

## Influenza Outbreak Investigation N1 Protein Sequences

>A/Michigan/45/2015 (H1N1)-2017-Present Vaccine

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVVFIREPFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVC RDNWHGSNRPWVSFNQNL EYQMGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGF SFKYNGVWIGRTKSISSRKGFEMIWD PNGWTGTDNKFSIKQDIVGINE  
WSGYSGSFVQHP ELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSD TVGWSWPDGAELPFTIDK

> A/California/07/2009(H1N1)-2011-2016 Vaccine

MNPNQKIITIGSVCMTIGMANLILQIGNIISIWISHSIQLGNQNIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVVFIREPFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPDNGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTVM  
TDGPSNGQASYKIFRIEKGKIVKSVEMNAPNYHYEECSCYPDSSEITCVC RDNWHGSNRPWVSFNQNL EYQIGYICSGIF  
GDNPRPNDKTGSCGPVSSNGANGVKGF SFKYNGVWIGRTKSISSRN GFEMIWD PNGWTGTDNNFSIKQDIVGINE  
WSGYSGSFVQHP ELTGLDCIRPCFWVELIRGRPKENTIWTSGSSISFCGVNSD TVGWSWPDGAELPFTIDK

> A/Brisbane/59/2007(H1N1)-2008-2010 Vaccine

MNPNQKIITIGSISIAIGIISLMLQIGNIISIWASHSIQTGSQNNTGICNQRIITYENSTWVNHTYVNINNTNVVAGEDKTS  
VTLAGNSSLC SISGWAIYTKDNSIRIGSKGDVVFIREPFISC SHLECRTFFLTQGALLNDKHSNGTVKDRSPYRALMSCPLG  
EAPSPYNSKFESVAWSASACHDGMGWL TIGISGPDNGAVAVLKYNGIITGTIKSWKKQILRTQESECVCMMNGSCFTIM  
TDGPSNKAASYKIFKIEKGKVT KSIELNAPNFHYEECSCYPDTGIVMCVCRDNWHGSNRPWVSFNQNL DYQIGYICSGV  
FGDNPRPEDGEGSCNPVTVDGANGVKGF SYKYDNGVWIGRTKSNRLRKGFEMIWD PNGWTNTDSDFSVKQDVVAI  
TDWSGYSGSFVQHP ELTGLDCIRPCFWVELVRGLPRENTTIWTSGSSISFCGVNSD TANWSWPDGA

>Patient A11

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVVFIREPFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVC RDNWHGSNRPWVSFNQNL EYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGF SFKYNGVWIGRTKSISSRKGFEMIWD PNGWTGTDNKFSIKQDIVGINE  
WSGYSGSFVQHP ELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSD TVGWSWPDGAELPFTIDK

>Patient A12

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVVFIREPFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVC RDNWHGSNRPWVSFNQNL EYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGF SFKYNGVWIGRTKSISSRKGFEMIWD PNGWTGTDNKFSIKQDIVGINE  
WSGYSGSFVQHP ELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSD TVGWSWPDGAELPFTIDK

>Patient A13

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVVFIREPFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVC RDNWHGSNRPWVSFNQNL EYQVGYICSGVF

GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient A17

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient B11

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient B12

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient B13

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient B17

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient C11

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSYCPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF

GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient C12

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient C13

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient C17

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient D11

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient D12

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNVWIGRTKSISSRKGFEMIWDPNNGWTGTDNKFQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient D13

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFPISCSPLECRFTFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSSEITCVCRDNWHGSNRPWVSFNQNLQYQVGYICSGVF

GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNGVWIGRTKSISSRKGFEMIWDPNGWTGTDNKFSIKQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK

>Patient D17

MNPNQKIITIGSICMTIGMANLILQIGNIISIWVSHSIQIGNQSQIETCNQSVITYENNTWVNQTYVNIISNTNFAAGQSV  
VSVKLAGNSSLCPVSGWAIYSKDNSVRIGSKGDVFIREFISCSPLECRTFFLTQGALLNDKHSNGTIKDRSPYRTLMSCP  
IGEVPSPYNSRFESVAWSASACHDGINWLTIGISGPD SGAVAVLKYNGIITDTIKSWRNNILRTQESECACVNGSCFTIMT  
DGPSDGQASYKIFRIEKGKIIKSVEMKAPNYHYEECSCYPDSEITCVC RDNWHGSNRPWVSFNQNLEYQVGYICSGVF  
GDNPRPNDKTGSCGPVSSNGANGVKGFSFKYGNGVWIGRTKSISSRKGFEMIWDPNGWTGTDNKFSIKQDIVGINE  
WSGYSGSFVQHPELTGLDCIRPCFWVELIRGRPEENTIWTSGSSISFCGVNSDTVGWSWPDGAELPFTIDK