

.FUBCPMJTN EVSJOH 'BTUJOH BOE 4UBSWBUJP
(MJNQTF /FX #PVOEBSJFT

ORDFLU &RXWR GH \$QGUDGH --QLRU
3RVW *UDGXDWLRQ 'HSDUWPHQW 1LOWRQ /LQV 8OLYHU\LVW 08QDXV %UD110
'HSDUWPHQW RI)RRG 7HFKQRORJ\ ,QVWLWXWR 1DFLRQDO GH 3HVTXLVDV GD \$PDJ{QLD ,13\$ 0DQDXV %
&RUUHVSRRGLQGH \$QGUDGH --QLRU 0& 'HSDUWPHQW RI)RRG 7HFKQRORJ\ ,QVWLWXWR 1DFLRQDO GH 3
(PDLO PRDFLUFRXWMU#JPDLO FRP
5HFHLYHG 6HSWH \$FFHSWHG 6HSWH 3XEOLVKHG 6HSWH
&RS\ULJKW ORDFLU &RXWR GH \$QGUDGH --QLRU 7KLV LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XC

H IUHH HQHUJ\ UHOHDVHG E\ FDWDEROLF GHJUDGDWLRQbYLD
DGHQRVLQH WULSKRVSKDWH DQG QLFRWLQDPLGH DGHQHQRHWDESRVSRDWHBDFU
XVHG WR GULYH WKH HQGHUJRQLF SURFHVV\FX QP UDQDEROHLUHLQDWHKHLV)BU@
&DUERK\GUDWHV H J JO\FRJHQ FRQVWLWXWR LPMHGLDWHFHQRJ\ DQG RUHVPLG
OLYHU DQG OLSLGV H J 7\$* FRQVWLWXWR HQJ WUPEXWHQRW WRRV IDW
DGLSRF\WHV > @ 3URWHLQV FRQVWLWXWR HQJ WUPEXWHQRW WRRV IDW
XODWH Yy™LQFUHDVLQJ WKH UHTXLUHPHQWV IRU \$YLWDP\K\VBVGGHULQHYDHLWKH\ \$W
ROLVP LV SRVWSRQHG LQ IDYRU RI FDWDEROLF \$WZ@ \ RU (PEGHQ 0H\HUKRI SDWKZD\ F

DEEUHYLDWHG YHUVLRQ RI JOXFRQRHRJHQH
,PSRUWDQWO\ ERWK JOXFRQRHRJHQHVLV
FDWDSOHURWLF SDWKZD\V EHFDXVH WKH\
SKRVSKRHQROS\UXYDWH ZKLFK LV WKHQ
* 3 > @
,W VKRPRELOLJDWLRQ RI HQGRJHQRXV V
YLWDO DFWLYLW\ > @ ,W LV FKDUDFW
JOXFDJRQ OHYHOV OLYHU JO\FRJHQRO
PDLQWDLQLQJ VHUXP JOXFRVH OHYHOV
)DVWLQJ PHWDEROLVP DOVR LQYROYHV K
FLUFXODWLQJ 7\$* IRU HQDEOLQJ HQHUJ\

WKHQ UHDFKHV WISH FVWFDWRSRJKHUV H J * /87 DQG
> @V IDVWLQJ FRQWLQXHV SURJUHVVLYH NHWRVLV GHYHORSV GXH WR WKH
PRELOL]DWLRQ DQG • R[LGDWLRQ RI IDWW\ DFLGV DQG WKH LQFUHDVH LQ NHWRQ
ERGLHV .%V H J • K\GUR[\EXW\UDWH WKDW UHSODFH JOXFRVH DV WKH
SULPDU\ HQHUJ\ VRXUFH LQ WKH &16 WKHUHE\ GHFUHDVLQJ WKH QHHG IRU
JOXFRQRJHQHVLV DQG VSDULQJ SURWHLQ FDWDEROLVP > @ \$W WKLV VWDJH
KRUPRQDO DGDSWLYH FKDQJHV LQYROYH IRU H[DPSOH ORZ LQVXOLQ DQG 7
OHYHOV DORQJ ZLWK KLJK OHYHOV RI NHWRJHQLF JOXFDJRQ DQG WKH LQDFWLY
PHWDEROLWH RUFRUWH @ .HWRQH ERGLHV UHDFK WKH
&16 YLD PRQRFDUER[\OLF DFLG WUDQVSRUWHUV H J 0&7 DQG > @
H EUDLQ DQG RWKHU RUJDQV XWLQ]H .%V LQ D SURFHVV WHUPHG NHWRO\VLV
> @ VQH FRQWUDU\ LQ WKH IHG VWDWH SRVWSUDQGLDO PHWDEROLVP LV
HVVHQWLDQO\ FKDUDFWHUL]HG E\ KLJK LQVXOLQ OHYHOV UHVSQRVLEOH IRU ER
DQWLOLSRO\WLF DQG DQWLJOXFRQHPPp PPp PYHUPP OP

D)\$ G@AD3 AD\$ DQ

&LWDWDRQFLU &RXWR GH \$QGUDGH --QLRU
%RXQGDULHV - 1XWU 'LHW H

0HWDEROLVP GXULQJ)DVWLQJ DQG 6W

3DJH RI

RODQ]DSLQH LQGXFIBGR12HKLWRSW\FBRSKLRUPDFBICRUHQ]2DRWWLQR & *DVWDOGL * 0DPP
3V\FKLDWU\ IXQFWLRQ LQ PHWDEROLVP %LRFKLP %LRSKY
9DQ GHQ %HUIJKH * 'H =HJKHU) %RXLOORQ&DKLOO \$FUXWH DQG)SWDORRQWDEEROLVP LQ VV
FULWLFDOGLVHOCHXWRBQGRFULQH SDUDGLJPV - &OLQ (QGRFULQRO
0HWDE :DQJ 7 +XQJ &&< 5DQGHIDRPS-DUDWLYH SKIV
6DQZ'DO \$OORVWHULF FRQWUROV RI DPSIKLEFCGLHS \$DYDZDRQ LQJEDFHWBHWVWDR IDPLQH
%DFWHULRO 5HY 0DUWLQH] % 2UWUJR5GRUPRQH UHJXODWLRQ
+DQVRQ5NLPL 3 %RUQ WR UXQ WKH VWRUVRWVLRWVDFH3(BQVJFKWV IURP DQLPDOV QDW
PRXVH %LRFKLP
.D\DED 0 3DUN , ,ZD\DPD . 6H\D < 2JDWD+HQCHP'DDQW\$H.WHQQ(BQJ\ &DXMMHFWQK
PHWDE6DLPHWZHHQ VOHHS VWDJHV DQG EHWZVQGRURBHFUGXUMHQ5EDRURULR GHSULYDWLFR
DZDNHQLQJ 0HWDE &OLQ ([S RYHUYLHZ \$FWD 0HG \$XVWULDFD
&KRZGKXU\ 6\$ 2UVNRY (5 ,PSOLFDWLRCHERHUDVWLDDEGRODVGDFDQGIURYDVFXODU PH
PHWDEROLVP DQG IHHG HYDOXDWLRQ LQ UKRULFDQDQVFK-DQQLP DFFHPSDFQ\LQJ DFXWH V
- 1XWU
.UDXV :(6OHQW] &\$ ([HUFLVH WUDLQDQDFKQMSIQSHHQXODHWLROQFFDQHG SKRVSKDWL
LQVXOLQ DFWLRQ D WDWLQZHG\ZWE RI 6DX6VH%DQSKHP -
%DVGHY7FQWEURXWVN\ 6WRIFNU «WLRQVHLWXVDRQ GHQ %HUIJKH * ,QWHQVLYH LQVX
PRELOLV,2VDRQ «GH 9«GLWFLRQ)@BPIFUQRQUHFRQFLOLQJ WKH HYLGHQFH 1DW 5HY (QGR
6FLHQFHV 3DULV 0DQ\$ &DQR /4 9DQ 3HOW - *LDUGRJOHX 3
&DPDQ6RQDWWVRQ 03 %UDLQ PHWDEROWXPRQ KMSWVH/VRLQJ% DQBJXODWHV VWDU
QHXURGHJHQHUDWLRQ (0%2 - V\VVHPLF PHWDEROLF VWUHV 6FL 5HS
.HUQ55VDXJKW/RQULVFRQVHUNSDPS)DVWLQJDU3N ,V HDUEHWQWBLNDWMLRQF ULWLFDO
WKH KLVWRU\ SDWKRSK\VLRRRJ\ DQG FRPSQ\FUDV28DQ &DLV 1XWG 0HWDE &DUH
/RQJR 9' 0DWWVRQ 03)DVWLQJ PROHIFKIDU5\$PHFKDQLV9V DQD 30 5HFLSUR
FOLQLFDO DSSOLFDWLRQV &HOO 0HWDE DXWRSDDGLHQGRFULQH VLJQDOLQJQLGRPUH
6°QGHUJDDRIGDQVHQ 5) -HQVHQ 0' 1LHOVHQ5HY 3RVWSUDQGLDO
9//7* PHWDEROLVP LQ W\SH GLDEHWHV 0HWDEROLVP