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## **Cancer Association of South Africa (CANSA)**

### **Fact Sheet and Position Statement on Aspirin**

#### **Introduction**

Aspirin is part of a group of medications called non-steroidal anti-inflammatory drugs (NSAIDs), but differs from most other NSAIDs in its mechanism of action. Though it, and others with similar structure, called the salicylates, have similar effects [antipyretic (reduction of fever), anti-inflammatory, and analgesic] to the other NSAIDs and inhibit the same enzyme cyclooxygenase (COX), aspirin does so in an irreversible manner and, unlike others, affects more the COX-1 variant than the COX-2 variant of the enzyme (Burke, Smythe & FitzGerald, 2006).

The active ingredient of Aspirin was first discovered from the bark of the willow tree in 1763 by the Reverend Edward Stone (Church of England Rector) of Wadham College, Oxford University. He had discovered salicylic acid, the active metabolite of aspirin. Aspirin was first synthesised by Felix Hoffman, a chemist with the German company Bayer in 1897.

[Picture Credit: Felix Hoffman]

Aspirin is one of the most widely used medications in the world, with an estimated 40 000 tons of it being consumed each year. In countries where 'Aspirin' is a registered trademark owned by Bayer, the generic term is acetylsalicylic acid (ASA). It is on the World Health Organization's List of Essential Medicines, a list of the most important medications needed in a basic health system. (World Health Organization; Wikipedia).



#### **A Warning Against the Indiscriminate Use of Aspirin**

Although taking an occasional aspirin or two is safe for most adults to use for headaches, body aches or fever, daily use of aspirin can have serious side effects, including internal bleeding. One should take a daily aspirin only if one's doctor advises to do so. If one has had a heart attack or stroke, a doctor will likely recommend taking a daily aspirin unless there is evidence of a serious allergy or history of bleeding. If someone has a high risk of having a first heart attack, a doctor might recommend aspirin after weighing the risks and benefits. No one should start daily aspirin therapy on their own (Mayo Clinic).

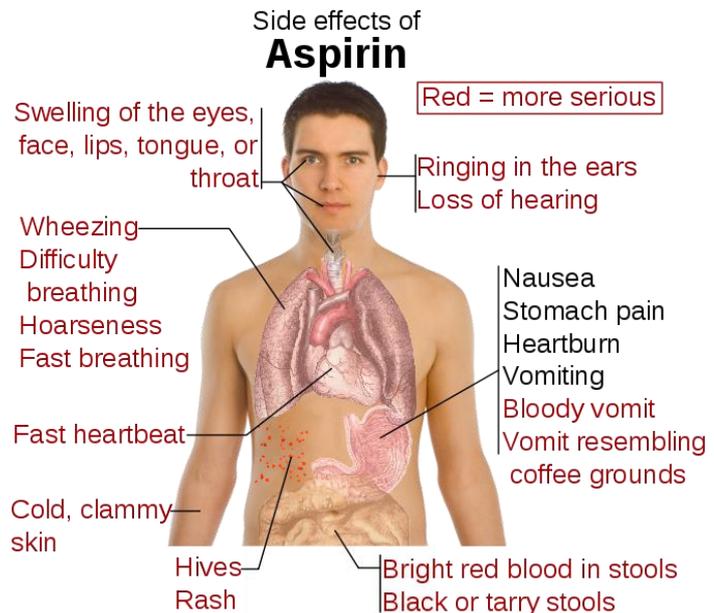
One should not use aspirin if one has a bleeding disorder such as haemophilia, a recent history of stomach or intestinal bleeding, or if one is allergic to a non-steroidal anti-inflammatory drug (NSAID) such as Advil, Motrin, Aleve, Orudis, Indocin, Lodine, Voltaren, Toradol, Mobic, Relafen, Feldene, and others.

Even though aspirin is freely available, it should not be given indiscriminately to a child or teenager with a fever, flu symptoms, or chicken pox as it can cause Reye's syndrome (a rare but serious illness that can affect the brain and liver that occurs most commonly in kids recovering from a viral infection), a serious and sometimes fatal condition in children.

[Picture Credit: Aspirin Side Effects]

To make sure aspirin is safe to use, one should inform one's doctor about:

- asthma or seasonal allergies
- stomach ulcers
- liver disease
- kidney disease
- a bleeding or blood clotting disorder
- heart disease, high blood pressure, or congestive heart failure
- gout
- nasal polyps



Aspirin may be harmful to an unborn baby's heart, and may also reduce birth weight or have other dangerous effects. Women should inform their doctor if they are pregnant or plan to become pregnant while taking aspirin. Aspirin can pass into breast milk and may harm a nursing baby. Women should, therefore, not breast-feed while using this medicine. (Drugs.com).

### Aspirin and Non-Communicable Diseases

Non-communicable diseases (NCDs) accounted for two of every three deaths (34,5 million) worldwide in 2010. An important way to tackle cardiovascular diseases (CVD) inclusive of stroke prevention is to encourage people to adopt healthier behaviours and diets as well as the use of life-long aspirin (daily, low dose) for secondary prevention of CVD as this is well established and included in many evidence-based guidelines (Algra, 2013). This should, however, only be done after consultation with a medical practitioner.

### Aspirin and Reducing the Risk for Cancer

The following are recorded scientific findings on Aspirin and cancer:

### Lowering the Risk for Cancer

Not everyone should start swallowing a daily aspirin. The drug comes with some very real drawbacks - most notably an increased risk for internal bleeding.

That is especially true among older adults or those who drink alcohol, have a history of ulcers, or who take anticoagulant drugs. The risk of bleeding may be too great to recommend an aspirin regimen, research suggests.

While bleeding risks are lower among people taking low-dose aspirin compared to those on full-strength versions of the drug, aspirin swallowers are still twice as likely to suffer from life-threatening bleeding compared to those not on aspirin. Low doses of aspirin or “baby aspirin” are generally 81 milligrams.

A daily low-dose aspirin (81mg) may make sense for people at high risk for certain types of cancer, but the potential side effects mean aspirin certainly is not for everyone. Only one's doctor can help one weigh the benefits against the risks.

Patients receiving cancer treatment could increase their chance of survival by up to 20% and help stop their cancer from spreading by taking a low-dose of aspirin, new research suggests.

In a systematic review of the available scientific literature a team from Cardiff University's School of Medicine found a significant reduction in mortality and cancer spread by patients who took a low-level dose of aspirin in addition to their cancer treatment (average study follow-up length over 5 years).

The researchers found that there is a growing body of evidence that taking aspirin is of significant benefit in reducing some cancers. Whilst it is known that a low-dose of aspirin has been shown to reduce the incidence of cancer, its role in the treatment of cancer remains uncertain. The team's review looked at all of the available data including five randomised trials and forty two observational studies of colorectal, breast and prostate cancers. (MD Anderson Cancer Center; Science Daily; Elwood, *et al*, 2016).

### Aspirin can lower cancer mortality

There is some evidence from randomised trials that short-term (2–3 years) aspirin use can lower cancer mortality. When compared with controls, aspirin use resulted in fewer deaths due to cancer. Aspirin also tended to reduce the incidence of female reproductive cancers and death due to colorectal cancer and lymphoma (Yelsengekar & Mahandas, 2012).

### Aspirin and a decreased risk for cancer

According to Pasche, *et al.* (2014) an association between intake of aspirin and decreased cancer risk was identified in the past decades. Whether aspirin can be used as an anticancer agent in patients with a diagnosis of cancer was unknown until recently. Recent studies suggest that aspirin might provide therapeutic benefit in the adjuvant treatment of certain forms of cancer.

### Aspirin, lifestyle and colon cancer

Lifestyle, including aspirin use, has the effect of modulating age-associated DNA methylation changes in the colonic epithelium and thereby impacts the evolution of cancer methylomes in colon cancer (Noreen, *et al.*, 2014).

In a study carried out by researchers from a number of institutions across Europe and the US, including Queen Mary University of London, it was found that people aged between 50 and 65 who take aspirin every day for 10 years could cut their risk of bowel cancer by 30% and cancers of the throat and stomach by 25%, according to the study published in the *Annals of Oncology*. Aspirin is an antiplatelet, which means it reduces the risk of clots forming in your blood. Platelets may also protect cancer cells in the body, and it has been suggested aspirin's effect on them may hinder this process. However, the exact mechanism is not well understood and more research is needed.

Taking aspirin every day comes with a serious health warning as it can cause serious side effects such as ulcers and bleeding from the stomach, particularly in elderly people. However, the researchers argue the benefits of taking the drug need to be balanced against the harms. Anyone thinking of taking aspirin for prevention should talk to their medical practitioner first (NHS Choices.UK; WebMD).

The earliest and strongest evidence that aspirin can prevent cancer emerged from studies showing that a daily dose of aspirin reduced the risk of colorectal cancer by 20%. Early on, it appeared that people had to take aspirin for at least five years to reduce their risk of developing cancer, but some of the newer studies suggest that 2 years may also help prevent cancer (Booker).

#### Aspirin as a promising agent for cancer prevention and treatment

High-quality evidence suggests that aspirin is a promising agent for cancer prevention and treatment. Direct inhibition of cyclooxygenase-2 (COX-2) pathway is generally thought to be the main mechanism by which aspirin inhibits cancer development. However, either pharmacological properties of aspirin or recent results of epidemiologic studies do not support that mechanism. To address this inconsistency, we hypothesize that antiplatelet effect of aspirin via inhibition of COX-1 may be one of potential mechanisms to inhibit carcinogenesis. Aberrant platelet activation will lead to promote hostility of tumour microenvironment by releasing an abundant array of angiogenesis regulators. Given the outstanding ability of antiplatelet, aspirin may restore balance of pro- and anti-angiogenic factors released from platelet to "normalise" tumour vasculature and shape tumour microenvironment to some extent, which will not only diminish tumour aggressiveness and progression, but also enhance the sensitivity to therapeutic treatment. Thus, targeting the platelet activation leading to alter tumour microenvironment may provide a novel way to tumour therapy (Su, *et al.*, 2014).

#### Anti-cancer effects of Aspirin

According to Alfonso, *et al.*, (2104) Salicylates from plant sources have been used for centuries by different cultures to treat a variety of ailments such as inflammation, fever and pain. A chemical derivative of salicylic acid, aspirin, was synthesised and mass produced by the end of the 19th century and is one of the most widely used drugs in the world. Its cardio-protective properties are well established; however, recent evidence shows that it can also act as a chemo-preventive agent. Its antithrombotic and anti-inflammatory actions occur through the inhibition of cyclooxygenases. The precise mechanisms leading to its anticancer effects are not clearly established, although multiple mechanisms affecting enzyme activity, transcription factors, cellular signalling and mitochondrial functions have been proposed. This review presents a brief account of the major COX-dependent and independent pathways described in connection with aspirin's anticancer effects. Aspirin's unique ability to acetylate biomolecules besides COX has not been thoroughly investigated nor have all the targets of its primary metabolite, salicylic acid been identified. Recent reports on the ability

of aspirin to acetylate multiple cellular proteins warrant a comprehensive study to investigate the role of this posttranslational modification in its anticancer effects. In this review, we also raise the intriguing possibility that aspirin may interact and acetylate cellular molecules such as RNA, and metabolites such as CoA, leading to a change in their function.

#### Aspirin and oesophageal cancer

Aspirin is the most widely used among all nonsteroidal anti-inflammatory drugs (NSAIDs), which is cheap and acceptable to patients. Several observational results provide the further investigation of prevention and therapy of aspirin or similar drugs in oesophageal cancer. Data from case control studies, cohort studies and randomized controlled trials (RCTs) also give some support of a beneficial role of aspirin on oesophageal squamous cell carcinoma (ESCC). Experimental data suggest that aspirin may prevent carcinogenesis of ESCC by favourably affecting proliferation, apoptosis, or other as yet unidentified growth-regulating processes. But the mechanism by which aspirin influence on oesophageal squamous cell carcinoma needs further investigation (Li, Cheng & Zhang, 2014).

#### Aspirin and ovarian cancer

Taking aspirin daily may cut a woman's risk of ovarian cancer by 20%, according to a study published February 6, 2014 in the *Journal of the National Cancer Institute*. This new research adds to the large number of studies conducted in recent years showing aspirin may help prevent certain types of cancers (American Cancer Society).

#### Aspirin and Pancreatic Cancer

Regular use of aspirin by people living in Shanghai, China, was associated with decreased risk for developing pancreatic cancer, according to data published in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research. Data from this new study and meta-analysis of data from 18 other studies suggest that over the past two decades, as the general population's use of aspirin has increased, the effect of aspirin in decreasing pancreatic cancer risk has become more pronounced (Science Daily).

### **The Daily Aspirin Dose Matters**

A standard dose of aspirin (one pill) is typically 325 mgs, and a low-dose or 'baby' aspirin is 81mg. Although called baby aspirin, children under 12 should not take aspirin due to the risk of Reye's Syndrome. In a study that compared daily use of very low dose aspirin (30mg) to a daily dose of 283mg for preventing vascular events, researchers found no significant difference in cancer deaths between the two groups. In six studies of daily low-dose aspirin use (75 to 100 mg) for preventing vascular events, aspirin reduced the risk for cancer by almost 25% after at least 3 years of aspirin therapy.

Daily aspirin use appeared to be particularly beneficial in reducing the risk for certain cancers of the female reproductive organs. For instance, there were significantly fewer cases of uterine cancer among the women taking aspirin every day than among the women who did not take aspirin (zero cases among women taking aspirin as compared to 9 cases in the non-aspirin group).

[Picture Credit: Aspirin]



At doses as low as 75mg, daily aspirin not only lowered the risk of heart attack and stroke, but it appears to have prevented many types of cancer, including colon cancer and uterine cancer, as well as slowed the spread of cancer to distant organs. The usual dose that is prescribed is 81mg daily. Higher aspirin doses, which increase the risk of ulcer and internal bleeding, did not appear to work any better.

While these studies are exciting and reveal aspirin to be more of a wonder drug than we ever imagined, it is important to remember that aspirin therapy is NOT for everyone. Aspirin belongs to a group of medications known as 'blood thinners'. These drugs prevent the body from making potentially harmful clots that can block blood vessels and cause heart attacks and strokes. Patients already taking blood thinners who take aspirin may be at an increased risk for internal bleeding, ranging from mild to life-threatening. Those with severe liver and kidney disease are warned against using aspirin given the potentially toxic effects on these organs. In addition, asthma patients may be particularly sensitive to aspirin and can, as a result, experience asthma-related complications (Booker).

Not all over-the-counter pain relievers contain aspirin. If a health care provider prescribes daily aspirin to lower the risk of a heart attack and clot-related stroke, or to assist in lowering the risk for cancer, read the labels carefully to make sure it is the right product. Some drugs combine aspirin with other pain relievers or other ingredients and should not be used for long-term aspirin therapy (US Food and Drug Administration).

### **CANSA's Position on Aspirin**

Even though Aspirin (salicylic acid) is cheap and freely available, CANSA believes that:

- Aspirin is, indeed, a 'wonder' drug, however, it should be used with caution
- Although taking an occasional aspirin or two would be safe for most adults to use to treat headaches, body aches or fever, daily use of aspirin can have serious side effects, including internal bleeding and allergic reaction especially in individuals who are inclined to allergies or suffer from asthma
- Aspirin should always be used within a safe dosage range
- The proposed safe dosage range of aspirin, for lowering the risk of certain cancers in patients who have consulted with their medical practitioner, is 81mg per day
- The safe dosage range for adults (in cases of fever and/or pain) is 325mg to 650mg orally or rectally every 4 hours as needed, but intake should not exceed 4g per 24 hours
- It should not be indiscriminately given to children and teenagers because of the risk of Reyes syndrome, allergies and possible internal bleeding
- Even though there may be scientific evidence that aspirin is advantageous against some non-communicable diseases like cardiovascular incidents and even in lowering the risk of some cancers, it should NOT be used on a continuous (long-term) basis without prior consultation with a medical practitioner

### **Medical Disclaimer**

This Fact Sheet and Position Statement is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet and Position Statement. So far as permissible by law, the Cancer Association of

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