

Why women are more likely to report vaccine side effects

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It's perfectly normal for people to notice side effects from vaccines. These tell us that the immune system is responding to fight the disease—as it should.

However, far more [side effects](#) have been reported in [women](#) than in men after receiving the [coronavirus](#) vaccination in Norway, in relation to the gender distribution of the vaccine doses.

The Norwegian Medicines Agency has so far received reports of 5,635 suspected cases of side effects, 4,684 of which were reported by women. [Their report on vaccine side effects is now available.](#)

And the numbers fit a bigger picture.

When researchers at the US Centers for Disease Control and Prevention (CDC) analyzed data from the first 13.7 million vaccine doses, they found the same thing.

Almost 80 percent of the reported side effects were among women, although only a little over 60 percent of those vaccinated at that time were women.

One explanation may be that women are more likely to report side effects to the healthcare system. But [biological differences](#) related to gender may be part of the reason.

Women more likely to have a severe reaction

"This gender difference is completely in line with previous reports from other vaccines," microbiologist and immunologist Sabra Klein, from the Johns Hopkins Bloomberg School of Public Health, told the *New York Times* about the CDC figures.

Women also more often experienced the very rare but severe reactions to the coronavirus vaccines, according to the CDC's analysis of the first 13.7 million doses in the United States.

All 19 people who experienced so-called anaphylactic reactions after the Moderna vaccine were women. Women comprised 44 of the 47 individuals who experienced an anaphylactic reaction after the Pfizer vaccine.

Most of the people who developed a rare blood clot problem after the AstraZeneca [vaccine](#) were women under the age of 60, according to a press release from the European Medicines Agency, the EMA.

However, a review of the cases did not provide a basis for determining any specific risk factors, including gender or age, according to the EMA.

Strong immune response, for better or worse

Gender differences in relation to vaccines have received more attention in recent years, researchers wrote in an article in the journal *Seminars in Immunopathology*, in 2019.

Women and girls tend to develop stronger antibody responses and experience more side effects after vaccination than men, the researchers wrote.

Young people tend to have stronger immune responses than older people in general, because the [immune system](#) weakens with age. And women's immune systems tend to mobilize more strongly than men's.

"After infections, women tend to have stronger immune responses than men, both from antibodies and stronger T-cell responses," says Gunnveig Grødeland, an immunologist and researcher at the Department of Clinical Medicine at the University of Oslo (UiO).

Strong immune responses can be beneficial when the body is fighting off

disease.

"But the disadvantage for women is that they can also experience stronger autoimmune responses, meaning that the immune system attacks things in the body that belong there," Grødeland said.

In general, far more women than men are affected by autoimmune diseases, according to [a research review from 2020](#).

But at the same time, women may have other biological benefits.

X chromosome and hormones

"It may be that hormones affect how the body copes with infections, but it is not known whether testosterone plays a separate role. There is a lot of research that needs to be done," said Anne Spurkland, an immunologist and professor of medicine at UiO to forskning.no at the start of the coronavirus pandemic, [in an article about why more men than women seemed to die of COVID-19](#) (in Norwegian). This gender difference still applies.

Perhaps sex chromosomes also contribute to the difference in how the immune system works more generally in women and men.

Many genes linked to the immune system are on the x chromosome—of which women have two and men have one, [The New York Times](#) writes.

A woman's additional x chromosome also helps weed out genetic diseases.

"There are many more genetic diseases in men. If there is a gene defect on one [x chromosome](#), the other can correct it," says Grødeland.

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