

# Influence of Blood Group on Development of Cancer and Other Diseases

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**Received date:** July 17, 2021; **Accepted date:** August 14, 2021; **Published date:** August 27, 2021

**Citation:** P.D. Gupta (2021) Influence of Blood Group on Development of Cancer and Other Diseases. *Clinical Cancer and Oncology Research* 1(2) DOI:10.31579/CCOR-2021/010

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## Abstract

On discovery of blood groups Nobel Prize was awarded to Karl Landsteiner, this itself shows its importance. The blood type is inherited, so it's predetermined at birth. One cannot change blood type later in life. O negative is devoid of all immunological markers and hence show the lowest risk for heart disease whereas people with types AB and B are at the greatest risk, which could be a result of higher rates of inflammation for these blood types. Compared with blood type A, blood type B was associated with statistically significant reduced risk of all cancers (HR, 0.91, 95% CI:0.84, 0.99). Both blood types B and AB were associated with significantly lower risk of gastrointestinal cancer and colorectal cancer, respectively [1].

**Keywords:** blood pressure; cancer; gastrointestinal cancer

## Identification and Characteristics of Blood Groups

Nobel laureate Karl Landsteiner discovered the ABO blood group system in 1900[2]. His extensive research on serology based on simple but strong scientific reasoning led to identification of major blood groups such as O, A, and B types, compatibility testing, and subsequent transfusion practices [3-5]. The four human blood groups are defined by the type of glycoproteins — confections of sugar and protein — found on the surface of red blood cells and other cells, including those in the pancreas. A gene known as ABO helps construct these glycoproteins by ordering the placement of sugar molecules on a protein “backbone” called the H antigen. The pattern formed by these sugars determines whether an individual's blood type is A, B, AB, or O. (In the O type, no sugars are attached to the antigen0.

Over a period of time, our understanding on blood groups has evolved to encompass not only transfusion-related problems but also specific disease association with RBC surface antigens. A person's blood group is determined by a pair of genes, one gene inherited from each parent. Each blood group is identified by its own antigens, located on the surface of red blood cells. So, the ABO system has A and B antigens and the RhD system has the D antigen. In all, there are 30 major blood group systems. AB negative is the rarest of the eight main blood types. Blood types percentage wise, O positive: 35%, O negative: 13%, A positive: 30%, A negative: 8%, B positive: 8%, B negative: 2%, AB positive: 2% and AB negative: 1%.

Usually, blood type does not change lifelong, however, in some cases, the blood types have changed. This has been due to unusual circumstances, such as having a bone marrow transplant or getting certain types of cancers or infections. Revisions in laboratory procedures for Rh typing

may present as a change in the Rh blood type of pregnant women-and as a change in their eligibility for Rh immune globulin [6].

## Blood Groups and Diseases

The recent discoveries have led to new insights on how a person's blood type may predispose them to developing a certain disease. People with certain blood types are more likely to have blood clots or bleeding conditions, kidney stones, or pregnancy-induced hypertension. Previous studies have found that people with blood type A or B were more likely to have cardiovascular disease or experience a blood clot than people with type O blood, and that people with type O blood were more likely to have a bleeding condition. Others have suggested that people with certain blood types may be more susceptible to some infectious diseases [4].

Of the eight main blood types, people with type O have the lowest risk for heart disease. People with types AB and B are at the greatest risk, which could be a result of higher rates of inflammation for these blood types. A heart-healthy lifestyle is particularly important for people with types AB and B blood. However, the need for O negative blood is the highest because it is used most often during emergencies. The need for O+ is high because it is the most frequently occurring blood type (37% of the population). The universal red cell donor has Type O negative blood. The universal plasma donor has Type AB blood.

In addition to ABO antigens expressed on red blood cell membranes surface of several other normal and pathological cells and tissues. The role of ABO blood group in cancer biology has been intensely studied by several investigators, and it is now widely recognised that ABO antigens are associated with the risk of developing several types of tumours, namely pancreatic and gastric cancers. The current knowledge of the

underlying pathogenic mechanisms of the association is also analysed [4, 7].

### Blood types indicate greater risk for cancer

The new study demonstrates that while people's overall risk of pancreatic cancer is relatively low — with nearly 40,000 new cases diagnosed annually in the United States, compared with nearly 150,000 new cases of colorectal cancer — people with blood types A, B, or AB were more likely to develop the disease than those with type O. They found that, compared to participants with type O blood, those with type A had a 32 percent higher chance of incurring pancreatic cancer, those with type AB had a 51 percent higher chance, and those with type B had a 72 percent higher chance.

Within the entire group, 17 percent of pancreatic cancers were attributable to inheriting a non-O blood group. But because the lifetime risk of developing the disease is relatively low (estimated at 1.3 percent) and the increased risk associated with blood type is relatively modest, screening tests for pancreatic cancer risk are unlikely to be based on blood type alone. The real value of the findings is what they suggest about the inner workings of the disease, the authors say [8].

Blood-type antigens may also affect the level of inflammatory proteins in a person's blood. Chronic inflammation has been linked to pancreatic cancer risk. Experiments by other investigators have shown that normal pancreas cells carry a different pattern of these blood-type antigens than pancreatic tumor cells do, suggesting that changes in the ABO gene's activity may occur as the cells become cancerous

Intriguing as these findings are, they don't necessarily prove a direct link between blood-type antigens and pancreatic cancer development, the authors assert. It is also possible that the ABO gene is merely a marker for other, nearby genes that are more directly involved in cancer development. "The association between blood type and pancreatic cancer risk provides a new avenue for getting at the biological mechanisms that underlie the disease," Wolpin says. "Understanding the biology will put us in a better position to intervene so the cancer doesn't develop or progress [8]." They found that the risk of pancreatic was lowest among individuals with blood type O. Compared with individuals with blood type O, those with blood type A have a 32% higher risk of developing pancreatic cancer, those with type AB have a 51% higher risk, and those with type B have a 72% higher risk [8]. Even lately SARS Co V2 has preference for infection according to blood groups [9].

### Current Opinion

The study done by multiple authors [10], concluded that "there is still very little information available about whether people with RhD-positive or RhD-negative blood groups may be at risk of certain diseases, or how many more diseases may be affected by blood type or group. Dahlén and colleagues scanned Swedish health registries with information on more than five million people for links between ABO blood type or RhD-positive or RhD-negative blood groups and more than 1,000 disease [10,11]. They found 49 diseases that were linked to ABO blood types, and one that was linked to the RhD group. And women who were RhD-positive were more likely to experience pregnancy-induced hypertension.

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DOI: [10.31579/CCOR-2021/010](https://doi.org/10.31579/CCOR-2021/010)

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