

FOR INFORMATION ONLY.  
WHEN PERFORMING  
THE ASSAY ALWAYS REFER  
TO PACKAGE INSERT  
SUPPLIED  
WITH THE KIT



# CanAg CEA EIA

REF

401-10

IVD

CE

## Instructions for use. 2009-11

- DE Wenden Sie sich bitten an die deutsche Niederlassung um die geltende Gebrauchsanweisung zu erhalten.
- ES Por favor contacte con su distribuidor para una versión válida de "Instrucciones de uso" en español
- IT Contattare il proprio Distributore per ottenere la versione ufficiale della traduzione in lingua Italiana delle Istruzioni per l'Uso
- FR Pour une version certifiée de la Notice en Français, veuillez contacter votre Distributeur.
- DK Kontakt venligst den danske distributør for gældende version af dansk brugsanvisning.
- GR Παρακαλούμε όπως επικοινωνήσετε με τον προμηθευτή σας για την έγκυρη απόδοση στα Ελληνικά των οδηγιών χρήσης
- SE Vänligen kontakta Er distributör för gällande version av bruksanvisning på svenska.

GB EXPLANATION OF SYMBOLS  
DE BEDEUTUNG DER SYMBOLE  
ES EXPLICACIÓN DE SÍMBOLOS  
IT SIGNIFICATO DEI SIMBOLI  
FR EXPLICATION DES SYMBOLES  
NL PICTOGRAMMEN  
DK SYMBOLFORKLARING  
CS VYSVĚTLENÍ SYMBOLŮ  
GR ΕΠΕΞΗΓΗΣΗ ΤΩΝ ΣΥΜΒΟΛΩΝ  
PT INTERPRETAÇÃO DE SÍMBOLOS  
HU JELMAGYARÁZAT  
SE SYMBOLFÖRKLARING  
PL INTERPRETACJA SYMBOLI  
LT SIMBOLIŲ PAAIŠKINIMAI  
RU ОБОЗНАЧЕНИЯ



Use By/Verwendbar bis/  
Fecha de caducidad/  
Utilizzare entro/Utiliser jusque/  
Houdbaar tot/Holdbar til/  
Ρουζιτηλέο до/Ημερομηνία λήξης/  
Prazo de validade/Felhasználható  
Bäst före datum/Uzyc przed/  
Sunaudoti iki/Использовать до

LOT

Batch code/  
Chargenbezeichnung/  
Codigo de lote/  
Codice del lotto/Code du lot/  
Lot number/Lotnummer/  
Číslo šarže/Αριθμός Παρτίδας/  
Código do lote/Sarzszzám  
Lotnummer/Kod partii/Partijos  
koda/Номер лота



Date of manufacture/  
Herstellungsdatum/  
Fecha de fabricación/  
Data di fabbricazione/  
Date de fabrication/  
Produktie datum/Produktionsdato/  
Datum výroby/Ημερομηνία  
Παράγωγής/Data de fabrico/  
Gyártás időpontja/Tillverkningsdatum/  
Data produkcji/Pagaminimo data/  
Дата производства

REF

Catalogue number/Bestellnummer/  
Número de catálogo/  
Numero di catalogo/Référence du  
catalogue/Catalogus nummer/  
Katalognummer/Katalogové číslo/  
Αριθμός καταλόγου/  
Referència de catálogo/  
Katalógusszám/Produktnummer/  
Numer katalogowy/Katalogo numeris/  
Номер по каталогу



Manufacturer/Hersteller/Fabricante/  
Fabbricante/Fabricant/Fabrikant/  
Producent/Výrobce/Κτασκευαστής/  
Fabricante/Gyártó/Tillverkare/  
Producent/Gamintojas/  
Производитель



Contains sufficient for <96> tests/  
Inhalt ausreichend für <96> Prüfungen/  
Contenido suficiente para <96>  
ensayos/Contenuto sufficiente per  
"96" saggi/Contenu suffisant pour  
"96" tests/Inhoud voldoende voor "96"  
testen/Innehåller tillräckligt  
till "96" test/Lze použít pro <96> testů/  
Περιεχόμενο επαρκές για «96»  
εξετάσεις/Conteúdo suficiente para  
"96" ensaios/A doboz tartalma <96>  
vizsgálat elvégzéséhez elegendő/  
Innehåller tillräckligt till "96" antal tester/  
Wystarczy na wykonanie <96> testów/  
Turinys skirtas atlikti <96> tyrimus  
/Содержит достаточные количества  
для «96» определений



In Vitro Diagnostic Medical Device/  
In Vitro Diagnostikum/Producto  
sanitario para diagnóstico in vitro/  
Dispositivo medico-diagnostico in vitro/  
Dispositif médical de diagnostic in vitro/  
Medisch hulpmiddel voor in-vitro  
diagnostiek/Medicinsk udstyr til in  
vitro-diagnostik/In Vitro diagnostický  
zdravotnický prostředek /  
In Vitro Διαγνωστικό Ιατροτεχνολογικό  
προϊόν/Dispositivo médico para  
diagnóstico in vitro/In vitro  
diagnostikum/Endast för in vitro-  
diagnostik/Wyrób do diagnostyki In  
Vitro/In Vitro Diagnostinė Medicinos  
Priemonė/Только для диагностики  
In Vitro



Temperature limitation/  
Temperaturbegrenzung/  
Limite de temperatura/  
Limiti di temperatura/  
Limites de température/  
Temperatuurlimiet/  
Temperaturbegrænsning/  
Teplotní rozmezí od do/  
Περιορισμοί θερμοκρασίας/  
Limites de temperatura/  
Hörmérséklettartomány/  
Temperaturbegränsning/  
Przeznaczac zakresu temperatury/  
Temperatūriniai apribojimai/  
Температурный режим



Consult Instructions for Use/  
Gebrauchsanweisung beachten/  
Consulte las instrucciones de uso/  
Consultare le istruzioni per l'uso/  
Consulter les instructions d'utilisation/  
Raadpleeg de gebruiksaanwijzing/  
Se brugsanvisning/Viz návod k  
použití/ Συμβουλευτείτε τις οδηγίες  
χρήσης/Consulte as instruções de  
utilização/Nézze meg a Használati  
utasítást/Se bruksanvisning/Sprawdź  
w instrukcji obsługi/Dél naudojimo  
žūdrėkite instrukcijas/  
Обратитесь к инструкции по  
применению



Biological risks/Biogefährdung/  
Riesgo biológico/Rischio biologico/  
Risques biologiques/Biologisch  
risico/Biologisk fare/  
Biologicky nebezpečné  
Βιολογικοί κίνδυνοι/Risco biológico  
Biológiai kockázat/Biologisk risk/  
Ryzyko biologiczne/Biologinis pavojus/  
Биологическая опасность

ORIG MOU

From mouse/der Maus/de ratón/  
Murino/De souris/Mus/απο ποντίκι/  
Från mus/Pelès kilmēs/  
Мышиного происхождения

ORIG HUM

Human/Human/Humano/  
Origine Umana/Humaine/Human  
δείγματα αναφοράς/Human/  
Žmogaus kilmės/  
Человеческого происхождения

CONT

Contents of kit/Inhalt/Contenido/  
Contenido/Contenu/Indhold/  
ανιδραστήρια/Kit innehåll/  
Rinkinio turinys/  
Компоненты набора

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## WARNINGS AND PRECAUTIONS

### For in vitro diagnostic use

GB

- For Professional Use Only
- Please refer to the U.S. Department of Health and Human Services (Bethesda, Md., USA) publication No. (CDC) 88-8395 on laboratory safety procedures or any other local or national regulation.
- Handle all patient specimens as potentially infectious.
- Follow local guidelines for disposal of all waste material.

### Caution

Material used in the preparation of human source reagent has been tested and found to be Non Reactive for HIV 1 and 2 Antibody, HCV Antibody and Hepatitis B Surface Antigen (HBsAg). Since no method can completely rule out the presence of blood borne diseases, the handling and disposal of human source reagents from this product should be made as if they were potentially infectious.

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## WARNHINWEISE UND VORSICHTSMASSNAHMEN

### Für In-vitro-Diagnostik

DE

- Nur für geschultes Fachpersonal.
- Bitte beachten Sie die Vorschriften zur Laborsicherheit in der Publikation Nr. (CDC) 88-8395 des US Department of Health and Human Services (Bethesda, MD, USA) oder andere gleichwertige regionale oder nationale Bestimmungen.
- Alle Patientenproben gelten als potenziell infektiös und sind entsprechend zu handhaben.
- Befolgen Sie die lokalen Richtlinien zur Entsorgung von anfallenden Abfallstoffen.

### Achtung

Das zur Herstellung der Reagenzien aus humaner Quelle verwendete Material wurde auf HIV-1/2-Antikörper, HCV-Antikörper und Hepatitis-B-Oberflächenantigen (HBsAg) getestet und als nicht reaktiv befunden. Da es keine Methode gibt, mit der das Vorliegen von durch Blut übertragenen Krankheiten vollkommen ausgeschlossen werden kann, sollten der Umgang mit Reagenzien aus humaner Quelle und deren Entsorgung so erfolgen, als handele es sich um potenziell infektiöses Material.

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## CUIDADOS Y PRECAUCIONES

ES

### Para diagnóstico in vitro

- Solo para uso profesional
- Consultar la publicación del U.S. Department of Health and Human Services (Bethesda, Md., USA) publicación No. (CDC) 88-8395 o las normas locales o nacionales.
- Tratar todas las muestras de pacientes como potencialmente infecciosas.
- Todos los residuos se deben tirar cumpliendo las normas en vigor.

### Precaución

Material usado en la preparación de este reactivo se analizó la presencia de anticuerpos HIV 1 y 2, anticuerpos HCV y antígenos de superficie de hepatitis B, siendo el resultado de dichos análisis negativo. Sin embargo, como el test no puede excluir completamente los anticuerpos HIV 1 y 2, anticuerpos HCV y antígenos de superficie de hepatitis B, el manejo y disposición del reactivo debe ser como potencialmente infecciosas.

## AVVERTENZE E PRECAUZIONI

IT

### Per uso diagnostico in vitro

- Solamente per uso professionale
- Come riferimento si consiglia la pubblicazione No. (CDC) 88-8395 del US Department of Health and Human Service o qualsiasi altro regolamento locale o nazionale relativo alle Norme di Sicurezza da seguire nei Laboratori Diagnostici
- Maneggiare i campioni dei pazienti come potenzialmente infetti
- Seguire le normative vigenti relative all'eliminazione del materiale usato

### Precauzioni

Le sostanze usate nella preparazione dei reagenti sono state testate e trovate Non Reattive per l'anticorpo anti-HIV 1 e 2, per l'anticorpo anti-HCV e l'antigene di superficie dell'Epatite B (HbsAg). Tuttavia poiché nessun metodo diagnostico è in grado di escludere completamente la possibilità di trasmissione di infezioni attraverso il sangue si consiglia di maneggiare questi reattivi come potenzialmente infettivi.

## PRÉCAUTIONS D'EMPLOI ET MISE EN GARDE

FR

### Pour un usage diagnostic in Vitro

- Pour usage professionnel seulement.
- Prière de se référer à la Publication N° : (CDC) 88-8395 de l'U.S. Département of Health and Human Services (Bethesda, Md., USA) sur les procédures de sécurité dans les laboratoires ou toutes autres réglementations locales et nationales.
- Manipuler les échantillons de patients comme potentiellement infectieux.
- Suivre les réglementations locales pour l'élimination et le traitement de tous les déchets.

### Attention

Le matériel utilisé pour la préparation de réactifs d'origine humaine, a été testé et trouvé non réactif aux Anticorps anti-virus de l'immunodéficience humaine (VIH-1/2), aux Anticorps de l'Hépatite C (VHC) et à l'Antigène de surface de l'Hépatite B (AgHBs). Puisqu'il n'existe pas de méthode de test, rejetant complètement la présence de maladies dans le sang, la manipulation et l'élimination de réactifs d'origine humaine doivent être effectuées comme s'ils étaient potentiellement infectieux.

## ADVARSLER OG FORHOLDSREGLER

DK

### Til *in vitro* diagnostisk anvendelse

- Kun til professionel brug
- Der henvises til U.S. Department of Health and Human Services (de amerikanske sundhedsmyndigheder) (Bethesda, Md., USA) udgivelse nr. (CDC) 88-8395 vedrørende laboratoriesikkerhedsprocedurer eller andre lokale eller nationale forskrifter.
- Alle patientprøver skal behandles som potentielt smittefarlige.
- Følg lokale regler for afskaffelse af alt affald.

### Advarsel

Alt materiale anvendt ved beredningen af reagenser af human oprindelse er blevet testet og fundet negative for HIV 1 og 2 antistoffer, HCV antistoffer og Hepatitis B overflade antigen (HbsAg). Da ingen analysemetoder fuldstændig kan udelukke tilstedeværelsen af blodbårne sygdomme, skal håndtering og bortskaffelse af reagenser af human oprindelse fra dette produkt behandles som potentielt smittefarligt.

## ΠΡΟΕΙΔΟΠΟΙΗΣΕΙΣ ΚΑΙ ΠΡΟΦΥΛΑΞΕΙΣ

GR

### Για *in vitro* διαγνωσική χρήση

- Για επαγγελματική χρήση, μόνο.
- Παρακαλούμαι όπως επικαλεστείτε τις οδηγίες ασφαλούς λειτουργίας των εργαστηρίων του Τμήματος Υγείας και Ανθρώπινων Υπηρεσιών των Η.Π.Α.(U.S. Department of Health and Human Services) (Bethesda, Md., USA) αριθμός έκδοσης (CDC) 88—8395, ή οποιοδήποτε άλλο κατά τόπους σχετικό Εθνικό κανονισμό.
- Μεταχειριστήτε όλα τα δείγματα ως μολυσμένα.
- Ακολουθείστε τις κατά τόπου οδηγίες για απομάκρυνση άχρηστου υλικού.

### Προσοχή

Όλα τα υλικά που χρησιμοποιούνται για την παρασκευή αντιδραστηρίων ανθρώπινης προέλευσης έχουν εξετασθεί και έχουν βρεθεί αρνητικά για HIV-1/2 Αντίσωμα (Ab), HCV Αντίσωμα (Ab) και Ηπατίτιδας Β Αντιγόνο Επιφανείας (Hepatitis B Surface Antigen) (HBSAg). Εφ' όσον δεν υπάρχει μέθοδος ικανή να αποκλείσει απόλυτα την παρουσία αιματολογικών / μολυσματικών ασθενειών, ο τρόπος μεταχείρισης και η απομάκρυνση αντιδραστηρίων ανθρώπινης προέλευσης αυτού του συγκεκριμένου προϊόντος, πρέπει να είναι ίδιος με αυτόν που ακολουθείται για μολυσμένα δείγματα.

## VARNINGAR OCH SÄKERHETSÅTGÄRDER

SE

### Endast för *in vitro* diagnostik

- Endast för professionellt bruk
- Följ "U.S. Department of Health and Human Services (Bethesda, Md., USA) publikation (CDC) 88-8395" eller annan lokal eller nationell bestämmelse beträffande laboratoriesäkerhet.
- Hantera alla patientprover som potentiellt smittsamma.
- Följ lokala bestämmelser för bortskaffande av avfall.

### Varning

Material som använts för tillverkning av reagens med humant ursprung har testats och befunnits negativt för HIV 1 och 2 antikroppar, HCV antikroppar samt hepatit B ytantigen (HBSAg). Eftersom inget test fullständigt kan utesluta ev. närvaro av blodsmitta skall hantering och bortskaffande av humant material från denna produkt ske som om den vore potentiellt infektiös.

# CanAg CEA EIA

Instructions for use

Enzyme immunometric assay kit  
For 96 determinations

## INTENDED USE

The CanAg CEA EIA kit is intended for the quantitative determination of the cancer associated antigen CEA in serum.

## SUMMARY AND EXPLANATION OF THE ASSAY

Carcinoembryonic antigen (CEA) is a glycoprotein, which was first identified in patients with colonic carcinoma and in epithelial tumours of endodermal origin (gastrointestinal tract) by Gold and Freedman (1). The CEA molecule is quite heterogeneous due to the carbohydrate contents (50-60%) and depending on the purification procedure employed. It is soluble in perchloric acid and has a molecular weight of about 175.000–200.000 Daltons (2). Immunological and genetic characterization of CEA has identified a family of CEA-like molecules sharing common antigenic determinants. The most relevant CEA-like molecule is NCA (non-specific cross-reacting antigen) synthesized both by normal and pathological tissues. The problem of cross-reacting CEA-like molecules when assaying CEA is possible to overcome by the use of monoclonal antibodies. The CanAg CEA EIA is based on two mouse monoclonal antibodies against the Gold epitopes IV and V (3, 4).

CEA is secreted from tumour cells and is a widely used serological marker of gastrointestinal carcinomas, lung cancer and breast cancer. In colorectal cancer, the clinical use of CEA testing for monitoring response to therapy and for documenting progressive disease is well established (5, 6). CEA may also be present in benign gastrointestinal inflammatory diseases or in hepatobiliary diseases. These observations make it necessary to emphasize that the CEA assay should not be used as a cancer-screening test.

## PRINCIPLE OF THE TEST

The CanAg CEA EIA is a solid-phase, non-competitive immunoassay based upon the direct sandwich technique. Calibrators, controls and patient samples are incubated together with biotinylated Anti-CEA monoclonal antibody and horseradish peroxidase (HRP) labelled Anti-CEA monoclonal antibody in Streptavidin coated microstrips. After washing, buffered Substrate/ Chromogen reagent (hydrogen peroxide and 3, 3', 5, 5' tetra-methylbenzidine) is added to each well and the enzyme reaction is allowed to proceed. During the enzyme reaction a blue colour will develop if antigen is present. The intensity of the colour is proportional to the amount of CEA

present in the samples.

The colour intensity is determined in a microplate spectrophotometer at 620 nm (or optionally at 405 nm after addition of Stop Solution). Calibration curves are constructed for each assay by plotting absorbance value versus the concentration for each calibrator. The CEA concentrations of patient samples are then read from the calibration curve.

## REAGENTS

- Each CanAg CEA EIA kit contains reagents for 96 tests.
- The expiry date of the kit is stated on the label on the outside of the kit box.
- Do not use the kit beyond the expiry date.
- Do not mix reagents from different kit lots.
- Store the kit at 2–8°C. Do not freeze.
- Opened reagents are stable according to the table below provided they are not contaminated, stored in resealed original containers and handled as prescribed. Return to 2–8°C immediately after use.

Component	Quantity	Storage and stability after first opening
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### MICROPLA

Microplate	1 Plate	2–8°C until expiry date stated on the plate
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12 x 8 wells coated with Streptavidin. After opening, immediately return unused strips to the aluminium pouch, containing desiccant. Reseal carefully to keep dry.

CEA Calibrators	6 vials	2–8°C until expiry date stated on the vials
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CAL	CEA	0
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0 µg/L 1 x 8 mL

CAL	CEA	2
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2 µg/L 1 x 0.75 mL

CAL	CEA	5
-----	-----	---

5 µg/L 1 x 0.75 mL

CAL	CEA	15
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15 µg/L 1 x 0.75 mL

CAL	CEA	50
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50 µg/L 1 x 0.75 mL

CAL	CEA	75
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75 µg/L 1 x 0.75 mL

Human CEA in a Tris-HCl buffered salt solution containing bovine serum albumin, an inert yellow dye and 0.01% methyl-isothiazolone (MIT) as preservative. Ready for use. 

CAL	CEA	0
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 should also be used for dilution of samples.

Component	Quantity	Storage and stability after first opening			
<b>CEA Controls</b>	2 vials	2–8°C until expiry date stated on the vials			
<table border="1" style="display: inline-table;"><tr><td>CONTROL</td><td>CEA</td><td>1</td></tr></table>	CONTROL	CEA	1	1 x 0.75 mL	
CONTROL	CEA	1			
<table border="1" style="display: inline-table;"><tr><td>CONTROL</td><td>CEA</td><td>2</td></tr></table>	CONTROL	CEA	2	1 x 0.75 mL	
CONTROL	CEA	2			

Human CEA in a Tris-HCl buffered salt solution containing bovine serum albumin, and 0.01% methyl-isothiazolone (MIT) as preservative. Ready for use.

<b>BIOTIN</b>	<b>Anti-CEA</b>
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<b>Biotin Anti-CEA</b>	1 x 15 mL	2–8°C until expiry date stated on the vial
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Biotin Anti-CEA monoclonal antibody from mouse, approximately 3 µg/mL. Contains phosphate buffered saline (pH 7.2), bovine serum albumin, bovine immunoglobulin, blocking agents, Tween 20, an inert blue dye and 0.01% methyl-isothiazolone (MIT) as preservative. To be mixed with Tracer, HRP Anti-CEA before use.

<b>CONJ</b>	<b>Anti-CEA</b>
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<b>Tracer, HRP Anti-CEA</b>	1 x 0.75 mL	2–8°C until expiry date stated on the vial
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Stock solution of HRP Anti-CEA monoclonal antibody from mouse, approximately 60 µg/mL. Contains preservatives. To be mixed with Biotin Anti-CEA before use.

<b>SUBS</b>	<b>TMB</b>
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<b>TMB HRP-Substrate</b>	1 x 12 mL	2–8°C until expiry date stated on the vial
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Contains buffered hydrogen peroxide and 3, 3', 5, 5' tetramethyl-benzidine (TMB). Ready for use.

Component	Quantity	Storage and stability after first opening
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**STOP**

<b>STOP Solution</b>	1 x 15 mL	2–8°C until expiry date stated on the vial
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Contains 0.12 M hydrochloric acid. Ready for use.

**WASHBUF 25X**

<b>Wash Concentrate</b>	1 x 50 mL	2–8°C until expiry date stated on the bottle
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A Tris-HCl buffered salt solution with Tween 20. Contains Germall II as preservative. To be diluted with water 25 times before use.

### Indications of instability

The TMB HRP-Substrate should be colourless or slightly bluish. A blue colour indicates that the reagent has been contaminated and should be discarded.

### WARNINGS AND PRECAUTIONS

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- Please refer to the US Department of Health and Human Services (Bethesda, Md., US) publication No. (CDC) 88-8395 on laboratory safety or any other local or national regulation.
- Handle all patient specimens as potentially infectious.
- Follow local guidelines for disposal of all waste material.

#### Caution

Material used in the preparation of human source reagent has been tested and found to be Non Reactive for HIV-1/2 Antibody, HCV Antibody and Hepatitis B Surface Antigen (HBsAg). Since no method can completely rule out the presence of blood borne diseases, the handling and disposal of human source reagents from this product should be made as if they were potentially infectious.

## SPECIMEN COLLECTION AND HANDLING

The CanAg CEA EIA is intended for use with serum. Collect blood by venipuncture and separate the serum according to common procedures. Samples can be stored at 2–8° C for 2 days. For longer periods it is recommended to store the samples at –20° C or below. Avoid repeated freezing and thawing of the samples. Allow frozen samples to thaw slowly, preferably at 2–8° C over night and then bring the samples to room temperature before analysis.

## PROCEDURE

### Materials required but not supplied with the kit

**1. Microplate shaker**

Shaking should be medium to vigorous. Longitudinal shaking approximately 200 strokes/min, oscillations 700-900/min.

**2. Microplate wash device**

Automatic plate wash capable of performing 1 and 6 washing cycles with a minimal fill volume of 350 µL/well/washcycle.

The Nunc Immuno-8 manual strip washer is recommended if an automatic microplatewash is not used.

**3. Microplate spectrophotometer**

With a wavelength of 620 nm and/or 405 nm and an absorbance range of 0 to 3.0.

**4. Precision pipettes**

With disposable plastic tips to deliver microlitre and millilitre volumes. An 8-channel pipette or respenser pipette with disposable plastic tips for delivery of 100 µL is useful but not essential.

**5. Distilled or deionized water**

For preparation of Wash Solution.

### Procedural notes

1. A thorough understanding of this package insert is necessary to ensure proper use of the CanAg CEA EIA kit. The reagents supplied with the kit are intended for use as an integral unit. Do not mix identical reagents from kits having different lot numbers. Do not use the kit reagents after the expiry date printed on the outside of the kit box.

2. Reagents should be allowed to reach room temperature (20–25°C) prior to use. The assay should only be performed at temperatures between 20–25°C to obtain accurate results. Frozen specimens should be brought to room temperature slowly and must be gently but thoroughly mixed after thawing.
3. Before starting to pipette calibrators, controls and patient specimens it is advisable to mark the strips to be able to clearly identify the samples during and after the assay.
4. The requirement for efficient and thorough washing for separation of bound and unbound antigen and reagents from the solid-phase bound antibody-antigen complexes is one of the most important steps in an EIA. In order to ensure efficient washing make sure that all wells are completely filled to the top edge with wash solution during each wash cycle, that wash solution is dispensed at a good flow rate, that the aspiration of the wells between and after the wash cycles is complete and that the wells are empty. If there is liquid left, invert the plate and tap it carefully against absorbent paper.
  - Automatic strip washer: Follow the manufacturer's instructions for cleaning and maintenance diligently and wash the required number of wash cycles prior to and after each incubation step. It's highly recommended to use *strip* process mode and *overflow* wash mode with a dispensing volume of 800 µL. The aspiration/wash device should not be left standing with the Wash Solution for long periods, as the needles may get clogged resulting in poor liquid delivery and aspiration.
5. The TMB HRP-Substrate is very sensitive for contamination. For optimal stability of the TMB HRP-Substrate, pour the required amount from the vial to a carefully cleaned reservoir or preferably a disposable plastic tray to avoid contamination of the reagent. Be sure to use clean disposable plastic pipette tips (or respenser pipette tip).
6. Be sure to use clean disposable plastic pipette tips and a proper pipetting technique when handling samples and reagents. Avoid carry-over by holding the pipette tip slightly above the top of the well and avoid touching the plastic strip or surface of the liquid. A proper pipetting technique is of particular importance when handling the TMB HRP-Substrate Solution.

# Protocol Sheet

**CanAg CEA EIA** REF **401-10**

Mix the components directly before use. Use shaking conditions according to the Instructions.

Step	Bottle/Plate	Procedure
1. Prepare Wash Solution	<b>WASHBUF</b>   <b>25X</b>	Dilute 50 mL of Wash Concentrate with 1200 mL of distilled water or deionized water.
Prepare Antibody Solution	<b>CONJ</b>   <b>Anti-CEA</b> <b>BIOTIN</b>   <b>Anti-CEA</b>	Mix 50 $\mu$ L of Tracer, HRP Anti-CEA, with 1 mL of Biotin Anti-CEA per strip:
	<b>No. of Strips</b>	<b>Tracer, HRP Anti-CEA (<math>\mu</math>L)</b>   <b>Biotin Anti-CEA (mL)</b>
	1	50   1
	2	100   2
	3	150   3
	4	200   4
	5	250   5
	6	300   6
	7	350   7
	8	400   8
	9	450   9
	10	500   10



Preparation of reagents	Stability of prepared reagent
<b>Wash Solution</b>	2 weeks at 2–25°C in a sealed container

Pour the 50 mL Wash Concentrate into a clean container and dilute 25- fold by adding 1200 mL of distilled or deionized water to give a buffered Wash Solution.

<b>Antibody Solution</b>	3 weeks at 2–8°C
Prepare the required quantity of Antibody Solution by mixing 50 µL of Tracer, HRP Anti-CEA with 1 mL of Biotin Anti-CEA per strip (see table below and the Protocol Sheet).	

No. of Strips	Tracer, HRP Anti-CEA (µL)	Biotin Anti-CEA (mL)
1	50	1
2	100	2
3	150	3
4	200	4
5	250	5
6	300	6
7	350	7
8	400	8
9	450	9
10	500	10
11	550	11
12	600	12

Be sure to use a clean plastic or glass bottle for preparation of the Antibody Solution.

**Alternative:** Pour the content of the Tracer, HRP Anti-CEA into the vial of Biotin Anti-CEA and mix gently. Make sure that all of the Tracer, HRP Anti-CEA is transferred to the vial of Biotin Anti-CEA.

**NOTE:** The Antibody Solution is stable for 3 weeks at 2–8°C. Do not prepare more Antibody Solution than will be used within this period and make sure that it is stored properly.

### Assay procedure

Perform each determination in duplicate for calibrators, controls and patient samples. A calibration curve should be run with each assay. All reagents and samples must be brought to room temperature (20–25°C) before use.

1. Start to prepare Wash Solution and Antibody Solution. It is important to use clean containers. Follow the instructions carefully.

- Transfer the required number of microplate strips to a strip frame. (Immediately return the remaining strips to the aluminium pouch containing a desiccant and reseal carefully). Wash each strip once with the Wash Solution. Do not wash more strips than can be handled within 30 min.
- Pipette 25  $\mu\text{L}$  of the CEA Calibrators (CAL 0, 2, 5, 15, 50, 75), controls (c) and patient samples (unknowns-Unk) into the strip wells according to the following scheme:

	1	2	3	4	5	6	7 etc
A	Cal 0	Cal 50	Unk 1				
B	Cal 0	Cal 50	Unk 1				
C	Cal 2	Cal 75	Unk 2				
D	Cal 2	Cal 75	Unk 2				
E	Cal 5	C1	etc.				
F	Cal 5	C1					
G	Cal 15	C2					
H	Cal 15	C2					

- Add 100  $\mu\text{L}$  of Antibody Solution to each well using a 100  $\mu\text{L}$  precision pipette (or an 8-channel 100  $\mu\text{L}$  precision pipette). Avoid carry-over by holding the pipette tip slightly above the top of the well and avoid touching the plastic strip or the surface of the liquid.
- Incubate the frame containing the strips for 1 hour ( $\pm 5$  min) at room temperature (20–25°C) with constant shaking of the plate using a microplate shaker.
- Wash each strip 6 times, using the wash procedure described in Procedural notes item 4.
- Add 100  $\mu\text{L}$  of TMB HRP-Substrate to each well using the same pipetting procedure as in item 4. The TMB HRP-Substrate should be added to the wells as quickly as possible and the time between the addition to the first and last well should not exceed 5 min.
- Incubate for 30 min ( $\pm 5$  min) at room temperature with constant shaking. Avoid direct sunlight.

9. Immediately read the absorbance at 620 nm in a microplate spectrophotometer.

### **Option**

If the laboratory does not have access to a microplate spectrophotometer capable of reading at 620 nm, the absorbance can be determined as follows:

- Alt. 9. Add 100  $\mu$ L of Stop Solution. Mix and read the absorbance at 405 nm in a microplate spectrophotometer within 15 minutes after addition of Stop Solution.

### **Measurement range**

The CanAg CEA EIA measures concentrations between 0.25 and 75  $\mu$ g/L. If CEA concentrations above the measuring range are to be expected, it is recommended to dilute samples with CEA Calibrator 0 prior to analysis.

### **Quality control**

CEA Control 1 and 2 may be used for validation of the assay series. Ranges of expected results are indicated on the vial labels. If values outside of the specified range are obtained, a complete check of reagents and reader performance should be made and the analysis repeated. It is recommended that each laboratory in addition prepare its own serum pools at different levels, which can be used as internal controls in order to assure the accuracy of the assay.

### **Reference material**

The 1<sup>st</sup> International Reference Preparation IRP 73/601 may be used as a reference standard. Values for CEA Calibrators and Controls were assigned against a set of in-house reference standards whose values are traceable to IRP 73/601 using the conversion factor 13.5, i.e. 1  $\mu$ g/L corresponds to 13.5 IU/L.

### **CALCULATION OF RESULTS**

If a microplate spectrophotometer reader with built-in data calculation program is used, refer to the manual for the plate reader and create a program using the concentration stated on the labels of each of the CEA Calibrators.

For automatic calculation of CEA results it is recommended to use either of the following methods:

- Cubic spline curve fit method. Calibrator 0 should be included in the curve with the value 0  $\mu$ g/L.
- Spline smoothed curve fit method. Calibrator 0 should be used as plate blank.

- Interpolation with point-to-point evaluation. Calibrator 0 should be included in the curve with the value 0 µg/L.
- Quadratic curve fit method. Calibrator 0 should be included in the curve with the value 0 µg/L.

**NOTE:** 4-parametric or linear regression should not be used.

For manual evaluation, a calibration curve is constructed by plotting the absorbance (A) values obtained for each CEA calibrator against the corresponding CEA concentration (in µg/L), see figure below. The unknown CEA concentrations can then be read from the calibration curve using the mean absorbance value of each patient specimen.

If samples in an initial analysis give CEA levels higher than 75 µg/L the samples should be diluted 1/10 and 1/100 with CEA calibrator 0 and reanalyzed to obtain the accurate CEA concentration.

1 : 10 dilution = 50 µL of specimen + 450 µL of CEA 0 µg/L

1 : 100 dilution = 50 µL of 1:10 dilution + 450 µL of CEA 0 µg/L

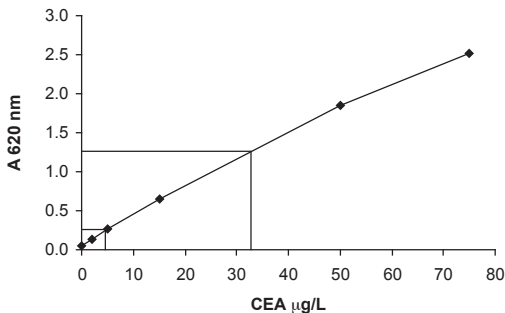
The CEA concentration of the undiluted sample is then obtained as follows:

Dilution 1/10: 10 x Measured value

Dilution 1/100: 100 x Measured value

#### Example of results

Specimen	Calibrator values	Mean abs value (A)	CEA (µg/L)
CAL CEA 0	0 µg/L	0.050	
CAL CEA 2	2 µg/L	0.131	
CAL CEA 5	5 µg/L	0.259	
CAL CEA 15	15 µg/L	0.657	
CAL CEA 50	50 µg/L	1.857	
CAL CEA 75	75 µg/L	2.519	
Specimen A		0.220	4.1
Specimen B		1.290	32.3



**Example (do not use this curve or table above to determine actual assay results).**

## LIMITATIONS OF THE PROCEDURE

The level of CEA cannot be used as absolute evidence for the presence or absence of malignant disease and the CEA test should not be used in cancer screening. The results of the test should be interpreted only in conjunction with other investigations and procedures in the diagnosis of disease and the management of patients and the CEA test should not replace any established clinical examination.

Anti-reagent antibodies (human anti-mouse antibody (HAMA) or heterophilic antibodies) in the patient sample may occasionally interfere with the assay, even though specific blocking agents are included in the buffer.

## EXPECTED VALUES

CanAg CEA was measured in 95 healthy blood donors and in 117 healthy individuals between 60 and 64 years. The lower and upper extremes of the normal range were examined using IFCC recommended non-parametric statistical treatment. The reference interval contains the central 95% fraction of the reference distribution. Reference limits may accordingly be estimated as the 2.5% (lower) and 97.5% (upper) fractiles. These limits cut off a fraction of 2.5% of the values in each tail of the reference distribution. Non-parametric estimates:

	Mean (µg/L)	SD (µg/L)	Median (µg/L)	Range (µg/L)	Upper reference limit (Central 95% fraction)
Healthy blood donors n=95	1.3	1.0	1.0	0.5–9.1	3.2 µg/L
Healthy individuals age 60-64, n=117	2.4	1.7	1.9	0.5–8.8	7.4 µg/L

96% of the healthy subjects had assay values below 5 µg/L.

It is recommended that each laboratory establish their own normal range to account for such local environmental factors as diet, climate, living conditions, patient selection, etc. It should also be borne in mind that the individual patient's own baseline results provides the most important reference point for interpretation of marker results. Smoking may increase CEA levels in healthy individuals.

### Precision

Intermediate precision was calculated according to NCCLS guideline EP5-A (7) using four levels of frozen pooled human serum containing added CEA and two different CanAg CEA EIA reagent combinations. Each sample was randomly pipetted (n=2/analysis) and analysed twice each day over 20 days.

Sample	Replicates	Mean (µg/L)	Within-run SD (µg/L)	Within-run CV %	Between-day SD (µg/L)	Between-day CV %
CEA 1	80	2.78	0.07	2.5	0.08	2.7
CEA 2	80	5.97	0.15	2.6	0.11	1.8
CEA 3	80	20.8	0.44	2.1	0.36	1.7
CEA 4	80	57.3	1.57	2.7	0.87	1.5

### Detection limit

The detection limit of the CanAg CEA EIA is  $\leq 0.25$  µg/L defined as the concentration corresponding to the mean of the absorbance values of the CEA calibrator 0 plus 2 standard deviations according to formula:

$$\frac{2 \times \text{SD CAL 0}}{\text{OD CAL 2} - \text{OD CAL 0}} \times 2 \mu\text{g/L}$$

## Recovery

Spiked serum samples were prepared by adding human CEA antigen to normal serum samples. The recovery of the added antigen was in the range 90–115 %.

## Hook effect

When reading absorbance at 405 nm, i.e. using the Optional assay procedure with addition of STOP solution, no hook effect has been noticed for samples containing up to 250 000 µg/L. When absorbance is read at 620 nm, extremely high samples may change the colour of the substrate from blue to greenish. This may lead to a falsely low absorbance that may fall within the calibration curve range and noticed as a hook. Such a hook effect at 620 nm has been noticed for samples containing more than 2000 µg/L.

In order to avoid reporting misleadingly low results due to apparent hook effect when absorbance is read at 620 nm it is recommended to use the Optional assay procedure and determine absorbance at 405 nm in patients analysed for the first time or in patients where very high CEA values may be expected.

## Linearity

Patient samples were serially diluted with CEA Calibrator 0 and analysed. The obtained values were between 90–120 % of the expected values.

## Specificity

The CanAg CEA EIA is based on two mouse monoclonal antibodies, the catching MAb 12-140-10 against Gold epitope IV and the detecting MAb 12-140-1 against Gold epitope V (4, 5). The NCCLS guideline EP7-P (8) was followed to determine possible sources of interference. The following substances and concentrations were tested and found not to interfere with the test.

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	<b>Concentration with no significant (± 10%) interference</b>
Lipemia (Intralipid®)	10 mg/mL
Bilirubin, unconjugated	0.6 mg/mL
Hemoglobin	5 mg/mL

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### **Method comparison**

The CanAg CEA EIA was compared to the Wallac Delfia CEA kit. Seventy-seven human serum samples ranging in values from 0-790 µg/L were measured and linear regression analyses of the results yielded:

$$\text{CanAg CEA} = 0.90 \times \text{Delfia CEA} + 0.53 \quad r = 1.00$$

## **WARRANTY**

The performance data presented here were obtained using the assay procedure indicated. Any change or modification of the procedure not recommended by Fujirebio Diagnostics AB may affect the results, in which event Fujirebio Diagnostics AB disclaims all warranties expressed, implied or statutory including the implied warranty of merchantability and fitness for use.

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