

# Periodic Graphics

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A collaboration between C&EN and  
Andy Brunning, author of the popular  
graphics blog *Compound Interest*

## HOW DOES IMMUNITY WORK?

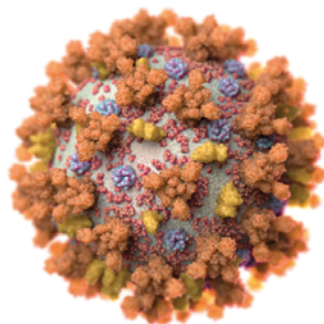
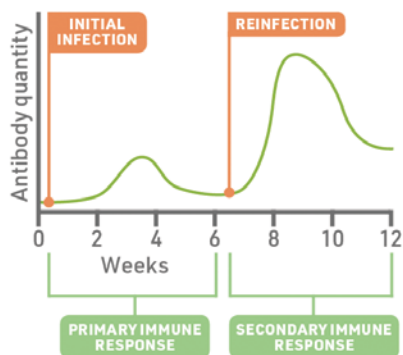
When you recover from a virus, what stops you from catching it again? How long does protection from a vaccine last? This graphic takes a look.

### THE IMMUNE RESPONSE

When your body detects an antigen (infectious agent), it releases antibodies. These bind to the antigen, neutralizing it or marking it to be destroyed by immune cells.



Our immune system's memory cells "remember" previous antigens. If we're infected again, the cells rapidly generate antibodies to get rid of the antigens. This is what we refer to as immunity.



VIRUS

### TESTING FOR IMMUNITY

Different antibodies have different production start times and durations in our blood. We can test for them to tell if someone has had an infection.

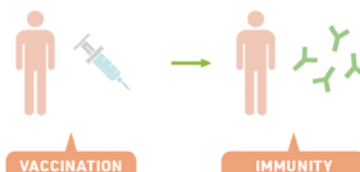
ANTIBODY TYPE	IgM	IgG
WHEN PRODUCTION STARTS AFTER INFECTION	5-10 days	10-14 days

### ANTIBODY TEST RESULTS

IgM	IgG	Result
✗	✗	No infection
✓	✗	Early-stage infection
✓	✓	Active infection
✗	✓	Past infection

### VACCINES AND IMMUNITY

Vaccines commonly use inactivated viruses or antigen fragments to imitate infection without causing disease. The vaccine triggers an immune response so that our immune system's memory cells recognize the virus or other antigen if we're ever infected.



For some diseases, vaccine-induced immunity lasts a lifetime. For others, it fades over time. For example, flu viruses mutate, meaning that existing antibodies don't recognize them and yearly vaccination is needed.

