What is vaccination?

Vaccines are one of the most convenient and safe preventive care measures available. A vaccine stimulates our immune system to recognize and fight off any foreign invaders in the body, and after getting vaccinated we develop immunity to these foreign agents. If our body is exposed to these agents later, our immune system will immediately destroy them and prevent us from getting ill. This is what makes vaccines such powerful tools - unlike most medicines, which treat or cure diseases, vaccines prevent us from getting diseases in the first place. Furthermore, vaccines can protect us from diseases for which there is no cure. One such example is polio. As recently as the 1950s, polio was America’s most-feared disease, causing death and paralysis in its victims; however, due to vaccination, there are now no reports of polio in the United States. Another success story comes from smallpox vaccination that eradicated the disease worldwide so that our children no longer run the risk of catching this dangerous disease. Overall, immunizations currently prevent 2-3 million deaths every year worldwide from diseases like diphtheria, tetanus, pertussis, influenza, and measles.

Why should you be vaccinated?

It is true that no medical treatment or drug will ever be 100% effective and safe for all people. However, history and science inform us that the benefits of vaccinations far outweigh the risks involved and that the vast majority of societal objections to vaccinations derive from misinformation and hysteria. In short, we feel that all people that can be vaccinated should be vaccinated. The scientific evidence accumulated over many decades argues overwhelmingly that vaccination is among the single best preventative measures a person can take not only for their own health but for the health of those around them. Without mass vaccination, common diseases of the past like diphtheria, smallpox, and measles would continue to run unchecked through the population and needlessly disable or kill thousands of people, in many cases children. The constant presence of lethal infectious disease in the population means the constant disruption of society, including economic disruptions that can lead to mass unemployment and poverty. It is also a fact that there are several people in the community that, for whatever reason, cannot receive vaccines due to compromises to their own immune systems. These people rely on “herd immunity”, or immune protection from a disease in a significant majority of the population, to protect themselves. It is our duty as good citizens to protect those around us that, through no fault of their own, are unable to protect themselves.

Why do some people elect to not be vaccinated?

In recent years, there has been a rise in the number of Americans unwilling to vaccinate, which presents a health concern that not only hurts those individuals not vaccinated but also the general population. One of the more common objections is for religious reasons or reasons of conscience. Virginia has a long history of protecting religious liberty beginning with the Virginia Statute for Religious Freedom written by Thomas Jefferson. We respect these central and sincere beliefs felt by some in the community but also hope that these beliefs are accompanied by a rational consideration of the welfare of family and community in making decisions to vaccinate.

More often, the reasons for opposing vaccination derive from popular misinformation that leads to objections based on personal beliefs or philosophical reasons. These include beliefs that getting diseases prevented by vaccination strengthens the immune system, that the probability of getting diseases prevented by vaccination is incredibly rare, or that the side effects
of vaccines are worse than the preventable disease. Several individuals also subscribe to safety concerns that have been found to be minimal many times over by numerous scientific studies, including the presence of toxic adjuvants and preservatives, linkages between vaccination and autism, sudden infant death syndrome, or Guillain-Barré syndrome, and the presence of severe side effects like febrile seizures allegedly connected to receiving multiple vaccines at the same time. Finally, others object to vaccination due to misinformation or mistrust of the healthcare system due to a misunderstanding of the scientific process, media reports or social media posts that sensationalize rare side effects, or a small minority of medical doctors that endorse or practice alternative medicine. Unfortunately, the scientific community must also overcome a lack of trust from the general public derived from the historical mistreatment of minority populations (e.g., the mistreatment of African-Americans by the scientific and medical community as exemplified by the Tuskegee syphilis study and the treatment of citizens like Henrietta Lacks), the profit motive of private companies that produce vaccines, and previous instances of failing to ensure the safety of drugs during clinical trials such as occurred with Vioxx and fen-phen.

**Conclusion**

The vast majority of the concerns listed here come from a well-meaning but misguided fear that a medical treatment proven to promote good health will do just the opposite. With rare exception, this could not be further from the truth. Mathematical modeling reveals that universal vaccination can largely curtail or eliminate the threat of most infectious diseases even if the vaccine is only ~70% effective (Bartsch et al., 2020). This argues for the use of vaccines as a public health tool to be used by as many in the community as possible to protect as many people as possible. In summary, the Virginia Academy of Science feels that it is our responsibility to the Commonwealth of Virginia and the nation as a whole to work against misinformation on vaccination and to promote all who are able to receive vaccinations to protect themselves and to protect society.

**Suggested further reading:**

General information on vaccines and vaccination from the Centers for Disease Control (CDC): [https://www.cdc.gov/vaccines/index.html](https://www.cdc.gov/vaccines/index.html)

Information from the CDC on vaccine safety: [https://www.cdc.gov/vaccinesafety/concerns/index.html](https://www.cdc.gov/vaccinesafety/concerns/index.html)

Reasons to be vaccinated, from the U.S. Department of Health and Human Services (HHS) [https://www.vaccines.gov/get-vaccinated/for_parents/five_reasons](https://www.vaccines.gov/get-vaccinated/for_parents/five_reasons)

Reasons to be vaccinated, from the National Foundation for Infectious Diseases [https://www.nfid.org/immunization/10-reasons-to-get-vaccinated/](https://www.nfid.org/immunization/10-reasons-to-get-vaccinated/)