

cobas[®] MPX

Multiplex HIV, HCV & HBV nucleic acid test

For in vitro diagnostic use



cobas[®] MPX – 192	P/N: 09288538190
cobas[®] MPX – 480	P/N: 09040862190
cobas[®] MPX Control Kit	P/N: 09040846190
cobas[®] NHP Negative Control Kit	P/N: 09051554190
cobas[®] omni MGP Reagent	P/N: 06997546190
cobas[®] omni Specimen Diluent	P/N: 06997511190
cobas[®] omni Lysis Reagent	P/N: 06997538190
cobas[®] omni Wash Reagent	P/N: 06997503190

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Intended use

cobas® MPX, for use on **cobas® 5800/6800/8800 Systems** is a qualitative in vitro nucleic acid screening test for the direct detection of Human Immunodeficiency Virus Type 1 (HIV-1) Group M RNA, HIV-1 Group O RNA, Human Immunodeficiency Virus Type 2 (HIV-2) RNA, Hepatitis C Virus (HCV) RNA, and Hepatitis B Virus (HBV) DNA in human plasma and serum.

This test is intended for use to screen donor samples for HIV-1 Group M RNA, HIV-1 Group O RNA, HIV-2 RNA, HCV RNA, and HBV DNA in plasma and serum samples from individual human donors, including donors of whole blood, blood components, source plasma and other living donors. This test is also intended for use to screen organ and tissue donors when donor samples are obtained while the donor's heart is still beating and in testing of cadaveric (non-heart beating) donors. Plasma and serum from all donors may be screened as individual samples. For donations of whole blood and blood components, plasma and serum samples may be tested individually or plasma may be tested in pools comprised of not more than six individual samples. For donors of hematopoietic stem/progenitor cells (HPCs) sourced from bone marrow, peripheral blood or cord blood, and for donors of donor lymphocytes for infusion (DLI), plasma may be tested in pools comprised of not more than six individual samples. For donations of source plasma, samples may be tested in pools comprised of not more than 96 individual samples. For donations from cadaveric (non-heart beating) organ and tissue donors, samples may only be screened as individual sample.

This test is intended to be used in conjunction with licensed serology tests for HIV, HCV, and HBV.

For an individual sample, results are simultaneously detected and discriminated for HIV, HCV, and HBV.

cobas® MPX can be considered a supplemental test that confirms HIV-1 infection for samples that are repeatedly reactive on a licensed donor screening test for antibodies to HIV-1 and reactive for HIV on **cobas® MPX**. **cobas® MPX** is not intended to be used as a supplement test to confirm HIV-2 infection.

cobas® MPX can be considered a supplemental test that confirms HCV infection for samples that are repeatedly reactive on a licensed donor screening test for antibodies to HCV and reactive for HCV on **cobas® MPX**.

cobas® MPX can be considered a supplemental test that confirms HBV infection for samples that are repeatedly reactive on a licensed donor screening test for Hepatitis B surface antigen and reactive for HBV on **cobas® MPX**.

This test is not intended for use as an aid in diagnosis of HIV, HCV, or HBV.

This test is not intended for use on samples of cord blood.

Summary and explanation of the test

Background: Screening of blood for transfusion-transmitted viral infections

A major concern regarding the transfusion of blood and blood components is the potential for transmission of viral infections, particularly with HIV-1, HIV-2, HCV, and HBV. These agents are primarily transmitted by exposure to contaminated blood or blood and plasma products, exposure to certain body tissues or fluids, by sexual contact, or by an infected mother to her newborn child.

HIV-1 is prevalent globally, with an estimated overall prevalence of 1.1% (0.56% in North America and 0.25% in Western Europe).¹ Persons infected with HIV-1 can experience a brief, initially acute, flu-like illness associated with high levels of viremia in peripheral blood within 3 to 6 weeks of initial infection. There are currently three principal genetic groups for HIV-1: Group M (main), Group N (non-M-non-O), and Group O (outlier). Group M is highly prevalent and is divided into 9 subtypes, as well as several circulating recombinant forms (CRFs).²⁻⁴

HIV-2 was first isolated in 1986 from patients in West Africa. Both HIV-1 and HIV-2 have the same modes of transmission and are associated with similar opportunistic infections and Acquired Immunodeficiency Syndrome (AIDS).^{5,6} The prevalence of HIV-2 in some African nations reaches more than 1%, and HIV-2 is a growing concern in certain parts of Europe and India.⁷⁻¹¹ The first case of HIV-2 infection in the United States (US) was diagnosed in 1987. The Centers for Disease Control and Prevention (CDC) advise that continued surveillance is needed to monitor HIV-2 in the US population.¹²

HCV is considered to be the principal etiologic agent responsible for 90% to 95% of post transfusion non-A and non-B hepatitis cases.¹²⁻¹⁵ The reported prevalence of HCV varies from 0.5 to 2.0% in Western Europe¹⁶ and between 6% and 40% in Egypt.¹⁷

More than 2 billion people alive today have been infected with HBV at some time in their lives. Of these, about 350 million remain infected chronically and become carriers of the virus.¹⁸⁻²⁰ Both HCV and HBV can result in chronic liver disease, and these viruses are the most common cause of liver cirrhosis and cancer, accounting for 78% of cases globally.²¹

Rationale for NAT testing

Serological screening assays have greatly reduced, but not eliminated, the risk of transmission of viral infections by transfusion of blood and blood products. Testing of whole blood and source plasma donations for HBV was initiated with HBsAg assays in the early 1970s and anti-HBc in the 1980s. In addition to HBV screening, blood and plasma donations are routinely tested for antibodies to HIV and HCV using enzyme immunoassays (EIAs).^{22,23} A residual transmission risk exists from blood donations made during the seroconversion window period, which has been estimated to be approximately 19 days, 65 days and 36 days for HIV-1, HCV and HBV, respectively.²⁴ Testing for the viral nucleic acids (HIV-1 RNA, HCV RNA, and HBV DNA), using nucleic acid amplification technology (NAT) can substantially reduce this risk.^{25,26} With the introduction of NAT, the current residual risk of transfusion in the US is 1:1.5 million for HIV-1, 1:1.2 million for HCV and 1:280,000-1:355,000 for HBV.^{27,28} Similar estimates for Germany, where NAT testing was introduced in 1999, give an estimated residual risk of transfusion transmitted infections of 1:4.3 million, 1:10.9 million and 1:360,000, for HIV-1, HCV and HBV respectively.²⁵ In addition, in the case of HBV, NAT testing will also interdict donors with an occult HBV infection in which HBV DNA is detectable but HBsAg is absent,²⁹ and in vaccinated donors with a breakthrough, subclinical infection.³⁰⁻³²

Explanation of the test

cobas® MPX is a qualitative multiplex test that is run on the **cobas® 5800/6800/8800 Systems**. **cobas® MPX** enables the simultaneous detection and discrimination of HIV RNA, HCV RNA, HBV DNA, and the internal control in a single test of an infected, individual donation or pooled plasma from individual donations. The test does not discriminate between HIV-1 Group M, HIV-1 Group O, and HIV-2.

Principles of the procedure

cobas® MPX is based on real time PCR technology on a fully automated sample preparation (nucleic acid extraction and purification) followed by PCR amplification and detection system. The **cobas® 5800 System** consists of a single, integrated instrument. The **cobas® 6800/8800 Systems** consist of the sample supply module, the transfer module, the processing module, and the analytic module. Automated data management is performed by the **cobas® 5800 or 6800/8800 System** software which assigns test results for all tests as non-reactive, reactive, or invalid. When using the **cobas® 5800 System**, the **cobas® Synergy** software is recommended for reviewing results and printing reports, and it is required to send results to a Laboratory Information Management System (LIMS) or other result management system. When using the **cobas® 6800/8800 Systems**, results can be reviewed directly on the system screen, printed as a report, or sent to a LIMS or other result management system.

Samples can either be tested individually or, optionally, can be tested in pools consisting of multiple samples.

When testing on **cobas**® 5800 Systems, use of the **cobas**® **Synergy** software is required even if pooling is not performed. If pooling in a pre-analytical step is performed, **cobas**® **Synergy** software with the Hamilton MICROLAB® STAR/STARlet IVD may be used.

When testing on the **cobas**® 6800/8800 Systems, the **cobas**® **p** 680 instrument, or **cobas**® **Synergy** software with the Hamilton MICROLAB® STAR/STARlet IVD, may optionally be used in a pre-analytical step if pooling is to be performed.

Nucleic acid from the sample and added armored RNA internal control (IC) molecules (which serve as the sample preparation and amplification/detection process control) is simultaneously extracted. In addition the test utilizes four external controls: three positive and a negative control. Viral nucleic acid is released by addition of proteinase and lysis reagent to the sample. The released nucleic acid binds to the silica surface of the added magnetic glass particles. Unbound substances and impurities, such as denatured protein, cellular debris, and potential PCR inhibitors (such as hemoglobin) are removed with subsequent wash reagent steps and purified nucleic acid is eluted from the magnetic glass particles with elution buffer at elevated temperature.

Selective amplification of target nucleic acid from the donor sample is achieved by the use of virus-specific forward and reverse primers which are selected from highly conserved regions of the viral nucleic acid. For HIV-1 Group M two different regions of the viral genome are amplified (dual target). A thermostable DNA polymerase enzyme is used for both reverse-transcription and amplification. The master mix includes deoxyuridine triphosphate (dUTP), instead of deoxythymidine triphosphate (dTTP), which is incorporated into the newly synthesized DNA (amplicon).³³⁻³⁵ Any contaminating amplicon from previous PCR runs are eliminated by the AmpErase enzyme [uracil-N-glycosylase], which is included in the PCR master mix, when heated in the first thermal cycling step. However, newly formed amplicon are not eliminated since the AmpErase enzyme is inactivated once exposed to temperatures above 55°C.

The **cobas**® MPX master mix contains detection probes which are specific for HIV-1 (Groups M and O), HIV-2, HCV, HBV, and IC nucleic acid. Detection probes for each HIV-1 Group M target are included, along with dual probes for HCV. The specific HIV, HCV, HBV, and IC detection probes are each labeled with one of four unique fluorescent dyes which act as a reporter. Each probe also has a fifth dye which acts as a quencher. The four reporter dyes are measured at defined wavelengths, thus permitting simultaneous detection and discrimination of the amplified HIV, HCV, and HBV targets and the IC.^{36,37} When not bound to the target sequence, the fluorescent signal of the intact probes is suppressed by the quencher dye. During the PCR amplification step, hybridization of the probes to the specific single-stranded DNA template results in cleavage by the 5' to 3' nuclease activity of the DNA polymerase resulting in separation of the reporter and quencher dyes and the generation of a fluorescent signal. With each PCR cycle, increasing amounts of cleaved probes are generated and the cumulative signal of the reporter dye is concomitantly increased. Since the four specific reporter dyes are measured at defined wavelengths, simultaneous detection and discrimination of the amplified HIV, HCV and HBV targets and the IC are possible.

Reagents and materials

cobas® MPX reagents and controls

All unopened reagents and controls shall be stored as recommended in Table 1 to Table 4.

Table 1 cobas® MPX

cobas® MPX Store at 2–8°C 192 test cassette (P/N 09288538190) 480 test cassette (P/N 09040862190)			
Kit components	Reagent ingredients	Quantity per kit	
		192 tests	480 tests
Proteinase Solution (PASE)	Tris buffer, < 0.05% EDTA, calcium chloride, calcium acetate, 8% (w/v) proteinase, glycerol EUH210: Safety data sheet available on request. EUH208: Contains Subtilisin from <i>Bacillus subtilis</i> . May produce an allergic reaction.	22.3 mL	38 mL
Internal Control (IC)	Tris buffer, < 0.05% EDTA, < 0.001% internal control armored RNA construct (non-infectious RNA encapsulated in MS2 bacteriophage), < 0.002% Poly rA RNA (synthetic), < 0.1% sodium azide	21.2 mL	38 mL
Elution Buffer (EB)	Tris buffer, 0.2% methyl-4 hydroxybenzoate	21.2 mL	38 mL
Master Mix Reagent 1 (MMX-R1)	Manganese acetate, potassium hydroxide, < 0.1% sodium azide	7.5 mL	14.5 mL
MPX Master Mix Reagent 2 (MPX MMX-R2)	Tricine buffer, potassium acetate, glycerol, 18% dimethyl sulfoxide, Tween 20, EDTA, < 0.06% dATP, dGTP, dCTP, < 0.14% dUTP, < 0.01% upstream and downstream HIV-1 Group M, HIV-1 Group O, HIV-2, HCV, HBV, and internal control primers, < 0.01% fluorescent-labeled HIV, HCV, and HBV probes, < 0.01% fluorescent-labeled internal control probe, < 0.01% oligonucleotide aptamer, < 0.01% ZO5D DNA polymerase, < 0.01% AmpErase (uracil-N-glycosylase) enzyme (microbial), < 0.1% sodium azide	9.7 mL	17.5 mL

Table 2 cobas® MPX Control Kit**cobas® MPX Control Kit**

Store at 2-8°C

(P/N 09040846190)







Kit components	Reagent ingredients	Quantity per kit	Safety symbol and warning*
MPX Multi-Positive Control (MPX M (+) C)	<p>< 0.001% Synthetic (armored) HIV-1 Group M RNA encapsulated in MS2 bacteriophage coat protein, < 0.001% synthetic (armored) HCV RNA encapsulated in MS2 bacteriophage coat protein, < 0.001% Synthetic (plasmid) HBV DNA encapsulated in Lambda bacteriophage coat protein, normal human plasma, non-reactive by licensed tests for antibody to HCV, antibody to HIV-1/2, HBsAg, antibody to HBc; HIV-1 RNA, HIV-2 RNA, HCV RNA, and HBV DNA not detectable by PCR methods.</p> <p>0.1% ProClin® 300 preservative**</p>	4 mL (4 x 1 mL)	  <p>WARNING</p> <p>H317: May cause an allergic skin reaction.</p> <p>P261: Avoid breathing mist or vapours.</p> <p>P272: Contaminated work clothing should not be allowed out of the workplace.</p> <p>P280: Wear protective gloves.</p> <p>P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention.</p> <p>P362 + P364: Take off contaminated clothing and wash it before reuse.</p> <p>P501: Dispose of contents/ container to an approved waste disposal plant.</p> <p>55965-84-9 Reaction mass of: 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)</p>
MPX HIV-1 O Positive Control (MPX O (+) C)	<p>< 0.001% Synthetic (armored) HIV-1 Group O RNA encapsulated in MS2 bacteriophage coat protein, normal human plasma, non-reactive by licensed tests for antibody to HCV, antibody to HIV-1/2, HBsAg, antibody to HBc; HIV-1 RNA, HIV-2 RNA, HCV RNA, and HBV DNA not detectable by PCR methods.</p> <p>0.1% ProClin® 300 preservative**</p>	4 mL (4 x 1 mL)	  <p>WARNING</p> <p>H317: May cause an allergic skin reaction.</p> <p>P261: Avoid breathing mist or vapours.</p> <p>P272: Contaminated work clothing should not be allowed out of the workplace.</p> <p>P280: Wear protective gloves.</p> <p>P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention.</p> <p>P362 + P364: Take off contaminated clothing and wash it before reuse.</p> <p>P501: Dispose of contents/ container to an approved waste disposal plant.</p> <p>55965-84-9 Reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)</p>

Table 2 cobas® MPX Control Kit**cobas® MPX Control Kit**

Store at 2-8°C



(P/N 09040846190)

Kit components	Reagent ingredients	Quantity per kit	Safety symbol and warning*
MPX HIV-2 Positive Control (MPX 2 (+) C)	< 0.001% Synthetic (armored) HIV-2 RNA encapsulated in MS2 bacteriophage coat protein, normal human plasma, non-reactive by licensed tests for antibody to HCV, antibody to HIV-1/2, HBsAg, antibody to HBc; HIV-1 RNA, HIV-2 RNA, HCV RNA, and HBV DNA not detectable by PCR methods. 0.1% ProClin® 300 preservative**	4 mL (4 x 1 mL)	  <p>WARNING</p> <p>H317: May cause an allergic skin reaction.</p> <p>P261: Avoid breathing mist or vapours.</p> <p>P272: Contaminated work clothing should not be allowed out of the workplace.</p> <p>P280: Wear protective gloves.</p> <p>P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention.</p> <p>P362 + P364: Take off contaminated clothing and wash it before reuse.</p> <p>P501: Dispose of contents/ container to an approved waste disposal plant.</p> <p>55965-84-9 Reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)</p>

* Product safety labeling primarily follows EU GHS guidance

** Hazardous substance

Table 3 cobas® NHP Negative Control Kit

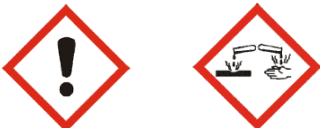
cobas® NHP Negative Control Kit			
Store at 2-8°C (P/N 09051554190)			
Kit components	Reagent ingredients	Quantity per kit	Safety symbol and warning*
Normal Human Plasma Negative Control (NHP-NC)	Normal human plasma, non-reactive by licensed tests for antibody to HCV, antibody to HIV-1/2, HBsAg, antibody to HBc; HIV-1 RNA, HIV-2 RNA, HCV RNA, and HBV DNA not detectable by PCR methods. < 0.1% ProClin® 300 preservative**	16 mL (16 x 1 mL)	  <p>WARNING</p> <p>H317: May cause an allergic skin reaction. P261: Avoid breathing mist or vapours. P272: Contaminated work clothing should not be allowed out of the workplace. P280: Wear protective gloves. P333 + P313: If skin irritation or rash occurs: Get medical advice/ attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P501: Dispose of contents/ container to an approved waste disposal plant.</p> <p>55965-84-9 Reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)</p>

* Product safety labeling primarily follows EU GHS guidance.

**Hazardous substance

cobas® omni reagents for sample preparation

Table 4 cobas® omni reagents for sample preparation*

Reagents	Reagent ingredients	Quantity per kit	Safety symbol and warning**
cobas® omni MGP Reagent (MGP) Store at 2–8°C (P/N 06997546190)	Magnetic glass particles, Tris buffer, 0.1% methyl-4 hydroxybenzoate, < 0.1% sodium azide	480 tests	Not applicable
cobas® omni Specimen Diluent (SPEC DIL) Store at 2–8°C (P/N 06997511190)	Tris buffer, 0.1% methyl-4 hydroxybenzoate, < 0.1% sodium azide	4 x 875 mL	Not applicable
cobas® omni Lysis Reagent (LYS) Store at 2–8°C (P/N 06997538190)	42.56% (w/w) guanidine thiocyanate***, 5% (w/v) polydocanol***, 2% (w/v) dithiothreitol***, dihydro sodium citrate	4 x 875 mL	 <p>DANGER</p> <p>H302: Harmful if swallowed. H314: Causes severe skin burns and eye damage. H412: Harmful to aquatic life with long lasting effects. EUH032: Contact with acids liberates very toxic gas. EUH071: Corrosive to the respiratory tract. P273: Avoid release to the environment. P280: Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection. P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. P304 + P340 + P310: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor. P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.</p> <p>593-84-0 Guanidinium thiocyanate 9002-92-0 Polidocanol 3483-12-3 (R*,R*)-1,4-dimercaptobutane-2,3-diol</p>
cobas® omni Wash Reagent (WASH) Store at 15–30°C (P/N 06997503190)	Sodium citrate dihydrate, 0.1% methyl-4 hydroxybenzoate	4.2 L	Not applicable

* These reagents are not included in the cobas® MPX test kit. See listing of additional materials required (Table 8 + Table 9).

** Product safety labeling primarily follows EU GHS guidance

***Hazardous substance

Reagent storage and handling requirements

Opened reagents shall be stored and will be handled as specified in Table 5 and Table 7.

When reagents are not loaded on the cobas® 5800/6800/8800 Systems, store them at the corresponding temperature specified in Table 5.

Table 5 Reagent storage (when reagent is not on the system)

Reagent	Storage temperature
cobas® MPX – 192T	2–8°C
cobas® MPX – 480	2–8°C
cobas® MPX Control Kit	2–8°C
cobas® NHP Negative Control Kit	2–8°C
cobas® omni Lysis Reagent	2–8°C
cobas® omni MGP Reagent	2–8°C
cobas® omni Specimen Diluent	2–8°C
cobas® omni Wash Reagent	15–30°C

Reagent handling requirements for the cobas® 5800 System

Reagents loaded onto the cobas® 5800 System are stored at appropriate temperatures and their expiration is monitored by the system. The system allows reagents to be used only if all of the conditions shown in Table 6 are met. The system automatically prevents use of expired reagents. Table 6 allows the user to understand the reagent handling conditions enforced by the cobas® 5800 System.

Table 6 Reagent expiry conditions enforced by the cobas® 5800 System

Reagent	Kit expiration date	Open-kit stability	Number of runs for which this kit can be used	On-board stability
cobas® MPX – 192	Date not passed	90 days from first usage	Max 40 runs	Max. 36 days
cobas® MPX – 480	Date not passed	90 days from first usage	Max 40 runs	Max. 36 days
cobas® MPX Control Kit	Date not passed	Not applicable*	Not applicable	Max 36 days
cobas® NHP Negative Control Kit	Date not passed	Not applicable*	Not applicable	Max 36 days
cobas® omni Lysis Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni MGP Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni Specimen Diluent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni Wash Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable

* Single use reagents

** Time is measured from the first time that reagent is loaded onto the cobas® 5800 System.

Reagent handling requirements for the cobas® 6800/8800 Systems

Reagents loaded onto the cobas® 6800/8800 Systems are stored at appropriate temperatures and their expiration is monitored by the system. The system allows reagents to be used only if all of the conditions shown in Table 7 are met. The system automatically prevents use of expired reagents. Table 7 allows the user to understand the reagent handling conditions enforced by the cobas® 6800/8800 Systems.

Table 7 Reagent expiry conditions enforced by the cobas® 6800/8800 Systems

Reagent	Kit expiration date	Open-kit stability	Number of runs for which this kit can be used	On-board stability (cumulative time on board outside refrigerator)
cobas® MPX – 192T	Date not passed	90 days from first usage	Max 30 runs	Max 40 hours
cobas® MPX – 480	Date not passed	90 days from first usage	Max 20 runs	Max 20 hours
cobas® MPX Control Kit	Date not passed	Not applicable*	Not applicable	Max 8 hours
cobas® NHP Negative Control Kit	Date not passed	Not applicable*	Not applicable	Max 10 hours
cobas® omni Lysis Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni MGP Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni Specimen Diluent	Date not passed	30 days from loading**	Not applicable	Not applicable
cobas® omni Wash Reagent	Date not passed	30 days from loading**	Not applicable	Not applicable

* Single use reagents

** Time is measured from the first time that reagent is loaded onto the cobas® 6800/8800 Systems.

Additional materials required for the cobas® 5800 System

Table 8 Materials and consumables for use on **cobas® 5800 System**

Material	P/N
cobas® omni Processing Plate 24	08413975001
cobas® omni Amplification Plate 24	08499853001
cobas® omni Liquid Waste Plate 24	08413983001
CORE Tips with Filter, 1 mL	04639642001
CORE Tips with Filter, 300 µL	07345607001
cobas® omni Liquid Waste Container	07094388001
cobas® omni Lysis Reagent	06997538190
cobas® omni MGP Reagent	06997546190
cobas® omni Specimen Diluent	06997511190
cobas® omni Wash Reagent	06997503190
Solid Waste Bag	07435967001
or	or
Solid Waste Bag with Insert	08030073001
Solid Waste Container (optional)	07094361001

Additional materials required for the cobas® 6800/8800 Systems

Table 9 Material and consumables for use on **cobas® 6800/8800 Systems**

Material	P/N
cobas® omni Processing Plate	05534917001
cobas® omni Amplification Plate	05534941001
cobas® omni Pipette Tips	05534925001
cobas® omni Liquid Waste Container	07094388001
cobas® omni Lysis Reagent	06997538190
cobas® omni MGP Reagent	06997546190
cobas® omni Specimen Diluent	06997511190
cobas® omni Wash Reagent	06997503190
Solid Waste Bag	07435967001
or	or
Solid Waste Bag with Insert	08030073001
Solid Waste Container	07094361001

Instrumentation and software required

The **cobas®** MPX analysis package for the **cobas®** 5800 System shall be installed on the **cobas®** 5800 System. The x800 Data Manager software for the **cobas®** 5800 System will be provided with the system. The **cobas®** Synergy software shall be installed.

The **cobas®** 6800/8800 software and **cobas®** MPX analysis package shall be installed on the instrument(s). The Instrument Gateway (IG) server will be provided with the system.

Table 10 Instrumentation

Equipment	P/N
cobas® 5800 System	08707464001
cobas® 6800 System (Option Moveable)	05524245001 and 06379672001
cobas® 6800 System (Fix)	05524245001 and 06379664001
cobas® 8800 System	05412722001
Sample Supply Module for cobas® 6800/8800 Systems	06301037001
cobas® Synergy software electronic license (for cobas® 5800 System)	09311246001
Options for pipetting and pooling	P/N
cobas® p 680 instrument (for cobas® 6800/8800 Systems)	06570577001
cobas® Synergy software electronic license (for cobas® 6800/8800 Systems)	09311238001
Hamilton MICROLAB® STAR IVD	04640535001
Hamilton MICROLAB® STARlet IVD	04872649001

Refer to the **cobas®** 5800 System User Assistance or the **cobas®** 6800/8800 Systems User Assistance for additional information. Refer to the **cobas®** p 680 instrument User Assistance, or to the **cobas®** Synergy software User Assistance, for additional information about primary and secondary sample tubes accepted on the instruments.

Note: Contact your local Roche representative for a detailed order list for sample racks, racks for clotted tips and rack trays accepted on the instruments.

Precautions and handling requirements

Warnings and precautions

As with any test procedure, good laboratory practice is essential to the proper performance of this assay. Due to the high sensitivity of this test, care should be taken to keep reagents and amplification mixtures free of contamination.

- For in vitro diagnostic use only.
- All samples should be handled as if infectious, using good laboratory procedures as outlined in Biosafety in Microbiological and Biomedical Laboratories and in the CLSI Document M29-A4.^{38,39} Only personnel proficient in handling infectious materials and the use of **cobas® MPX**, **cobas® 5800/6800/8800 Systems** and **cobas® p 680** instrument (for **cobas® 6800/8800 Systems**) or the Hamilton MICROLAB® STAR/STARlet IVD with **cobas® Synergy** software should perform this procedure.
- All human-sourced materials should be considered potentially infectious and should be handled with universal precautions. If spillage occurs, immediately disinfect with a freshly prepared solution of 0.6% sodium hypochlorite in distilled or deionized water (dilute household bleach 1:10) or follow appropriate site procedures.
- **cobas® MPX Control Kit** and **cobas® NHP Negative Control Kit** contain plasma derived from human blood. The source material has been tested by licensed antibody tests and found non-reactive for the presence of antibody to HCV, antibody to HIV-1/2, HBsAg, and antibody to HBc. Testing of normal human plasma by PCR methods also showed no detectable HIV-1 (Groups M and O) RNA, HIV-2 RNA, HCV RNA, and HBV DNA. No known test method can offer complete assurance that products derived from human blood will not transmit infectious agents.
- Do not freeze whole blood.
- The use of sterile disposable pipettes and nuclease-free pipette tips is recommended. Use only supplied or specified required consumables to ensure optimal test performance.
- Closely follow procedures and guidelines provided to ensure that the test is performed correctly. Any deviation from the procedures and guidelines may affect optimal test performance.
- Disruption of the cell-plasma interface or diffusion of material post-centrifugation may result in higher invalid rates.
- False positive results may occur if carryover of samples is not adequately controlled during sample handling and processing.
- Inform your local competent authority about any serious incidents which may occur when using this assay.

Reagent handling

- Handle all reagents, controls, and samples according to good laboratory practice in order to prevent carryover of samples or controls.
- Before use, visually inspect each reagent cassette, diluent, lysis reagent, and wash reagent to ensure that there are no signs of leakage. If there is any evidence of leakage, do not use that material for testing.
- **cobas® omni** Lysis Reagent contains guanidine thiocyanate, a potentially hazardous chemical. Avoid contact of reagents with the skin, eyes, or mucous membranes. If contact does occur, immediately wash with generous amounts of water; otherwise, burns can occur.
- **cobas® MPX kits**, **cobas® omni** MGP Reagent, and **cobas® omni** Specimen Diluent contain sodium azide as a preservative. Avoid contact of reagents with the skin, eyes, or mucous membranes. If contact does occur, immediately wash with generous amounts of water; otherwise, burns can occur. If these reagents are spilled, dilute with water before wiping dry.
- Do not allow **cobas® omni** Lysis Reagent, which contains guanidine thiocyanate, to contact sodium hypochlorite (bleach) solution. This mixture can produce a highly toxic gas.

- Safety Data Sheets (SDS) are available on request from your local Roche representative.
- Dispose of all materials that have come in contact with samples and reagents in accordance with country, state, and local regulations.

Good laboratory practice

- Do not pipette by mouth.
- Do not eat, drink, or smoke in designated work areas.
- Wear laboratory gloves, laboratory coats, and eye protection when handling samples and reagents. Gloves must be changed between handling samples and **cobas®** MPX kits and **cobas® omni** reagents to prevent contamination. Avoid contaminating gloves when handling samples and controls.
- Wash hands thoroughly after handling samples and kit reagents, and after removing the gloves.
- Thoroughly clean and disinfect all laboratory work surfaces with a freshly prepared solution of 0.6% sodium hypochlorite in distilled or deionized water (dilute household bleach 1:10). Follow by wiping the surface with 70% ethanol.
- If spills occur on the **cobas®** 5800 instrument, follow the instructions in the **cobas®** 5800 System User Assistance to properly clean and decontaminate the surfaces of the instrument(s).
- If spills occur on the **cobas®** 6800/8800 instrument, follow the instructions in the **cobas®** 6800/8800 Systems User Assistance to properly clean and decontaminate the surfaces of the instrument(s).

Sample collection, transport and storage

Note: Handle all samples and controls as if they are capable of transmitting infectious agents.

Store all donor samples at specified temperatures.

Sample stability is affected by elevated temperatures.

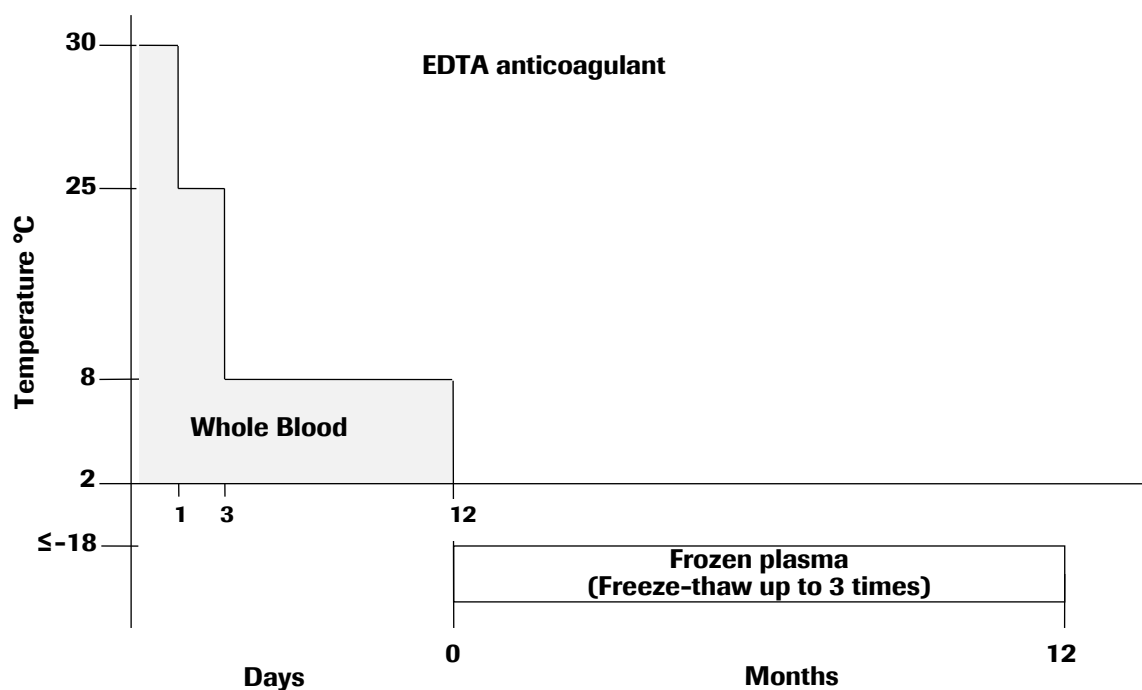
- It is recommended that serum samples are tested within 8 hours of centrifugation at 1600 x g for 20 minutes or are tested within 24 hours of high-speed centrifugation (e.g., 2600 x g for 20 minutes).

Living donor blood samples

- Plasma collected in EDTA, CPD, CPDA1, CP2D and 4% sodium citrate anticoagulant and serum collected in serum clot tubes may be used with **cobas® MPX**. Follow the sample collection tube/bag manufacturer instructions for handling and centrifugation.
- Blood collected in EDTA anticoagulant, Becton-Dickinson EDTA Plasma Preparation Tubes (BD PPT™) or Greiner Vacuette® K2 EDTA Plasma Gel Tubes may undergo additional centrifugation at 600 x g for 5 minutes prior to loading, optional pooling or retesting.
- Blood collected in EDTA anticoagulant may be stored for up to 12 days with the following conditions:
 - Samples must be centrifuged within 72 hours of draw.
 - For storage above 8°C, samples may be stored for 72 hours at up to 25°C, and up to 30°C for 24 hours during the 72 hours.

Other than noted above, samples are stored at 2-8°C. In addition, plasma separated from the cells may be stored for up to 12 months at $\leq -18^{\circ}\text{C}$ with three freeze/thaw cycles. Refer to Figure 1.

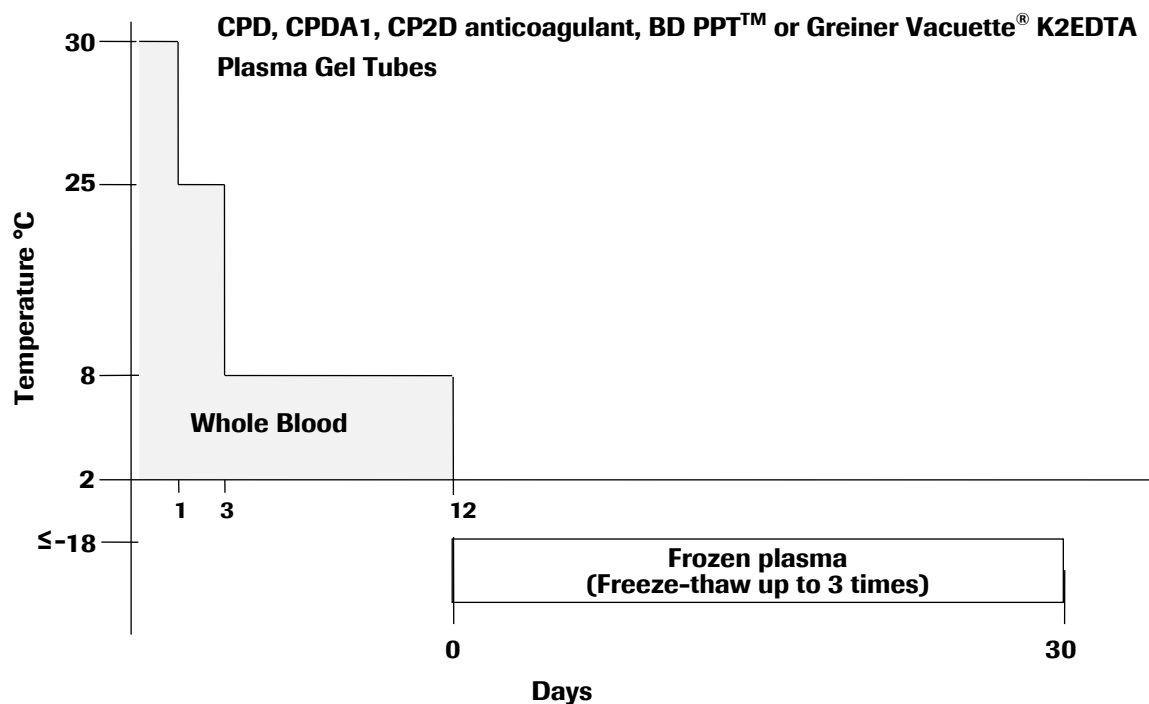
Figure 1 Sample storage conditions for living donor sample in EDTA anticoagulant



- Blood collected in CPD, CPDA1, CP2D anticoagulant, Becton-Dickinson EDTA Plasma Preparation Tubes (BD PPT™) or Greiner Vacuette® K2EDTA Plasma Gel Tubes may be stored for up to 12 days with the following conditions:
 - Samples must be centrifuged within 72 hours of draw.
 - For storage above 8°C, samples may be stored for 72 hours at up to 25°C, and up to 30°C for 24 hours during the 72 hours.

Other than noted above, samples are stored at 2-8°C. In addition, plasma separated from the cells may be stored for up to 30 days at $\leq -18^{\circ}\text{C}$ with three freeze/thaw cycles. Refer to Figure 2.

Figure 2 Sample storage conditions for living donor sample

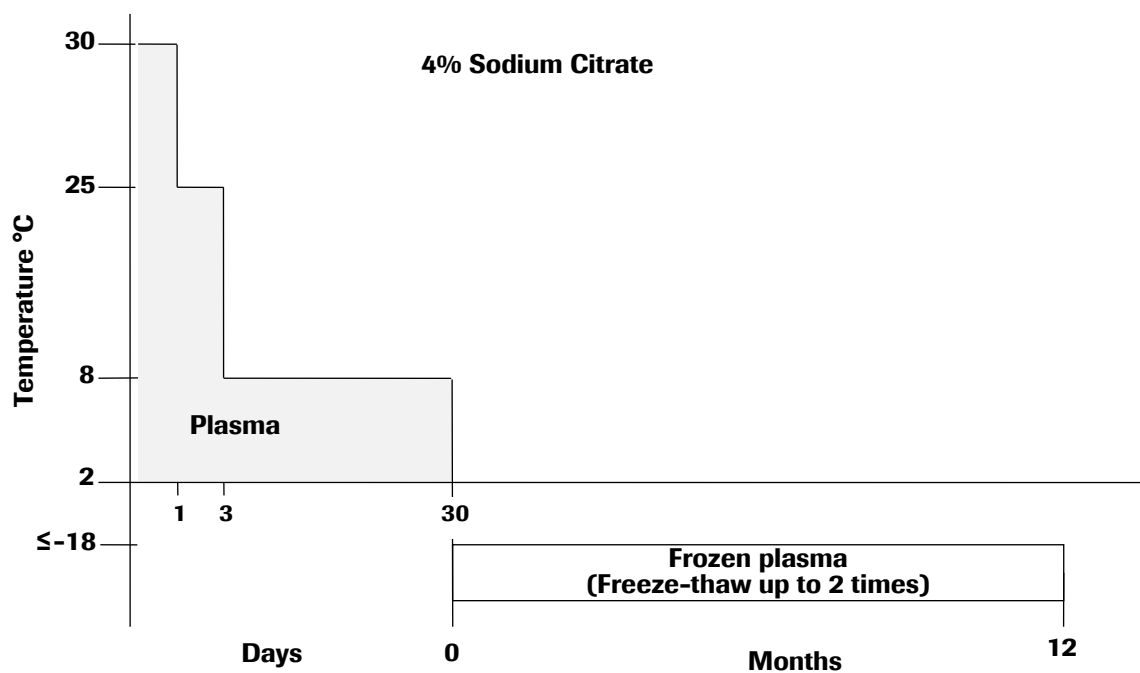


- Blood collected in serum clot tubes may be stored for up to 7 days at 2-8°C with the following conditions,
 - Samples must be centrifuged within 72 hours of draw.
 - For storage above 8°C, samples may be stored for 72 hours at up to 25°C, and up to 30°C for 24 hours during the 72 hours.

Other than noted above, samples are stored at 2-8°C. In addition, serum separated from the cells may be stored for up to 30 days at $\leq -18^{\circ}\text{C}$ with three freeze/thaw cycles.

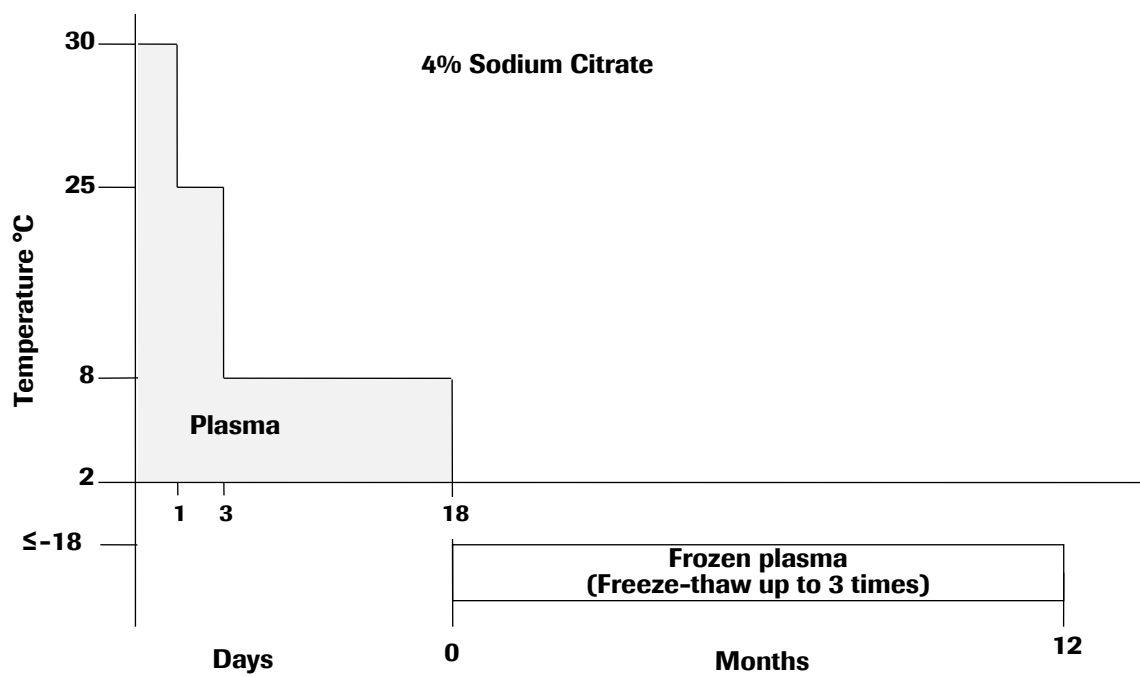
- Plasma collected in 4% sodium citrate anticoagulant may be stored for up to 30 days at 2-8°C with the following two conditions:
 - For storage above 8°C, specimens may be stored for 72 hours at up to 25°C, and up to 30°C for 24 hours during the 72 hours.

In addition, plasma collected in 4% sodium citrate anticoagulant may be stored for up to 12 months at $\leq -18^{\circ}\text{C}$ with two freeze/thaw cycles. Refer to Figure 3.

Figure 3 Sample storage conditions for plasma

- Plasma collected in 4% sodium citrate anticoagulant may be stored for up to 18 days at 2-8°C with the following conditions:
 - For storage above 8°C, samples may be stored for 72 hours at up to 25°C, and up to 30°C for 24 hours during the 72 hours.

In addition, apheresis plasma collected in 4% sodium citrate anticoagulant may be stored for up to 12 months at $\leq -18^{\circ}\text{C}$ with three freeze/thaw cycles. Refer to Figure 4.

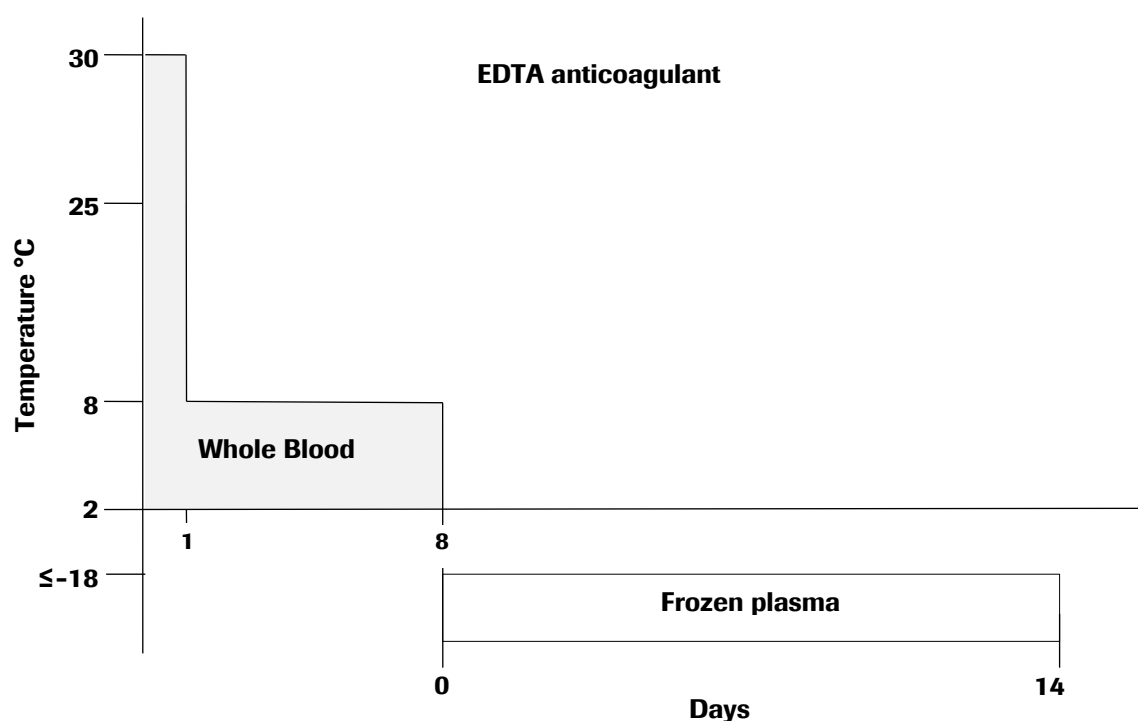
Figure 4 Sample storage conditions for plasma

Cadaveric blood samples

- Cadaveric blood samples collected in EDTA anticoagulant tubes and/or in serum clot tubes may be used with the cobas® MPX test. Follow the sample collection tube/bag manufacturer instructions for handling and centrifugation.
- Cadaveric blood collected in EDTA anticoagulant may be stored for up to 8 days at 2-8°C with the following conditions:
 - Samples must be centrifuged within 72 hours of draw.
 - For storage above 8°C, samples may be stored at up to 30°C, for 24 hours during the 72 hours.

Other than noted above, cadaveric EDTA plasma separated from the cells may be stored for up to 14 days at $\leq -18^{\circ}\text{C}$. Refer to Figure 5.

Figure 5 Sample storage conditions for cadaveric sample



- Cadaveric blood samples collected in serum clot tubes may be stored for up to 5 days at 2-8°C with the following conditions:
 - Samples must be centrifuged within 72 hours of draw.
 - For storage above 8°C, samples may be stored for 24 hours at up to 30°C, during the 72 hours.
- If living donor and/or cadaveric samples are to be shipped, they should be packaged and labeled in compliance with applicable country and/or international regulations covering the transport of samples and etiologic agents.

Instructions for use

Automated sample pipetting and pooling (optional)

The **cobas® p** 680 instrument, or the **cobas® Synergy** software with the Hamilton MICROLAB® STAR/STARlet IVD can be used as an optional component of the **cobas®** 6800/8800 Systems for automated pipetting and pooling of aliquots of multiple primary samples into one pooled sample. Refer to the **cobas® p** 680 instrument User Assistance for more information.

cobas® Synergy software with the Hamilton MICROLAB® STAR/STARlet IVD shall be used as an accessory to the **cobas®** 5800 Systems for automated pipetting and pooling of aliquots of multiple primary samples into one pooled sample.

Procedural notes

- Do not use **cobas®** MPX reagents, **cobas®** MPX Control Kit, **cobas®** NHP Negative Control Kit, or **cobas® omni** reagents after their expiry dates.
- Do not reuse consumables. They are for one-time use only.
- Refer to the **cobas®** 5800 System User Assistance for proper maintenance of instruments.
- Refer to the **cobas®** 6800/8800 Systems User Assistance for proper maintenance of instruments.

Running cobas® MPX on the cobas® 5800 System

The test procedure is described in detail in the **cobas® 5800 System User Assistance**. Figure 6 below summarizes the procedure. Refer to the **cobas® Synergy** software User Assistance as applicable for details on optional pooling procedures.

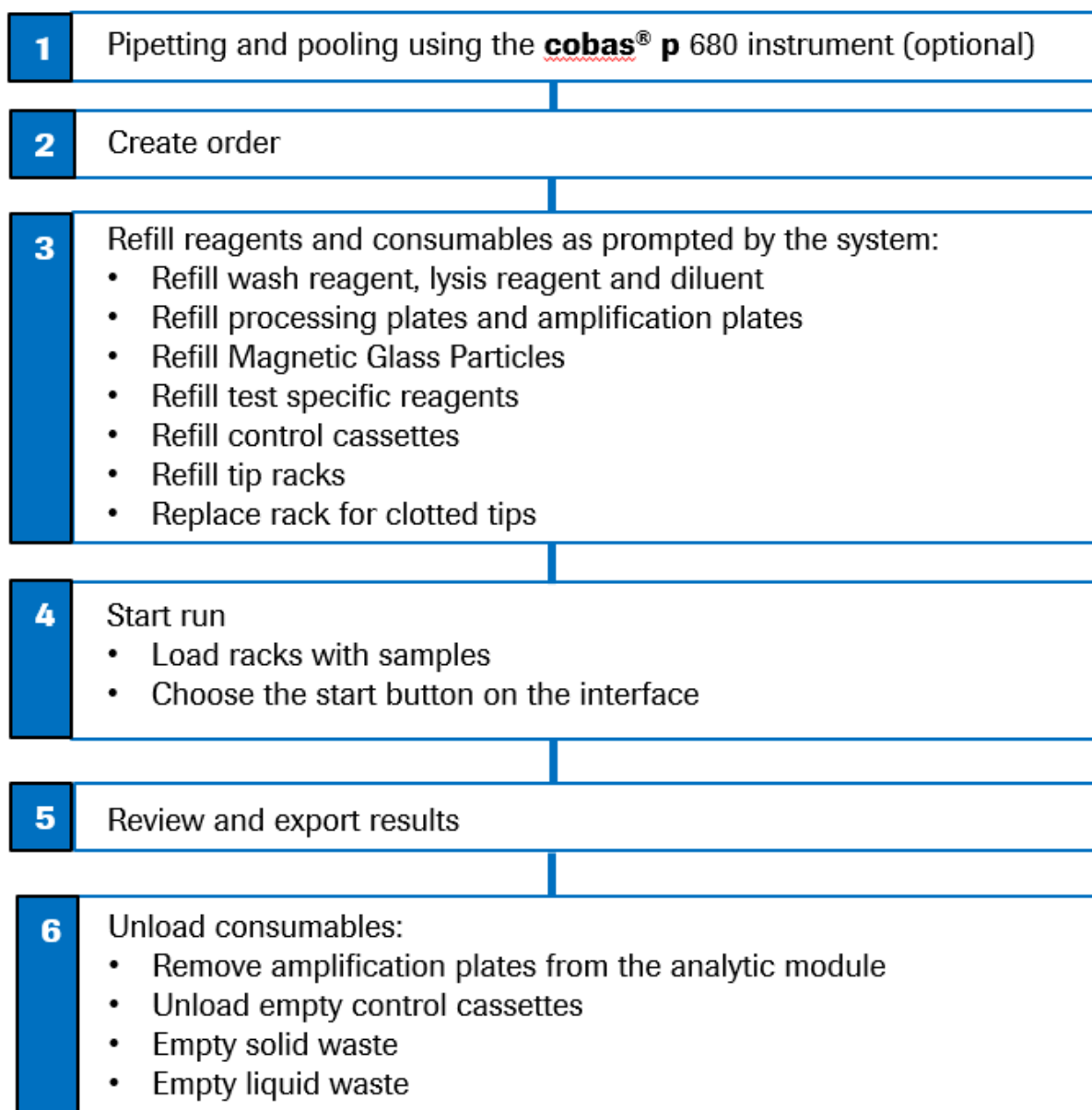
Figure 6 cobas® MPX test procedure on cobas® 5800 System

1	Pipetting and pooling
2	Loading sample racks onto the system <ul style="list-style-type: none"> • Load sample racks onto the system • Order tests manually if no LIS orders are available
3	Refill reagent and consumables as prompted by the system <ul style="list-style-type: none"> • Load test specific reagent cassette(s) • Load control mini racks • Load processing tips • Load elution tips • Load processing plates • Load liquid waste plates • Load amplification plates • Load MGP cassette • Refill specimen diluent • Refill lysis reagent • Refill wash reagent
4	Start the run by choosing the Start button manually on the user interface. All subsequent runs will start automatically if not manually postponed.
5	Review results
6	Remove any sample tubes Clean up the instrument <ul style="list-style-type: none"> • Empty reagent cassettes • Empty Control mini racks • Empty amplification plate drawer • Empty liquid waste • Empty solid waste

Running cobas® MPX on the cobas® 6800/8800 Systems

The test procedure is described in detail in the **cobas® 6800/8800 Systems User Assistance** and the **cobas® p 680 instrument Operator's Manual** or to the **cobas® Synergy** software User Assistance as applicable for details on optional pooling procedures. Figure 7 below summarizes the procedure.

Figure 7 cobas® MPX procedure



Results

The cobas® 5800 and cobas® 6800/8800 System automatically detects and discriminates HIV RNA, HCV RNA, and HBV DNA simultaneously for the samples and controls.

Quality control and validity of results on the cobas® 5800 System

The cobas® 5800 System will be delivered with the default setting of controls (positive and negative) scheduled with every run, but can be configured to a less frequent control schedule, by a Roche service engineer or by contacting Roche customer technical support, based on laboratory procedures and/or local regulations.

- One negative control [(-) C] and three positive controls, [MPX M (+) C, MPX O (+) C, and MPX 2 (+) C] are processed at least every 24 hours or with every new kit lot.
- In the cobas® 5800 System and/or report, check for flags and their associated results to ensure control validity.
- The associated samples are valid if no flags appear for all four controls.

Invalidation of results is performed automatically by the cobas® 5800 System based on negative or positive control failures.

Control results on cobas® 5800 System

The results of the controls are shown in the cobas® 5800 software in the “Controls” app.

- Controls are marked with “Valid” in the column “Control result” if all Targets of the control are reported valid. Controls are marked with ‘Invalid’ in the column “Control result” if all or one Target of the control are reported invalid.
- Controls marked with ‘Invalid’ show a flag in the “Flags” column. More information on why the control is reported invalid including flag information will be shown in the detail view.
- If one of the positive controls is invalid, repeat testing of all positive controls and all associated samples. If the negative control is invalid, repeat testing of all controls and all associated samples.

Table 11 Control flags for negative and positive controls on the cobas® 5800 System

Negative Control	Flag	Control Result	Interpretation
(-) C	A flag is shown	Invalid	The entire batch is assigned invalid if the result for the (-) C is invalid.
Positive Control	Flag	Control Result	Interpretation
MPX M (+) C	A flag is shown	Invalid	The entire batch is assigned invalid if the result for the MPX M (+) C is invalid.
MPX O (+) C	A flag is shown	Invalid	The entire batch is assigned invalid if the result for the MPX O (+) C is invalid.
MPX 2 (+) C	A flag is shown	Invalid	The entire batch is assigned invalid if the result for the MPX 2 (+) C is invalid.

If one of the controls is invalid, repeat testing of the respective control(s) and all associated samples.

Quality control and validity of results on the cobas® 6800/8800 Systems

- One negative control [(-) C] and three positive controls [MPX M (+) C, MPX O (+) C, and MPX 2 (+) C] are processed with each batch.
- In the cobas® 6800/8800 software and/or report, check for flags and their associated results to ensure the batch validity.
- The batch is valid if no flags appear for all four controls.

Invalidation of results is performed automatically by the cobas® 6800/8800 software based on negative and positive control failures.

Control flags on the cobas® 6800/8800 Systems

Table 12 Control flags for negative and positive controls

Negative Control	Flag	Result	Interpretation
(-) C	Q02	Invalid	The entire batch is assigned invalid if the result for the (-) C is invalid.
Positive Control	Flag	Result	Interpretation
MPX M (+) C	Q02	Invalid	The entire batch is assigned invalid if the result for the MPX M (+) C is invalid.
MPX O (+) C	Q02	Invalid	The entire batch is assigned invalid if the result for the MPX O (+) C is invalid.
MPX 2 (+) C	Q02	Invalid	The entire batch is assigned invalid if the result for the MPX 2 (+) C is invalid.

If the batch is invalid, repeat testing of the entire batch including samples and controls.

Interpretation of results

For a valid control batch, check each individual sample for flags in the **cobas**® 5800/6800/8800 software and/or report. The result interpretation should be as follows:

- A valid batch may include both valid and invalid donor sample results dependent on flags obtained for the individual samples.
- Sample results are valid only if the respective positive controls and the negative control of the corresponding batch are valid.

Four parameters are measured simultaneously for each sample: HIV, HCV, HBV, and the internal control. Final sample results for **cobas**® MPX are reported by the software. In addition to the overall results, individual target results will be displayed in the **cobas**® 5800/6800/8800 Systems and should be interpreted as follows:

Table 13 Target results for individual target result interpretation

Target results	Interpretation
HIV Non-Reactive	No target signal detected for HIV and IC signal detected.
HIV Reactive	Target signal detected for HIV and IC signal may be or may not be detected.
HCV Non-Reactive	No target signal detected for HCV and IC signal detected.
HCV Reactive	Target signal detected for HCV and IC signal may be or may not be detected.
HBV Non-Reactive	No target signal detected for HBV and IC signal detected.
HBV Reactive	Target signal detected for HBV and IC signal may be or may not be detected.
Invalid	Target and internal control signal not detected.

If using the **cobas**® **Synergy** software, review of the final result calculation should be performed through the **cobas**® **Synergy** software.

Additional information for interpretation of results on the cobas® 5800 System

The results of the samples are shown in the cobas® 5800 System. It is recommended to review results in the cobas® Synergy software.

- Samples associated with a valid control batch (as defined by your system control configuration) are shown as 'Valid' in the "Control result" column. Samples associated with a failed control batch are shown as 'Invalid' in the "Control result" column.
- If the associated controls of a sample result are invalid, a specific flag will be added to the sample result as follows:
 - Q05D: Result validation failure because of an invalid positive control
 - Q06D: Result validation failure because of an invalid negative control
- The values in "Results" column for individual sample target result should be interpreted as shown in Table 13 above.
 - The cobas® 5800 System will display individual target results. The overall result will be shown only in the result view of the cobas® Synergy software.
 - For more detailed information on sample results and flags refer to the cobas® 5800 System User Assistance

Repeat testing of individual sample(s)

Sample tubes with a final result of Invalid for one target require repeat testing regardless of valid results for the other targets.

An additional centrifugation at 600 x g for 5 minutes may help to reduce repeat invalid results for blood collected in EDTA anticoagulant, Becton-Dickinson EDTA Plasma Preparation Tubes (BD PPT™) or Greiner Vacuette® K2EDTA Plasma Gel Tubes.

Procedural limitations

- cobas® MPX has been evaluated only for use in combination with the cobas® MPX Control Kit, cobas® NHP Negative Control Kit, cobas® omni MGP Reagent, cobas® omni Lysis Reagent, cobas® omni Specimen Diluent, and cobas® omni Wash Reagent for use on the cobas® 5800 and cobas® 6800/8800 Systems.
- Reliable results depend on proper sample collection, storage and handling procedures.
- Do not use heparinized plasma with this test because heparin has been shown to inhibit PCR.
- Detection of HIV-1 Group M RNA, HIV-1 Group O RNA, HIV-2 RNA, HCV RNA, and HBV DNA is dependent on the number of virus particles present in the sample and may be affected by sample collection, storage and handling, patient factors (i.e., age, presence of symptoms), and/or stage of infection and pool size.
- Though rare, mutations within the highly conserved regions of a viral genome covered by cobas® MPX, may affect primers and/or probe binding resulting in the failure to detect presence of virus.
- Due to inherent differences between technologies, it is recommended that, prior to switching from one technology to the next, users perform method correlation studies in their laboratory to qualify technology differences. Users should follow their own specific policies/procedures.

System equivalency/system comparison

System equivalency of the cobas® 5800 System with the cobas® 6800/8800 Systems was demonstrated via equivalency studies.

The results presented in these Instructions for Use are based on equivalent performance for all systems.

Non-clinical performance evaluation performed on the cobas® 6800/8800 Systems

Key performance characteristics - Living donor samples

Limit of Detection (LoD)

WHO International Standards/Roche Primary Standards

The limits of detection (LoD) of cobas® MPX for HIV-1 Group M RNA HIV-1 Group O RNA, HIV-2 RNA, HCV RNA, and HBV DNA were determined using the following standards:

- WHO 3rd International Standard for HIV-1 Group M RNA (NIBSC code 10/152)
- WHO International Standard for HIV-2 RNA (NIBSC code 08/150)⁴⁰
- Roche Primary Standards for HIV-1 Group O RNA
- WHO 2nd International Standard for HCV RNA (NIBSC code 96/798)
- WHO 3rd International Standard for HBV DNA (NIBSC 10/264)

No international standard is currently available for HIV-1 Group O RNA. The Roche HIV-1 Group O RNA Standard is traceable to the CBER HIV-1 Subtype RNA Reference Panel #1 Lot 01. The Roche Primary Standards for HIV-1 Group O RNA are derived from commercially available cultured virus stocks, P/N 2420 (Cat. No. 500493, SeraCare Life Sciences).

For the WHO International HIV-1 Group M, HCV and HBV, HIV-2, and Roche primary HIV-1 Group O standards, three independent dilution series of each viral standard co-formulated for HIV-1 Group M, HCV, and HBV members and individually formulated HIV-1 Group O, and HIV-2 were prepared with normal, virus-negative (HIV, HBV and HCV) human EDTA-plasma. Each dilution series was tested using three different lots of cobas® MPX kits with approximately 63 replicates per lot, for a total of approximately 189 replicates per concentration. For the WHO International HIV-2 Standard, 33 replicates per lot from three independent dilutions and three reagent lots were tested for a total of 99 replicates per concentration. For each virus, PROBIT analysis on the data combined across dilution series and reagent lots was used to estimate the LoD, along with the lower and upper limit of the 95% confidence interval (Table 14). The reactivity rates observed in the LoD studies for each virus are summarized in Table 15 to Table 19.

Table 14 Results of PROBIT analysis on LoD data collected with viral standards in EDTA plasma and serum

Matrices	Analyte	Measuring units	LoD	Lower 95% confidence limit	Upper 95% confidence limit
EDTA Plasma	HIV-1 Group M	IU/mL	25.7	21.1	32.8
	HIV-1 Group O	copies/mL	8.2	7.0	10.0
	HIV-2	IU/mL	4.0	3.3	5.2
	HCV	IU/mL	7.0	5.9	8.6
	HBV	IU/mL	1.4	1.2	1.7
Serum	HIV-1 Group M	IU/mL	23.7	20.0	29.1
	HIV-1 Group O	copies/mL	12.2	10.3	14.9
	HIV-2	IU/mL	4.4	3.5	5.8
	HCV	IU/mL	8.1	6.8	10.1
	HBV	IU/mL	1.3	1.1	1.5

Table 15 Reactivity rates summary for HIV-1 Group M in EDTA plasma and serum

Matrices	HIV-1 Group M RNA concentration (IU/mL)	Number reactive	Number of valid replicates	% Reactive	95% Lower confidence bound (one-sided)
EDTA Plasma	30	186	188	98.9%	96.7%
	15	170	189	89.9%	85.6%
	7.5	124	189	65.6%	59.5%
	4.5	96	189	50.8%	44.6%
	1.5	50	189	26.5%	21.2%
Serum	30	186	189	98.4%	95.9%
	15	170	189	89.9 %	85.6%
	7.5	123	189	65.1%	59.0%
	4.5	85	189	45.0%	38.8%
	1.5	31	189	16.4%	12.1%

Table 16 Reactivity rates summary for HIV-1 Group O in EDTA plasma and serum

Matrices	HIV-1 Group O RNA concentration (copies/mL)	Number reactive	Number of valid replicates	% Reactive	95% Lower confidence bound (one-sided)
EDTA Plasma	18	187	187	100.0%	98.4%
	9	181	187	96.8%	93.8%
	4.5	162	189	85.7%	80.8%
	2.7	117	189	61.9%	55.7%
	0.9	57	189	30.2%	24.7%
Serum	18	186	187	99.5%	97.5%
	9	173	188	92.0%	88.0%
	4.5	142	189	75.1%	69.4%
	2.7	79	189	41.8%	35.8%
	0.9	39	189	20.6%	15.9%

Table 17 Reactivity rates summary for HIV-2 in EDTA plasma and serum

Matrices	HIV-2 RNA concentration (IU/mL)	Number reactive	Number of valid replicates	% Reactive	95% Lower confidence bound (one-sided)
EDTA Plasma	10	98	98	100.0%	97.0%
	5	98	99	99.0%	95.3 %
	2.5	80	98	81.6%	74.0%
	1.5	71	99	71.7%	63.3%
	0.5	26	99	26.3%	19.1%
Serum	10	98	98	100.0%	97.0%
	5	98	99	99.0%	95.3%
	2.5	81	99	81.8%	74.2%
	1.5	63	98	64.3%	55.6%
	0.5	28	98	28.6%	21.1%

Table 18 Reactivity rates summary for HCV in EDTA plasma and serum

Matrices	HCV RNA concentration (IU/mL)	Number reactive	Number of valid replicates	% Reactive	95% Lower confidence bound (one-sided)
EDTA Plasma	12	187	188	99.5 %	97.5 %
	6	178	189	94.2 %	90.6 %
	3	148	189	78.3 %	72.8 %
	1.8	112	189	59.3 %	53.0 %
	0.6	50	189	26.5 %	21.2 %
Serum	12	186	189	98.4 %	95.9 %
	6	173	189	91.5 %	87.4 %
	3	139	189	73.5 %	67.7 %
	1.8	112	189	59.3 %	53.0 %
	0.6	41	189	21.7 %	16.9 %

Table 19 Reactivity rates summary for HBV in EDTA plasma and serum

Matrices	HBV DNA concentration (IU/mL)	Number reactive	Number of valid replicates	% Reactive	95% Lower confidence bound (one-sided)
EDTA plasma	3.40	188	188	100.0 %	98.4 %
	1.70	184	189	97.4 %	94.5 %
	0.85	165	189	87.3 %	82.6 %
	0.51	126	189	66.7 %	60.6 %
	0.17	58	189	30.7 %	25.2 %
Serum	3.40	189	189	100.0 %	98.4 %
	1.70	184	189	97.4 %	94.5 %
	0.85	166	189	87.8 %	83.2 %
	0.51	140	189	74.1 %	68.3 %
	0.17	52	189	27.5 %	22.2 %

Genotype verification

The performance of **cobas**® MPX to detect subtypes of HIV-1 Group M (A-H, J, K, BF, BG) and circulating recombinant forms (CRF01_AE and CRF02_AG), HIV-1 Group O, HIV-1 Group N, and the subtypes of HIV-2 (A and B), genotypes of HCV (1 - 6) and genotypes of HBV (A-H and precore mutant) was determined by testing unique clinical samples and/or culture isolated for each subtype or genotype listed in Table 20 to Table 24.

HIV-1 Group M

A total of 115 unique HIV-1 Group M clinical samples with known HIV-1 subtype were quantified for HIV-1 concentrations using the COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2.0. All 115 samples were tested after dilution with normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma to 5 x LoD of **cobas**® MPX of which 102 samples were also tested neat (undiluted). All 115 clinical samples with known subtypes were detected neat and/or at 5 x LoD (Table 20).

Table 20 HIV-1 Group M clinical samples

Subtype	% Reactive (reactive/samples tested) neat	% Reactive (reactive/samples tested) diluted to 5 x LoD
A	100.0% (12/12)	100.0% (12/12)
CRF01_AE	100.0% (12/12)	100.0% (12/12)
CRF02_AG	100.0% (12/12)	100.0% (12/12)
B	100.0% (11/11)	100.0% (11/11)
C	100.0% (12/12)	100.0% (12/12)
D	100.0% (11/11)	100.0% (11/11)
F	100.0% (10/10)	100.0% (10/10)
G	100.0% (12/12)	100.0% (12/12)
H	100.0% (10/10)	100.0% (10/10)
BF	Not tested*	100% (3/3)
BG	Not tested*	100% (4/4)
J	Not tested*	100% (2/2)
K	Not tested*	100% (4/4)

*Insufficient volume to test at neat

HIV-1 Group O and HIV-1 Group N

A total of seven HIV-1 Group O and 2 HIV-1 Group N cultured isolates were tested after log dilutions were prepared in normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma. For HIV-1 Group O isolates, 28 total replicates across seven isolates were tested using 4 replicates of each dilution. For HIV-1 Group N isolates, two isolates were tested. A total of four replicates were tested for one isolate from dilution 1:1.00E+02 to 1:1.00E+03 and one replicate was tested for the second isolate at dilution of 1:1.00E+04. HIV-1 Group O culture isolates were detected up to dilution of 1:1.00E+07 and Group N culture isolates were detected up to dilution of 1:1.00E+04 (Table 21).

Table 21 HIV-1 Group O and HIV-1 Group N cultured isolates

Sample Dilution	% Reactive (reactive/valid replicates tested)	
	HIV-1 Group O	HIV-1 Group N
1:1.00E+02	100.0% (28/28)	100.0% (4/4)
1:1.00E+03	100.0% (28/28)	100.0% (4/4)
1:1.00E+04	89.3% (25/28)	20.0% (1/5)
1:1.00E+05	71.4% (20/28)	0.0% (0/4)
1:1.00E+06	71.4% (20/28)	0.0% (0/4)
1:1.00E+07	71.4% (20/28)	0.0% (0/4)

HIV-2

A total of five HIV-2 subtype A (four) and B (one) cultured isolates were tested after log dilutions were prepared in normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma. For subtype A, a total of 16 replicates across four isolates were tested for each dilution. For one isolate of subtype B, four total replicates were tested for each dilution. A total of 11 HIV-2 subtype A (five) and B (six) clinical samples were also tested after log dilutions were prepared in normal, virus-negative human EDTA-plasma. For subtype A, 20 total replicates across five clinical samples and for subtype B, 24 total replicates across six clinical samples were tested using four replicates for each dilution. All cultured isolates were detected by cobas® MPX. Clinical samples were detected by cobas® MPX at up to dilutions of 1:1.00E+03 for subtypes A and B. The overall results are summarized in Table 22.

Table 22 HIV-2 cultured isolates and clinical samples

Sample Dilution	% Reactive (reactive/valid replicates tested)			
	Cultured isolate		Clinical sample	
	Subtype A	Subtype B	Subtype A	Subtype B
1:1.00E+02	100.0% (16/16)	100.0% (4/4)	100.0% (20/20)	100.0% (24/24)
1:1.00E+03	100.0% (16/16)	100.0% (4/4)	65.0% (13/20)	50.0% (12/24)
1:1.00E+04	100.0% (15/15)	100.0% (4/4)	25.0% (5/20)	0.0% (0/24)
1:1.00E+05	100.0% (16/16)	100.0% (4/4)	5.0% (1/20)	0.0% (0/24)
1:1.00E+06	100.0% (16/16)	100.0% (4/4)	0.0% (0/20)	0.0% (0/24)
1:1.00E+07	81.2% (13/16)	0.0% (0/4)	0.0% (0/20)	0.0% (0/24)

HCV

A total of 96 unique HCV clinical samples with known HCV genotype were quantified for HCV concentrations using the COBAS® AmpliPrep/COBAS® TaqMan® HCV Test, v2.0. All 96 HCV clinical samples with known genotypes were tested after dilution with normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma to 5 x LoD of cobas® MPX. Of those, 95 samples were also tested neat. All samples were tested in single replicate. All 96 HCV-positive clinical samples were detected neat and/or diluted as summarized in Table 23.

Table 23 HCV clinical samples

Genotype	% Reactive (reactive/samples tested) neat	% Reactive (reactive/samples tested) diluted to 5 x LoD
1a	100.0% (9/9)	100.0% (9/9)
1b	100.0% (12/12)	100.0% (12/12)
1	100.0% (12/12)	100.0% (12/12)
2b	100.0% (1/1)	100.0% (1/1)
2	100.0% (13/13)	100.0% (13/13)
3a	100.0% (12/12)	100.0% (12/12)
3	100.0% (1/1)	100.0% (1/1)
4	100.0% (13/13)	100.0% (13/13)
5a	100.0% (10/10)	100.0% (10/10)
5	100.0% (2/2)	100.0% (2/2)
6	100.0% (10/10)	100.0% (11/11)

HBV

A total of 94 unique HBV clinical samples with known HBV genotype and pre-core mutants were quantified for HBV concentrations using the COBAS® AmpliPrep/COBAS® TaqMan® HBV Test. All 94 HBV clinical samples with known genotypes were tested neat and/or diluted with normal, virus-negative (HIV, HCV and HBV) EDTA-plasma to 5 x LoD of cobas® MPX. All samples were tested with single replicates. All 94 HBV-positive clinical samples were detected both at neat and/or diluted as summarized in Table 24.

Table 24 HBV clinical samples

Genotype	% Reactive (reactive/samples tested) neat	% Reactive (reactive/ samples tested) diluted to 5 x LoD
A	100.0% (15/15)	100.0% (15/15)
B	100.0% (12/12)	100.0% (11/11)
C	100.0% (10/10)	100.0% (9/9)
D	100.0% (12/12)	100.0% (11/11)
E	100.0% (12/12)	100.0% (11/11)
F	100.0% (12/12)	100.0% (12/12)
G	Not tested*	100.0% (1/1)
H	100.0% (8/8)	100.0% (8/8)
Pre core Mutant	100.0% (12/12)	100.0% (12/12)

* Insufficient volume to test at neat

Seroconversion panels

The performance of cobas® MPX was evaluated using commercially available seroconversion panels for HIV-1 Group M, HCV, and HBV. The results of cobas® MPX were compared to results for the same panels tested using the cobas® TaqScreen MPX Test on the cobas® s 201 system. In addition, a comparison was performed between cobas® MPX and serology tests for each target.

HIV-1 Group M seroconversion panels

Twenty commercially available seroconversion panels were used. Each panel member was tested neat and diluted 1:6 and 1:96 to simulate testing in pools with cobas® MPX and cobas® TaqScreen MPX Test. The cobas® MPX results were compared to the results obtained with the cobas® TaqScreen MPX Test and with results with the Abbott Architect HIV Ag/Ab Combo and the Murex HIVAg/Ab Combo serology tests tested neat. The overall performance results are shown in Table 25.

Table 25 Performance of cobas® MPX on HIV seroconversion panels

HIV Seroconversion panels	Days earlier detection than HIV Antibody/Antigen or HIV RNA								
	Abbott ARCHITECT HIV Ag/Ab Combo: Neat			Murex HIV Ab/Ag Combo: Neat			cobas® TaqScreen MPX Test: Neat, 1:6, 1:96		
	Days earlier detection by the cobas® MPX								
	Neat	1:6	1:96	Neat	1:6	1:96	Neat	1:6	1:96
1*	7	7	7	0	0	0	-4	0	-4
2	7	7	3	7	7	3	0	0	0
3	3	3	3	3	3	3	0	0	0
4	8	4	4	8	4	4	4	0	4
5	15	8	2	15	8	2	13	6	2
6	7	2	2	7	2	2	5	0	0
7	7	5	5	7	5	5	2	0	0
8	15	15	8	15	15	8	0	0	0
9	12	7	7	12	7	7	5	0	0
10	2	2	0	2	2	0	0	0	-2
11	6	0	0	6	0	0	6	0	0
12*	8	8	6	8	8	6	-5	2	0
13	7	7	7	7	7	7	0	0	2
14	10	3	3	10	3	3	2	0	0
15	12	7	7	12	7	7	0	-5	0
16	9	9	7	9	9	7	0	0	0
17	11	11	9	11	11	9	0	0	0
18	2	2	2	2	2	2	0	0	0
19	7	7	7	7	7	7	0	0	2
20	7	7	5	7	7	5	0	2	0
Minimum	2	0	0	0	0	0	-5	-5	-4
Average	8.1	6.1	4.7	7.8	5.7	4.4	1.4	0.3	0.2
Maximum	15	15	9	15	15	9	13	6	4

* Earlier reactivity was observed with the cobas® TaqScreen MPX Test due to HBV co-infection.

HCV seroconversion panels

Twenty-five seroconversion panels were used. Each panel member was tested neat and diluted 1:6 and 1:96 to simulate testing in pools with the cobas® MPX and cobas® TaqScreen MPX tests. The cobas® MPX results were compared to the results obtained with the cobas® TaqScreen MPX Test and with results with the ORTHO HCV Version 3.0 ELISA Test System and the Abbott PRISM HCV serology tests tested neat. The overall performance results are shown in Table 26.

Table 26 Performance of cobas® MPX on HCV seroconversion panels

HCV Seroconversion panels	Days earlier detection than HCV Antibody/Antigen or HCV RNA								
	ORTHO HCV Version 3.0 ELISA Test System: Neat			Abbott PRISM HCV: Neat			cobas® TaqScreen MPX Test: Neat, 1:6, 1:96		
	Days earlier detection by the cobas® MPX								
	Neat	1:6	1:96	Neat	1:6	1:96	Neat	1:6	1:96
1	13	13	13	7	7	7	0	0	0
2*	20	20	20	20	20	20	0	0	0
3	23	23	23	23	23	23	0	0	0
4*	23	23	23	19	19	19	0	0	0
5	33	33	33	33	33	33	-6	0	0
6*	39	39	39	37	37	37	0	0	0
7	32	32	32	32	32	32	0	0	0
8	38	38	38	38	38	38	-24**	0	0
9*	34	34	32	34	34	32	0	0	0
10*	32	32	29	32	32	29	0	3	0
11	34	34	34	34	34	34	0	0	0
12*	11	11	11	11	11	11	0	0	0
13*	10	10	10	10	10	10	0	0	0
14*	12	12	-2	12	12	-2	0	0	1
15	65	65	65	65	65	65	0	0	0
16	3	3	3	3	3	3	0	0	0
17*	13	13	13	16	16	16	0	0	0
18*	21	21	21	21	21	21	0	0	0
19	34	4	34	34	4	34	0	0	30
20	75	75	75	75	75	75	0	0	0
21	46	42	42	49	45	45	4	0	7
22	35	35	35	35	35	35	0	0	0
23	38	38	25	38	38	25	0	6	0
24	39	39	35	39	39	35	0	7	3
25	2	2	2	0	0	0	0	0	0
Minimum	2	2	-2	0	0	-2	-24	0	0
Average with exclusions*	34.0	31.7	30.4	33.7	31.4	30.1	-1.7	0.9	2.7
Maximum	75	75	75	75	75	75	4	7	30

* Panels were reactive on the first draw when tested with cobas® MPX or did not show seroconversion. These panels were excluded from the summary calculations for the minimum, average and maximum number of days earlier detection than HCV antibody or RNA for each dilution. One of the panels was used in 1:96 summary calculations versus serology only (panel 14).

**24 day interval between adjacent draws.

HBV seroconversion panels

Twenty-one commercially available seroconversion panels were used. Each panel member was tested neat and diluted 1:6 and 1:96 to simulate testing in pools with the **cobas®** MPX and **cobas®** TaqScreen MPX tests. The **cobas®** MPX results were compared to the results obtained with the **cobas®** TaqScreen MPX Test and with results with the Genetic Systems HBsAg and the Abbott PRISM HBsAg serology tests tested neat. The overall performance results are shown in Table 27.

Table 27 Performance of **cobas®** MPX on HBV seroconversion panels

HBV Seroconversion panels	Days earlier detection than HBsAg or HBV DNA								
	Genetic Systems HBsAg (3.0): Neat			Abbott PRISM HBsAg: Neat			cobas® TaqScreen MPX Test: Neat, 1:6, 1:96		
	Days earlier detection by the cobas® MPX								
	Neat	1:6	1:96	Neat	1:6	1:96	Neat	1:6	1:96
1	29	12	0	29	12	0	17	0	0
2	19	11	7	15	7	3	0	-3	0
3**	9	9	2	-14	-14	-21	0	0	0
4	38	27	19	38	27	19	4	0	2
5	22	0	0	22	0	0	0	-13	0
6	24	24	0	24	24	0	-7	7	0
7	21	18	7	21	18	7	3	4	0
8	21	14	11	21	14	11	3	0	7
9	19	12	5	19	12	5	0	5	5
10*	12	12	7	19	19	14	0	0	0
11**	17	17	0	0	0	-17	0	0	0
12	28	28	7	28	28	7	0	0	7
13	18	18	7	18	18	7	-8	4	10
14	18	15	7	11	8	0	9	0	5
15**	30	28	14	0	-2	-16	2	12	0
16	17	17	6	17	17	6	0	2	6
17	29	33	18	29	33	18	-4	15	3
18	22	10	0	22	10	0	12	0	0
19	18	14	3	18	14	3	4	0	0
20	28	28	0	28	28	0	-5	14	0
21	22	20	5	17	15	0	2	7	0
Minimum	9	0	0	-14	-14	-21	-8	-13	0
Average	22.5	17.8	6.0	18.2	13.5	2.2	1.6	2.7	2.1
Maximum	38	33	19	38	33	19	17	15	10

* Panel was consistently reactive with **cobas®** MPX, beginning on the first bleed and was excluded from the neat and 1:6 summary calculations for the minimum, average and maximum number of days earlier detection than HBV antibody.

** Low concentrations of HBV DNA were present in diluted panel members which were detected later by **cobas®** MPX than by serology; 1.7 IU/mL in Panel 3 at 1:96, 2.0 IU/mL in Panel 11 at 1:96, and 0.5 IU/mL in Panel 15 at 1:96.

Analytical specificity

The analytical specificity of cobas® MPX was evaluated for cross-reactivity with 25 microorganisms at 10⁶ particles, copies, or PFU/mL, which included 18 viral isolates, six bacterial strains and one yeast isolate (Table 28). The microorganisms were added to normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma and tested with and without HIV-1 Group M, HCV, HBV (co-formulated), HIV-1 Group O and HIV-2 virus added to a concentration of approximately 3 x LoD of cobas® MPX for each virus. The tested microorganisms do not cross-react or interfere with cobas® MPX.

Table 28 Microorganisms tested for analytical specificity

Viruses	Flavivirus	Bacteria	Yeast
Adenovirus 5	West Nile Virus	<i>Escherichia coli</i>	<i>Candida albicans</i>
Cytomegalovirus	Dengue Virus type 1	<i>Propionibacterium acnes</i>	
Epstein-Barr Virus	Usutu Virus	<i>Staphylococcus aureus</i>	
Herpes Simplex Virus type 1		<i>Staphylococcus epidermidis</i>	
Herpes Simplex Virus type 2		<i>Streptococcus viridans</i>	
Hepatitis A Virus		<i>Staphylococcus haemolyticus</i>	
Hepatitis E Virus			
Hepatitis G Virus			
Human T-cell lymphotropic Virus type I			
Human T-cell lymphotropic Virus type II			
Human Herpes Virus 6			
Influenza Virus A			
Parvovirus B19			
Chikungunya Virus			
Varicella Zoster Virus			

Plasma samples from each of the disease states (Table 29) were tested with and without HIV-1 Group M, HCV, HBV (co-formulated), HIV-1 Group O and HIV-2 added to a concentration of approximately 3 x LoD of cobas® MPX for each virus. These disease states do not cross-react or interfere with cobas® MPX.

Table 29 Disease states samples tested for analytical specificity

Disease state		
Adenovirus type 5	Herpes Simplex Virus type1	Human T-cell lymphotropic Virus type I
Cytomegalovirus	Herpes Simplex Virus type 2	Human T-cell lymphotropic Virus type II
Dengue Virus	Hepatitis A Virus	Parvovirus B19
Epstein-Barr Virus	Hepatitis E Virus	West Nile Virus

Analytical specificity – interfering substances

Endogenous interference substances

Plasma samples with abnormally high levels of triglycerides (up to 33.2 g/L), hemoglobin (up to 2 g/L), unconjugated bilirubin (up to 0.236 g/L), albumin (up to 60 g/L), and human DNA (up to 0.002 g/L) were tested with and without HIV-1 Group M, HCV, HBV (co-formulated), HIV-1 Group O and HIV-2 virus added to a concentration of 3 x LoD of **cobas**® MPX. Samples containing these endogenous substances did not interfere with the sensitivity or specificity of **cobas**® MPX.

Exogenous interference substances

Normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma samples containing abnormally high concentrations of drugs (Table 30) were tested with and without HIV-1 Group M, HCV, HBV (co-formulated), HIV-1 Group O and HIV-2 added to a concentration of 3 x LoD of **cobas**® MPX for each virus. These exogenous substances did not interfere with the sensitivity or specificity of **cobas**® MPX.

Table 30 Clinical samples tested with drugs

Name of drug tested	Concentration
Acetaminophen	1324 µmol/L
Acetylsalicylic Acid	3620 µmol /L
Ascorbic Acid	342 µmol/L
Atorvastatin	600 µg Eq/L
Fluoxetine	11.2 µmol/L
Ibuprofen	2425 µmol/L
Loratadine	0.78 µmol/L
Nadolol	3.88 µmol/L
Naproxen	2170 µmol/L
Paroxetine	3.04 µmol/L
Phenylephrine HCL	491 µmol/L
Sertraline	1.96 µmol/L

Whole system failure

The whole system failure rate for **cobas**® MPX was determined by testing 100 replicates of EDTA plasma spiked with either HIV-1 Group M, HCV, HBV (co-formulated), HIV-1 Group O, and HIV-2, for a total of 300 replicates. These samples were tested at a target concentration of approximately 3 x LoD and were run in pools of 1 (undiluted). The study was performed using the **cobas**® 8800 System with **cobas**® p 680 instrument (pipetting and pooling).

The results of this study determined that all replicates were reactive for each target, resulting in a whole system failure rate of 0%. The two-sided 95% exact confidence interval was 0% for the lower bound and 1.22% for the upper bound [0%: 1.22%].

Cross contamination

The cross-contamination rate for **cobas®** MPX was determined by testing 240 replicates of a normal, virus-negative (HIV, HCV and HBV) human EDTA-plasma sample and 220 replicates of a high titer HBV sample at 1.00E+08 IU/mL. The study was performed using the **cobas®** 8800 System. In total, 5 runs were performed with positive and negative samples in a checkerboard configuration.

All 240 replicates of the negative sample were non-reactive, resulting in a cross-contamination rate of 0%. The two-sided 95% exact confidence interval was 0% for the lower bound and 1.53% for the upper bound [0%: 1.53%].

FDA/CBER panel evaluation

The sensitivity of **cobas®** MPX was determined by testing FDA/CBER Lot Release panels for HIV-1 Group M, HIV-1 Group O, HIV-2, HBV and HCV. Panel members were tested undiluted in replicates across the reagent lots (one replicate per panel member per reagent lot).

HIV-1 Group M

cobas® MPX is able to detect all levels of the FDA/CBER Lot Release Panel with concentrations of 10 cp/mL to 500 cp/mL and the negative panel member was non-reactive as summarized in Table 31.

Table 31 Summary of FDA/CBER HIV-1 Group M RNA lot release panel results

Panel Member	Concentration (cp/mL)	Expected Reactivity for HIV*	Observed HIV Result		
			Reagent Lot 1**	Reagent Lot 2	Reagent Lot 3
B4	0	NR	NT	NR	NR
B2	10	+/-	NT	R	R
B6	50	+/-	NT	R	R
B5	100	+/-	NT	R	R
B9	500	R	NT	R	R

* Reactivity: NR = non-reactive; +/- = may be reactive or non-reactive and were for information purposes only; R= reactive

**NT = Not Tested

HIV-1 Group O

cobas® MPX is able to detect all levels of the FDA/CBER Lot Release Panel with concentrations of 10 cp/mL to 1000 cp/mL as summarized in Table 32.

Table 32 Summary of FDA/CBER HIV-1 Group O RNA lot release panel results

Panel Member	Concentration (cp/mL)	Expected Reactivity for HIV*	Observed HIV Result		
			Reagent Lot 1	Reagent Lot 2	Reagent Lot 3
HIV-1 (O) #NC1	0	NR	Not applicable**	Not applicable**	Not applicable**
HIV-1 (O) #03	10	+/-	R	R	R
HIV-1 (O) #02	100	+/-	R	R	R
HIV-1 (O) #01	1000	R	R	R	R

* Reactivity: NR = non-reactive; +/- = may be reactive or non-reactive and were for information purposes only; R= reactive

**Due to non-availability of panel member NC1 (negative panel member), this panel member could not be tested.

HIV-2

cobas® MPX is able to detect all levels of the FDA/CBER Lot Release Panel with concentrations of 5 cp/mL to 100 cp/mL and the negative panel member was non-reactive as summarized in Table 33.

Table 33 Summary of FDA/CBER HIV-2 RNA lot release panel results

Panel Member	Concentration (cp/mL)	Expected Reactivity for HIV*	Observed HIV Result		
			Reagent Lot 1	Reagent Lot 2	Reagent Lot 3
HIV-2 #1	0	NR	NR	NR	NR
HIV-2 #2	5	+/-	R	R	R
HIV-2 #3	10	+/-	R	R	R
HIV-2 #4	50	R	R	R	R
HIV-2 #5	100	R	R	R	R

*Reactivity: NR = non-reactive; +/- = may be reactive or non-reactive and were for information purposes only; R= reactive

HBV

cobas® MPX is able to detect all levels of the FDA/CBER Lot Release Panel with concentrations of 10 cp/mL to 500 cp/mL and the negative panel member was non-reactive as summarized in Table 34.

Table 34 Summary of FDA/CBER HBV DNA lot release panel results

Panel Member	Concentration (cp/mL)	Expected Reactivity for HBV*	Observed HBV Result		
			Reagent Lot 1	Reagent Lot 2	Reagent Lot 3
1	0	NR	NR	NR	NR
2	10	+/-	R	R	R
3	100	R	R	R	R
4	50	+/-	R	R	R
5	500	R	R	R	R

*Reactivity: NR = non-reactive; +/- = may be reactive or non-reactive and were for information purposes only; R= reactive

HCV

cobas® MPX is able to detect all levels of the FDA/CBER Lot Release Panel with concentrations of 5 cp/mL to 500 cp/mL and the negative panel member was non-reactive as summarized in Table 35.

Table 35 Summary of FDA/CBER HCV RNA lot release panel results

Panel Member	Concentration (cp/mL)	Expected Reactivity for HCV*	Observed HCV Result		
			Reagent Lot 1	Reagent Lot 2	Reagent Lot 3
2001 (#2)	0	NR	NR	NR	NR
2002 (#10)	5	+/-	R	NR	R
2003 (#9)	10	+/-	R	R	NR
2004 (#8)	50	+/-	R	R	R
2005 (#7)	100	R	R	R	R
2006 (#6)	500	R	R	R	R

*Reactivity: NR = non-reactive; +/- = may be reactive or non-reactive and were for information purposes only; R= reactive

The overall internal control failure rate across studies using living donor specimens was 0.46% with a 95% confidence interval of 0.38% to 0.57%.

Key performance characteristics - Cadaveric samples

Sensitivity

The clinical sensitivity of the **cobas**® MPX test for HIV-1 Group M RNA, HIV-1 Group O RNA, HIV-2, RNA HCV RNA and HBV DNA was evaluated by testing a total of 60 individual virus-negative cadaveric samples, of those 35 individual samples were classified as moderately hemolyzed (straw to pink colored) and 25 individual samples were classified as highly hemolyzed (red to brown colored). In addition a total of 60 individual virus-negative living donor samples were tested. All cadaveric and living donor samples were divided evenly across 3 reagent lots, 5 clinical samples spiking groups (for HIV-1 M, HCV and HBV) with 12 samples per group. Each cadaveric and living donor sample was spiked with a co-formulation of three unique clinical samples (HIV-1 Group M, HCV and HBV), or Roche Primary Standards (individually formulated HIV-1 Group O and HIV-2) at approximately 5 x LoD of respective sample types. Each cadaveric sample was diluted 1:5.6 with **cobas**® **omni** Specimen Diluent on the instrument and tested using the cadaveric sample testing procedure.

All of the cadaveric and the living-donor samples had a reactive rate of 100% (95% confidence interval: 94.0 – 100%). The clinical sensitivity observed in cadaveric sample was equivalent to the sensitivity observed in living donor samples as determined by Fisher's Exact Test and summarized in Table 36.

Table 36 Summary of reactivity rate in cadaveric and living donor samples in EDTA plasma

Analyte	Cadaveric samples	Living donor samples
	% Reactive (Number of reactive /Number of samples tested)	% Reactive (Number of reactive/Number of samples tested)
HIV-1 Group M	100% (60/60)	100% (60/60)
HIV-1 Group O	100% (60/60)	100% (60/60)
HIV-2	100% (60/60)	100% (60/60)
HCV	100% (60/60)	100% (60/60)
HBV	100% (60/60)	100% (60/60)
Fisher's Exact Test, p-value ($\alpha=0.05$)	No significant differences in reactive rates ($p=1.000$)	

Specificity

The specificity of the **cobas**® MPX test in cadaveric EDTA plasma and serum samples was evaluated and compared with the specificity in living donor sample by testing single replicates of 60 individual cadaveric EDTA plasma samples, of those 37 individual donor samples were classified as moderately hemolyzed (straw to pink colored) and 23 individual samples were classified as highly hemolyzed (red to brown colored), 61 individual cadaveric serum samples of those 42 individual samples were classified as moderately hemolyzed and 19 individual donor samples were classified as highly hemolyzed, 60 individual sero-negative living-donor plasma and 60 individual serum samples. The study was performed with 3 independent **cobas**® MPX reagent lots. Each cadaveric sample was diluted 1:5.6 with **cobas**® **omni** Specimen Diluent on the instrument and tested using the cadaveric sample testing procedure. All the cadaveric and living donor samples from EDTA plasma and serum were non-reactive for 100% specificity. The specificity observed for cadaveric samples was equal

to the specificity observed for living-donor samples as determined by the Fisher's Exact Test ($\alpha=0.05$) as summarized in Table 37.

Table 37 Summary of specificity in cadaveric and living donor samples in EDTA plasma and serum

Matrices	Sample type	Number of non-reactive	Number of samples tested	% Non-reactive	Two-sided 95% Confidence Interval
EDTA plasma	Cadaveric donor	60	60	100%	94.0% - 100%
	Living donor	60	60	100%	94.0% - 100%
Serum	Cadaveric donor	61	61	100%	94.1% - 100%
	Living donor	60	60	100%	94.0% - 100%
Overall results using Fisher's Exact Test ($\alpha=0.05$)		Specificity for cadaveric sample and living-donor samples are equivalent: Fisher's Exact Test, $p = 1.000$			

Reproducibility

The reproducibility of the **cobas**® MPX test on the **cobas**® 6800/8800 Systems was determined using 20 cadaveric samples (moderately and highly hemolyzed) spiked with HIV-1 M, HBV and HCV clinical samples, and Roche Primary Standards for HIV-1 Group O RNA and HIV-2 RNA to approximately 5 x LoD of the **cobas**® MPX test. The results were compared to the reproducibility obtained with 20 living donor samples spiked with the Roche Primary and Secondary Standards to approximately 5 x LoD of the **cobas**® MPX test.

Testing was performed for the following variable components:

- day-to-day variability over 6 days
- lot-to-lot variability using 3 different reagent lots of the **cobas**® MPX test

One replicate was tested with each of the 3 reagent lots over 6 days for a total of 18 replicates per cadaveric and living donor sample. Each cadaveric sample was diluted 1:5.6 with **cobas**® **omni** Specimen Diluent on the instrument and tested using the cadaveric sample testing procedure. All valid reproducibility data were evaluated by comparing the reactive rates of living donors and cadaveric samples (two-sided 95% Confidence Intervals) across all variable components. The Fisher's exact p value was calculated for the test of statistical significance of the difference between proportions of reactives observed with cadaveric and living donor samples. No significant differences were observed.

cobas® MPX test is reproducible over multiple days and reagent lots for cadaveric and living donor samples. The results from reagent lot-to-lot variability are summarized in Table 38.

Table 38 cobas® MPX test reagent lot-to-lot reproducibility summary for cadaveric and living donor samples

Analyte	Reagent lot	Sample type	% Reactive (reactive/valid replicates)	Lower limit of 95% confidence interval	Upper limit of 95% confidence interval	Significant difference using Fisher's Exact Test p-value ($\alpha=0.05$)
HIV-1 Group M	1	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	2	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	3	Cadaveric	100.0% (118/118)	96.9%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
HIV-1 Group O	1	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	2	Cadaveric	100.0% (117/117)	96.9%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	3	Cadaveric	99.2% (118/119)	95.4%	100.0%	p = 0.4979
		Living donor	100.0% (120/120)	97.0%	100.0%	
HIV-2	1	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	2	Cadaveric	98.3% (118/120)	94.1%	99.8%	p = 0.4979
		Living donor	100.0% (120/120)	97.0%	100.0%	
	3	Cadaveric	99.2% (118/119)	95.4%	100.0%	p = 0.4979
		Living donor	100.0% (120/120)	97.0%	100.0%	
HCV	1	Cadaveric	98.3% (118/120)	94.1%	99.8%	p = 0.4979
		Living donor	100.0% (120/120)	97.0%	100.0%	
	2	Cadaveric	98.3% (118/120)	94.1%	99.8%	p = 0.4979
		Living donor	100.0% (120/120)	97.0%	100.0%	
	3	Cadaveric	97.5% (115/118)	92.7%	99.5%	p = 0.1203
		Living donor	100.0% (120/120)	97.0%	100.0%	
HBV	1	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	2	Cadaveric	100.0% (120/120)	97.0%	100.0%	p = 1.0000
		Living donor	100.0% (120/120)	97.0%	100.0%	
	3	Cadaveric	100.0% (118/118)	96.9%	100.0%	p = 1.0000
		Living donor	99.2% (119/120)	95.4%	100.0%	

The overall internal control failure rate across studies using cadaveric specimens was 3.39% with a 95% confidence interval of 2.51% to 4.47%.

Clinical performance evaluation performed on the cobas® 6800/8800 Systems

Reproducibility

The reproducibility of cobas® MPX for use on the cobas® 6800/8800 Systems was established by testing a 32-member panel composed of two negative plasma samples and two plasma samples positive for each virus (HIV-1 Group M, Group O, HIV-2, HCV, and HBV) at three different concentrations (approximately 0.5 x, 1.0 x, and 3.0 x the LoD of cobas® MPX) for each virus.

Operators at each of the three cobas® MPX sites performed five days of testing, using three lots of cobas® MPX reagents to obtain two valid batches per day. Two replicates per concentration were tested to yield up to 180 tests per panel member virus type at each of the three concentrations.

All valid batches and test results were analyzed by calculating the percentage of reactive test results for each panel member and the percentage of non-reactive results for the negative control panel member (Table 39). This study demonstrated that cobas® MPX for use on the cobas® 6800/8800 Systems shows reproducible performance across the variables assessed (lot, site/instrument, day, batch, and within batch) and for the five analytes tested.

Table 39 Test results summarized by site, lot, day, and batch (positive panel members)

		Site		Lot		Day		Batch	
Viral Target	Viral Load Concentration	ID	% Positive Results	ID	% Positive Results	ID	% Positive Results	ID	% Positive Results
HIV-1 Group M	0.5 x LoD	1	81.7% (49/60)	1	81.7% (49/60)	1	91.7% (33/36)	1	84.3% (75/89)
		2	84.7% (50/59)	2	88.3% (53/60)	2	77.1% (27/35)	2	81.1% (73/90)
		3	81.7% (49/60)	3	78.0% (46/59)	3	83.3% (30/36)		
						4	83.3% (30/36)		
						5	77.8% (28/36)		
	1.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	97.2% (35/36)	1	100.0% (90/90)
		2	100.0% (60/60)	2	100.0% (60/60)	2	97.2% (35/36)	2	97.8% (88/90)
		3	96.7% (58/60)	3	96.7% (58/60)	3	100.0% (36/36)		
						4	100.0% (36/36)		
						5	100.0% (36/36)		
	3.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	100.0% (36/36)	1	100.0% (90/90)
		2	100.0% (60/60)	2	100.0% (60/60)	2	100.0% (36/36)	2	100.0% (90/90)
		3	100.0% (60/60)	3	100.0% (60/60)	3	100.0% (36/36)		
						4	100.0% (36/36)		
						5	100.0% (36/36)		

		Site		Lot		Day		Batch	
Viral Target	Viral Load Concentration	ID	% Positive Results	ID	% Positive Results	ID	% Positive Results	ID	% Positive Results
HIV-1 Group O	0.5 x LoD	1	78.3% (47/60)	1	83.3% (50/60)	1	72.2% (26/36)	1	73.3% (66/90)
		2	76.7% (46/60)	2	78.3% (47/60)	2	77.8% (28/36)	2	86.7% (78/90)
		3	85.0% (51/60)	3	78.3% (47/60)	3	77.8% (28/36)		
						4	86.1% (31/36)		
						5	86.1% (31/36)		
	1.0 x LoD	1	98.3% (59/60)	1	98.3% (59/60)	1	94.4% (34/36)	1	95.6% (86/90)
		2	100.0% (60/60)	2	96.7% (58/60)	2	100.0% (36/36)	2	98.9% (89/90)
		3	93.3% (56/60)	3	96.7% (58/60)	3	97.2% (35/36)		
						4	100.0% (36/36)		
						5	94.4% (34/36)		
	3.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	100.0% (36/36)	1	100.0% (90/90)
		2	100.0% (60/60)	2	100.0% (60/60)	2	100.0% (36/36)	2	100.0% (90/90)
		3	100.0% (60/60)	3	100.0% (60/60)	3	100.0% (36/36)		
						4	100.0% (36/36)		
						5	100.0% (36/36)		
HIV-2	0.5 x LoD	1	74.1% (43/58)	1	73.3% (44/60)	1	77.8% (28/36)	1	69.7% (62/89)
		2	76.7% (46/60)	2	79.7% (47/59)	2	69.4% (25/36)	2	79.8% (71/89)
		3	73.3% (44/60)	3	71.2% (42/59)	3	75.0% (27/36)		
						4	71.4% (25/35)		
						5	80.0% (28/35)		
	1.0 x LoD	1	94.9% (56/59)	1	96.6% (57/59)	1	97.2% (35/36)	1	96.6% (85/88)
		2	100.0% (59/59)	2	98.3% (58/59)	2	94.3% (33/35)	2	96.7% (87/90)
		3	95.0% (57/60)	3	95.0% (57/60)	3	97.2% (35/36)		
						4	94.3% (33/35)		
						5	100.0% (36/36)		
	3.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	100.0% (36/36)	1	100.0% (90/90)
		2	100.0% (60/60)	2	100.0% (60/60)	2	100.0% (36/36)	2	100.0% (90/90)
		3	100.0% (60/60)	3	100.0% (60/60)	3	100.0% (36/36)		
						4	100.0% (36/36)		
						5	100.0% (36/36)		

Viral Target	Viral Load Concentration	Site		Lot		Day		Batch	
		ID	% Positive Results	ID	% Positive Results	ID	% Positive Results	ID	% Positive Results
HCV	0.5 x LoD	1	75.0% (45/60)	1	80.0% (48/60)	1	66.7% (24/36)	1	79.8% (71/89)
		2	70.7% (41/58)	2	76.7% (46/60)	2	77.8% (28/36)	2	74.2% (66/89)
		3	85.0% (51/60)	3	74.1% (43/58)	3	69.4% (25/36)		
						4	91.2% (31/34)		
						5	80.6% (29/36)		
	0.7 x LoD	1	81.7% (49/60)	1	93.3% (56/60)	1	86.1% (31/36)	1	91.1% (82/90)
		2	90.0% (54/60)	2	90.0% (54/60)	2	91.7% (33/36)	2	87.8% (79/90)
		3	96.7% (58/60)	3	85.0% (51/60)	3	91.7% (33/36)		
						4	86.1% (31/36)		
						5	91.7% (33/36)		
	3.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	100.0% (36/36)	1	100.0% (90/90)
		2	100.0% (59/59)	2	100.0% (60/60)	2	100.0% (36/36)	2	100.0% (89/89)
		3	100.0% (60/60)	3	100.0% (59/59)	3	100.0% (36/36)		
						4	100.0% (35/35)		
						5	100.0% (36/36)		
HBV	0.5 x LoD	1	80.0% (48/60)	1	80.0% (48/60)	1	80.6% (29/36)	1	72.2% (65/90)
		2	78.3% (47/60)	2	73.3% (44/60)	2	80.6% (29/36)	2	82.2% (74/90)
		3	73.3% (44/60)	3	78.3% (47/60)	3	75.0% (27/36)		
						4	77.8% (28/36)		
						5	72.2% (26/36)		
	1.0 x LoD	1	88.3% (53/60)	1	98.3% (59/60)	1	91.7% (33/36)	1	92.2% (83/90)
		2	95.0% (57/60)	2	90.0% (54/60)	2	97.2% (35/36)	2	93.3% (84/90)
		3	95.0% (57/60)	3	90.0% (54/60)	3	97.2% (35/36)		
						4	91.7% (33/36)		
						5	86.1% (31/36)		
	3.0 x LoD	1	100.0% (60/60)	1	100.0% (60/60)	1	100.0% (36/36)	1	100.0% (90/90)
		2	100.0% (60/60)	2	100.0% (60/60)	2	100.0% (36/36)	2	100.0% (90/90)
		3	100.0% (60/60)	3	100.0% (60/60)	3	100.0% (36/36)		
						4	100.0% (36/36)		
						5	100.0% (36/36)		

Clinical specificity

Reactivity in blood donor population

Samples were collected from consented blood donors recruited from four test sites. Testing with **cobas®** MPX was done according to two testing algorithms: one for individual donation testing, which required a single level of testing; and one for pools of six testing, which required a single level of testing for primary pools that were non-reactive and two levels of testing (primary pool and individual donation resolution testing for primary pools that were reactive). A total of 74,180 donations were tested with **cobas®** MPX, resulting in an overall clinical specificity of 99.992% (74,174/74,180; 99.982% to 99.996%) (Table 40). The pool specificity was 99.905% (10,524/10,534; 99.825%-99.948%) (Table 41). Ten reactive pools contained all status negative donations. The clinical specificity for individual donation testing was 99.946% (11,192/11,198; 99.883% to 99.975%). The invalid batch rate for the **cobas®** MPX was 3.5% for initial testing donations in pools of six and for individual donations was 6.8% (16/235). Two HCV-positive NAT yield cases were identified during this study.

Table 40 Clinical specificity of **cobas®** MPX – overall

Pool Size	Frequency (n/N)	Estimate in Percent (95% Score Confidence Interval)
Individual (Plasma)	5,523 / 5,528	99.910% (99.788% to 99.961%)
Individual (Serum)	5,669 / 5,670	99.982% (99.900% to 99.997%)
Individual (Plasma/Serum)	11,192 / 11,198	99.946% (99.883% to 99.975%)
Pools of 6 (Plasma)	62,982 / 62,982	100.000% (99.994% to 100.000%)
Overall	74,174 / 74,180	99.992% (99.982% to 99.996%)

N = Total number of status negative donations; n = **cobas®** MPX non-reactive donations

Table 41 Pool reactivity of **cobas®** MPX in volunteer blood donors

Category	No. of Pools	Percentage of Pools Tested
Pools Tested	10,563	100
Non-Reactive pools	10,524	99.63
Reactive pools	39	0.37
Reactive pools with donor status positive	29	0.27
Reactive pools with donor status negative (false positive)*	10	0.10

*Of the 10 false reactive pools, one pool was HIV false reactive, four pools were HCV false reactive, and five pools were HBV false reactive.

Reactivity in source plasma donor population

A total of 108,306 evaluable donations from 24,514 unique donors were tested in pools of 96 with both **cobas®** MPX and **cobas®** TaqScreen MPX (incorporating the COBAS® AmpliScreen (CAS) tests for HBV, HCV, and HIV for viral target resolution). One hundred eight thousand two hundred ninety-seven donations tested negative for anti-HIV, anti-HCV, and HBsAg (Table 42). Donation status was assigned based on the concordance of two virus-specific tests (e.g., two NAT results or NAT and serology) on the index donation or the results of follow-up testing. A total of 1,106 evaluable pools were tested with **cobas®** MPX, of which 1,092 (98.7%) were non-reactive and 14 (1.3%) were reactive. Of the 1,092 non-reactive pools, 1,090 pools contained all status-negative donations, and two pools contained at least one donation status-positive donation. Of the 1,106 pools tested, there were two non-reactive pools with at least one status-positive donation and seven reactive pools with at least one status-positive donation (Table 43).

Table 42 Clinical specificity of the cobas® MPX – donation level

Parameter	Total Number of Status-Negative Donations	cobas® MPX Result		Estimate in Percent (95% Score CI)
		Reactive	Non-Reactive	
Clinical Specificity	108,297	6	108,291	99.994 (99.988, 99.997)
HIV Clinical Specificity	108,297	3	108,294	99.997 (99.992, 99.999)
HCV Clinical Specificity	108,297	1	108,296	99.999 (99.995, 100.000)
HBV Clinical Specificity	108,297	2	108,295	99.998 (99.993, 99.999)

Table 43 Pool reactivity in source plasma donations

Category	Number of Pools	Percentage of Pools Tested
Total Pools of 96* tested:	1,106	100
Non-Reactive pools**	1,092	98.7
Non-reactive pools with all donations status negative	1,090	98.6 (1,090/1,106)
Non-reactive pools with at least one status-positive donation	2***	0.2 (2/1,106)
Reactive pools**	14	1.3
Reactive pools with at least one status-positive donation	7	0.6 (7/1,106)
Reactive pools with donation status-negative (false reactive pools)	7	0.6 (7/1,106)

* 479/1106 pools had < 96 donations

** Donation status was assigned based on the concordance of two virus-specific tests (e.g., two NAT results or NAT and serology) on the index donation, or the results of follow-up testing.

***These two non-reactive pools contained donations from an HBV-positive donor. The donor's index donation was HBV-positive on cobas® MPX but negative on cobas® TaqScreen MPX Test and was confirmed HBV-positive by alternative high-sensitivity NAT. This donor made three subsequent donations that were nonreactive on both NAT screening assays. One of these donations was contained within an HCV-positive pool.

Eleven unique donors contributed 12 reactive donations (six HCV, three HIV, and three HBV). Seven donors completed follow-up testing: three of these donors did not show evidence of infection on follow-up; four donors were confirmed to have infection on follow-up, of whom two seroconverted (HCV) during follow-up (Table 44). One of the three HBV donors was determined to be a NAT HBV yield case.

Table 44 Observed testing reactivity patterns from initial testing on evaluable donations

cobas® MPX Result	Donation Status*	Number of Donations
HCV+	Positive	5
HBV+	Negative	2
HBV+	Positive	4**
HCV+	Negative	1
HIV+	Negative	3
Non-Reactive	Negative	108,291
	Total	108,306

* Donation Status was assigned based on the test reactivity pattern (concordance of two virus-specific tests (e.g., two NAT results or NAT and serology) on the index donation or results of follow-up testing).

These donations are all from the same donor whose index donation was HBV+ and whose subsequent three donations were classified as status positive even though **cobas® MPX test was non-reactive for HBV.

Note: Only evaluable donations are included in this summary table; + = Reactive/Positive

The clinical specificity of **cobas®** MPX for source plasma pools was determined by the analysis of 108,306 evaluable donations from 24,514 unique donors. Evaluable donations had valid **cobas®** MPX, **cobas®** TaqScreen MPX Test and CAS results from testing pools, and valid serology results (across analytes) from testing of individual donations. Of these 108,306 evaluable donations, 108,297 were assigned a donation status of negative, of which 108,291 were **cobas®** MPX non-reactive, for a clinical specificity of 99.994% (95% Confidence Interval: 99.988% to 99.997%). Seven false **cobas®** MPX reactive pools of 96 resolved to contain all status-negative donations. Of the 24,514 unique donors tested, 24,509 contributed only status-negative donations, of which 24,503 were non-reactive on **cobas®** MPX and six had false-reactive results, resulting in specificity (at the donor level) of 99.976% (95% Confidence Interval: 99.947% to 99.989%).

Studies in high risk populations

Third-party vendors collected samples from individuals at high risk for infection with HIV, HCV, or HBV. High-risk factors were included, but were not limited to, a history of incarceration; history of a diagnosis of a sexually-transmitted disease; history of multiple sex partners; use of injection drugs; diagnosed with or treated for HIV; and diagnosed with or treated for hepatitis. Some sample contributors indicated more than one risk factor. A total of 510 samples from a high risk population were distributed approximately evenly across three test sites and tested with **cobas®** MPX and **cobas®** TaqScreen MPX incorporating CAS.

All samples were prepared as panels. The diluted samples were manually diluted with pooled human plasma confirmed to be negative for HIV-1/2, HCV, and HBV. At the testing sites, samples were tested neat with both **cobas®** MPX and **cobas®** TaqScreen incorporating CAS (for target resolution), as per the Standard Specimen Processing Procedure recommended in the **cobas®** TaqScreen MPX Test Package Insert. Samples were also tested dilute to simulate pools of six with both **cobas®** MPX and **cobas®** TaqScreen. CAS was not performed on dilute samples.

The 510 neat samples generated results from **cobas®** MPX and the **cobas®** TaqScreen MPX Test which included 179 samples reactive (for one or more targets) on **cobas®** MPX (35.1%); and 181 samples that were reactive on **cobas®** TaqScreen MPX Test (35.5%). 488 (95.7%) samples that showed results concordant between **cobas®** MPX and **cobas®** TaqScreen MPX Test, while 22 (4.3%) of samples produced results that were discordant between **cobas®** MPX and **cobas®** TaqScreen MPX Test.

For the 510 high-risk neat samples, **cobas® MPX** correctly identified the presence or absence of viral target 97.0% (495/510) of the time, compared to CAS or alternative NAT (NGI; National Genetics Institute) test results. For the 3% of samples for which **cobas® MPX** did not correctly identify the presence or absence of viral target, **cobas® MPX** incorrectly detected a viral target in samples that did not contain a viral target 1.8% (9/510) of time (false reactive result) and failed to detect a viral target in samples that contained a target 1.2% (6/510) of the time (false non-reactive result). These results are summarized in Table 45.

Table 45 Correct versus incorrect identification of virus - neat

	cobas® MPX Result*	%	Total Correct
True reactives	170	97.0%	495
True non-reactives	325		
False reactives	9	1.8%	15
False non-reactives	6	1.2%	
Total	510	100.0%	510

*Final status (as compared with CAS or alternative NAT [NGI testing] results)

Note: Correct identification = True reactive and true non-reactive results (shown in bold type).

Of 510 dilute samples tested, 153 samples were reactive on **cobas® MPX** (30.0%), compared to 151 samples that were reactive on **cobas® TaqScreen MPX Test** (29.6%). Of the 510 dilute samples, 484 (94.9%) samples showed results concordant between **cobas® MPX** and **cobas® TaqScreen MPX Test**; and 26 (5.1%) samples showed results discordant between **cobas® MPX** and **cobas® TaqScreen MPX Test**.

cobas® MPX correctly identified the viral target 96.7% (492/509) of the time (509 dilute samples excludes one sample for which no NGI result was obtained). For the 3.4% of samples for which **cobas® MPX** did not correctly identify the viral target, **cobas® MPX** incorrectly detected a viral target in samples that did not contain a viral target 1.2% (6/509) of time (false reactive result) and failed to detect a viral target in samples that contained a target 2.2% (11/509) of the time (false non-reactive result). These results are summarized in Table 46.

Table 46 Correct versus incorrect identification of virus - dilute

	cobas® MPX Result*	%	Total correct
True reactives	147	96.7	492
True non-reactives	345		
False reactives	6	1.2	17
False non-reactives	11	2.2	
Total	509**	100	509**

* Final status (as compared with CAS or alternative NAT [NGI testing] results), which was performed on neat aliquot.

**Excludes one sample for which no NGI result was obtained.

Note: Correct identification = True reactive and true non-reactive results (shown in bold type).

Clinical sensitivity

Studies in NAT-positive populations

A total of 2,569 HIV, HCV, and HBV NAT-positive samples were tested across four test sites with **cobas**® MPX and the **cobas**® TaqScreen MPX Test incorporating CAS. Four lots of **cobas**® MPX reagents were used. The 2,569 samples known to be NAT-positive consisted of 1,015 HIV-positive samples, 1,016 HCV-positive samples, and 538 HBV-positive samples. Each of these samples were tested both neat and dilute (1:6) with **cobas**® MPX and the **cobas**® TaqScreen MPX Test. Only neat, not dilute, samples, were tested with the licensed CAS Tests per the Standard Specimen Processing Procedure recommended in the **cobas**® TaqScreen MPX Test Package Insert. Table 47 compares the sensitivities of **cobas**® MPX and **cobas**® TaqScreen Test Results for HIV, HCV, and HBV Known Positive Samples.

The overall clinical sensitivity of the **cobas**® MPX was 100.0% (2,549/2,549) for neat known positive samples and 100.0% (2,555/2,555) for dilute (1:6) known positive samples. The overall clinical sensitivity of the **cobas**® TaqScreen MPX Test was 99.9% (2,523/2,524) for neat known positive samples and 99.8% (2,559/2,563) for dilute (1:6) known positive samples. The overall positive percent agreement (PPA) across all known positive samples in this study between **cobas**® MPX and the **cobas**® TaqScreen MPX Test was 100.0% for both neat and dilute samples (Table 47).

Table 47 Comparison of the sensitivities of **cobas**® MPX and **cobas**® TaqScreen Test results for HIV, HCV, and HBV known positive samples

Dilution	Target Virus	Sensitivity in Known Positive Samples*		Difference (cobas® MPX Result – cobas® TaqScreen MPX Test)	
		cobas® MPX Result	cobas® TaqScreen MPX Test	Estimate	95% Confidence Interval
Neat	Overall	100.00% (2,549/2,549)	99.96% (2,523/2,524)	0.04%	(-0.04%, 0.12%)
	HIV	100.00% (1,006/1,006)	99.90% (1,007/1,008)	0.10%	(-0.10%, 0.29%)
	HCV	100.00% (1,015/1,015)	100.00% (1,014/1,014)	0.00%	Not applicable
	HBV	100.00% (528/528)	100.00% (502/502)	0.00%	Not applicable
1:6	Overall	100.00% (2,555/2,555)	99.84% (2,559/2,563)	0.16%	(0.00%, 0.31%)
	HIV	100.00% (1,006/1,006)	99.60% (1,005/1,009)	0.40%	(0.01%, 0.78%)
	HCV	100.00% (1,016/1,016)	100.00% (1,016/1,016)	0.00%	Not applicable
	HBV	100.00% (533/533)	100.00% (538/538)	0.00%	Not applicable

*Only known positive samples with valid test results were included in the sensitivity analysis.

HIV NAT positive population

The 1,015 HIV-positive neat samples generated 1,006 evaluable test results with **cobas**® MPX and 1,008 evaluable test results with the **cobas**® TaqScreen MPX Test incorporating CAS. One thousand fifteen HIV dilute samples produced 1,006 evaluable test results with **cobas**® MPX and 1,009 evaluable test results with the **cobas**® TaqScreen MPX Test (CAS was not performed on dilute samples).

cobas® MPX was reactive for 1,006 of 1,006 (100.0%) HIV neat samples and 1,006 of 1,006 (100.0%) HIV dilute samples. The **cobas**® TaqScreen MPX Test incorporating CAS was reactive for 1,007 of 1,008 (99.90 %) for HIV neat samples. The **cobas**® TaqScreen MPX Test (no CAS performed) was reactive for 1,005 of 1,009 (99.60%) for HIV dilute samples. The PPA between **cobas**® MPX and the **cobas**® TaqScreen MPX Test for neat and dilute HIV samples was 100.0% and 100.0% respectively.

HCV NAT positive population

cobas® MPX was reactive for 1,015 of 1,015 (100.0%) HCV neat samples and 1,016 of 1,016 (100.0%) HCV dilute samples. The cobas® TaqScreen MPX Test incorporating CAS was also reactive for 1,014 of 1,014 (100.0 %) for neat samples. The cobas® TaqScreen MPX Test (no CAS performed) was reactive for 1,016 of 1,016 (100.0%) for dilute samples. The PPA between cobas® MPX and the cobas® TaqScreen MPX Test for neat and dilute HCV samples was 100.0% and 100.0% respectively.

HBV NAT-positive population

The 538 HBV-positive neat samples generated 528 evaluable test results with cobas® MPX and 502 evaluable test results with the cobas® TaqScreen MPX Test incorporating CAS. The 538 HBV dilute samples produced 533 evaluable test results with cobas® MPX, and 538 evaluable test results with the cobas® TaqScreen MPX Test (CAS was not performed on dilute samples).

cobas® MPX was reactive for 528 of 528 (100.0%) HBV-positive neat samples and 533 of 533 (100.0%) HBV-positive dilute samples. The cobas® TaqScreen MPX Test incorporating CAS was reactive for 502 of 502 (100.0%) for HBV neat samples. The cobas® TaqScreen MPX Test (no CAS performed) was reactive for 538 of 538 (100.0%) for HBV dilute samples. The PPA between cobas® MPX and the cobas® TaqScreen MPX Test for neat and dilute HBV samples was 100.0% and 100.0% respectively.

Clinical sensitivity for HIV-1 Group O and HIV-2 seropositive population

HIV-1 Group O seropositive population

A total of 12 HIV-1 Group O seropositive samples were tested after 1:6 dilution using **cobas® MPX** and **cobas® TaqScreen MPX Test**. The samples were tested after 1:6 dilution due to limited volume. All of the HIV-1 Group O samples were reactive for HIV when tested with **cobas® MPX** after a 1:6 dilution as summarized in Table 48, for a clinical sensitivity of 100.0% relative to serology.

Table 48 Comparison of overall reactivity for HIV-1 Group O seropositive samples (1:6 dilution)

cobas® TaqScreen MPX Test (1:6 Dilution)	cobas® MPX (1:6 Dilution)		Total
	Reactive	Non-Reactive	
Reactive	11	0	11
Non-Reactive	1	0	1
Total	12	0	12

HIV-2 seropositive population

A total of 319 HIV-2 seropositive samples were tested using the **cobas® MPX** and **cobas® TaqScreen MPX Test**. Out of the 319 seropositive samples, 184 were tested neat and after 1:6 dilution with **cobas® MPX** and **cobas® TaqScreen MPX Test** whereas the remaining 135 were only tested after 1:6 dilution due to limited volume.

A total of 137 samples of the 184 neat tested samples was reactive as summarized in Table 49, for a clinical sensitivity of 74.5% relative to serology using **cobas® MPX**. Comparable sensitivity of **cobas® MPX** towards HIV-2 was also demonstrated when samples were diluted 1:6 prior to testing with both methods. A total of 198 samples of the 319 1:6 diluted samples were reactive with **cobas® MPX** as summarized in Table 50.

Table 49 Comparison of overall reactivity for HIV-2 seropositive samples (neat)

cobas® TaqScreen MPX Test (Neat)	cobas® MPX (Neat)		Total
	Reactive	Non-Reactive	
Reactive	118	7	125
Non-Reactive	19	40	59
Total	137	47	184

Table 50 Comparison of overall reactivity for HIV-2 seropositive samples (1:6 dilution)

cobas® TaqScreen MPX Test (1:6 Dilution)	cobas® MPX (1:6 Dilution)		Total
	Reactive	Non-Reactive	
Reactive	173	33	206
Non-Reactive	25	88	113
Total	198	121	319

Confirmation of serology results

Data from the Known Positive Study included 2,555 known-positive samples, each with nucleic acid test (NAT)-confirmed infection with either HIV, HCV, or HBV and serology test results. Supplemental serology test results were also known for 1,771 (69.3%) samples. The correct **cobas®** MPX result, defined as reactive for the viral target for which the specimen was known to be positive (e.g., HIV, HCV, or HBV), was compared to the supplemental serology results. The percentages of correct results (sensitivity estimate) for **cobas®** MPX were calculated for each target virus and overall, with associated 95% confidence intervals (CI). **cobas®** MPX correctly identified 1,771 of 1,771 (100.0%) of specimens with reactive serology and supplemental serology results. Table 51 shows the reactivity of **cobas®** MPX for each viral target analyte, compared to the known viral target serology and supplemental serology test result, as well as an estimate of sensitivity and 95% CI overall and for each viral target.

Table 51 Sensitivity of the **cobas®** MPX for neat known positive specimens with confirmatory serology results

Dilution	Test	Target Virus	Total Known Positive Specimens*	Number Reactive By Test	Sensitivity Estimate	95% Score CI
Neat	MPX8800	Overall	1,771	1,771	100.00%	(99.78%, 100.00%)
Neat	MPX8800	HIV	496	496	100.00%	(99.23%, 100.00%)
Neat	MPX8800	HCV	747	747	100.00%	(99.49%, 100.00%)
Neat	MPX8800	HBV	528	528	100.00%	(99.28%, 100.00%)

*Only known positive specimens with valid **cobas®** MPX results from neat samples and confirmatory serology results are included in this sensitivity analysis.

Additional information

Key test features





















































Sample type	Plasma and Serum
Minimum amount of sample required for living donor	1000 µL*
Amount of sample processed for living donor	850 µL
Minimum amount of sample required for cadaveric donor	300 µL*
Amount of sample processed for cadaveric donor	150 µL

*Tubes used for testing may have different dead volumes and require more or less minimum volume. Contact your local Roche service representative for further information.

Symbols

The following symbols are used in labeling for Roche PCR diagnostic products.

Table 52 Symbols used in labeling for Roche PCR diagnostics products

 Age/DOB	 Device not for near-patient testing	 QS IU/PCR	QS IU per PCR reaction, use the QS International Units (IU) per PCR reaction in calculation of the results.
 Ancillary Software	 Device not for self-testing		
 Assigned Range [copies/mL]	 Distributor (Note: The applicable country/region may be designated beneath the symbol)	 SN	Serial number
 Assigned Range [IU/mL]	 Do not re-use	 Site	Site
 EC REP	 Female	 Procedure Standard	Standard Procedure
 BARCODE	 For IVD performance evaluation only	 STERILE EO	Sterilized using ethylene oxide
 LOT	 GTIN	 Store in dark	
 Biological risks	 Importer	 Temperature limit	
 REF	 IVD	 TDF	Test Definition File
 CE marking of conformity; this device is in conformity with the applicable requirements for CE marking of an in vitro diagnostic medical device	 LLR	 This way up	
	 Male	 Procedure UltraSensitive	Ultrasensitive Procedure
 Collect Date	 Manufacturer	 UDI	Unique Device Identifier
 Consult instructions for use	 CONTROL -	 ULR	Upper Limit of Assigned Range
 Contains sufficient for <n> tests	 NON STERILE	 Urine Fill Line	Urine Fill Line
 CONTENT	 Patient Name	 Rx Only	US Only: Federal law restricts this device to sale by or on the order of a physician.
 CONTROL	 Patient number	 Use-by date	
 Date of manufacture	 Peel here		
 Device for near-patient testing	 CONTROL +		
 Device for self-testing	 QS copies / PCR		QS copies per PCR reaction, use the QS copies per PCR reaction in calculation of the results.

Technical support

For technical support (assistance) please reach out to your local affiliate:

https://www.roche.com/about/business/roche_worldwide.htm

Manufacturer

Table 53 Manufacturer



Roche Molecular Systems, Inc.
1080 US Highway 202 South
Branchburg, NJ 08876 USA
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Made in USA

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