlement	Entitle to Active Force, Merchant Navy,SDA/SDO	Entitle to Regular Force
Assessment	Assessment provided by Medical Advisory or Disability Adjudicator based on claim type	Assessment provided by Medical Advisory or Disability Adjudicator based on claim type
Consult Medical Advisory	• Restrictive Lung Disease not listed above • Diagnosis Clarification • Assessment • Any eye condition	• Restrictive Lung Disease not listed above • Diagnosis Clarification • Assessment • Any eye condition

1. Wording from original directive indicates “Leukemia (typically acute nonlymphocytic type)”. All types of leukemia are included, providing most generous interpretation for the veteran. Dated 2021-01-27
2. Wording from original directive indicates the inclusion of: “Bladder cancer - (transitional cell carcinomas”). Currently, little support in the literature but remains included at this time, providing most generous interpretation for the veteran. Dated 2021-01-27

Link to Quick Reference Flowcharts - Quick Reference Exposure Flowcharts (gcdocs.gc.ca)

3. Bronchiectasis, pulmonary fibrosis, and interstitial fibrosis were excluded in the original medical directive. Medical literature currently supports mustard gas is a risk factor for the development of these conditions and therefore they are included at this time. Dated 2021-01-27
4. Included in IARC