

# 1HXURSURWHFWLYH (IIHFWV RI 3LWXLWDU\ \$G

5XL -L/LQJEDHQDQJ 5RQJTLQJ <DQJ

'HSDUWPHQW RI %LRFKHPLVWU\ DQG 0ROHFXODU ELRORJ\ 8QLYHUVLW\ RI /RXLVYLOOH 6FKRRO RI 0HGL

'HSDUWPHQW RI \$QDWRPLFDO 6FLHQFHV DQG 1HXURELRORJ\ 8QLYHUVLW\ RI /RXLVYLOOH 6FKRRO RI 0H

&RUUHVSQRGLQJ DXWKRU 'U 5RQJTLQJ <DQJ 8QLYHUVLW\ RI /RXLVYLOOH 6FKRRO RI 0HGLFLQH  
U \DQJ #ORXLVYLOOH HGX

5HFHLYHG-~~GDWH~~ \$FFHSWHG-~~GDWH~~ 3XEOLVKHG GDWH -XQH

&RS\ULJKW 5XL -L HW DO 7KLV LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XQGHU WKH WHUPV RI WK  
GLVWULEXWLRQ DQG UHSURGFWLRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO DXWKRU DQG VRXUFH D

## \$EVWUDFW

3LWXLWDU\ ~~DGHOVDWH~~HWLYDWLQJ SRO\SHSWLGH 3\$\$3 LV D PHPEHU RI WKH  
LQWHVWLQDO SHSWLGH 9,3 VXSHU IDPLO\ 3\$\$3 ZDV ILUVW LVRODWHG IURP DQ  
VWLPXODWHG F\$03 SURGFWLRQ LQ WKH UDW SLWXLWDU\ FHOXFXOXUH 3\$\$3 L  
QHUYRXV V\VHPV 3\$\$3 SOD\ WKH UROHV RI QHXURWUDQVPLWWHU QHXURPRGX  
SURWHLQ ELQGLQJ UHFHSWRUV 3\$ 9\$3& DQG 93\$& \$ QXPEHU RI UHFHQW  
QHXURSURWHFWLYH IXQFWLRQV RI 3\$\$3 LQ ERWK LQ YLWUR DQG LQ YLYR PRGH  
WKURXJK ERWK GLUHFV DQG LQGLUHFV ZD\ 3\$\$3 LQKLELWV FDVSDVH WKUR  
SDWKZD\ 0RUHRYHU 3\$\$3 FDQ VWLPXODWH DVWURF\WHV WR UHOHDVH QHXUR  
,/ 7KH SUHVHQW UHYLHZ ZLOO EULHIO\ VXPPDULJH WKH UHFHQW VWXGLHV DQG  
FOLQLF

SDWKZD\V >@ 7KURXJK WKH SDWKZD\V 3\$&\$3 FDQ GHDFWLYDWH  
FDVSDVH DQ DSRSWRWLF NH\ HQ]\PH DQG LQGXFH H[SUHVVLQR RI  
QHXURWURSKLQ VXFV DV %UDLQ GHULYHG QHXURWURSKLF IDFWRU %'1) WR  
NHHS WKH QHXUR@V VGGYUMDVO> 3\$&\$3 SURWHFWV WKH  
QHXURQV E\ PRGXODWLQJ JOLDO FHOOV WR LPSURYH WKH PLFURHQYLURQPHQW  
DURXQG WKH QHXURQV )RU LQVWDQFH WKH DVWURF\WHV H[SUHV D ORW RI  
3\$&\$3 UHFHSWRUV 3\$&\$3 FDQ LQGXFH WKH KLJK VHFUHWLRQ RI  
LQWHUOHXNLQ ,/ WR SURWHFW &\$ QHXURQV DJDLQVW DSRSWRVLV LQ WKH  
LVFKHPLF KLS@RFDPSXV >

,Q FRQFOXVLRQ D QXPEHUV RI SUHYLRXV VWXGLHV KDYH VKRZHG WKDW  
3\$&\$3 KDV D VLJQLILFDQW QHXURSURWHFWLYH SRWHQWLDO EHFDXVH RI LWV  
QHXURWURSKLF DQG DQWL DSRSWRVLV HIIHFV WKURXJK GLUHFV DQG LQGLUHF  
PHFKDQLVPV )XUWKHUPRUH 3\$&\$3 KDV WKH DELOLW\ WR FURVV WKH EORRG  
EUDLQ EDUJLKHU\HIRUH 3\$&\$3 PD\ EHFRPH D XVHIXO WKHUDSHXWLF  
DJHQW LQ PDQ\ EUDLQ LQMXU\ DQG QHXURGHJHQHUDWLYH GLVHDVHV ,Q RUGHU V  
XWLOLJLQJ 3\$&\$3 LQ FOLQLF UHVHDUFKHUV VWLOO QHHG WR SD\ PRUH DWWHQW  
WR GHOLYHU\ RI 3\$&\$3 LQWR WKH VSHFLILF UHJLRQ DQG EORFNDGH RI 3\$&\$3  
GHJUDGDWLRQ

5HIHUUHQFHV

0L\DWD \$ \$ULPXUD \$ 'DKO 55 0LQDPLQR 1 8HKDUD \$ HW DO  
,VRODWLRQ RI D QRYHO UHVLGXH K\SRWKDODPLF SRO\SHSWLGH ZKLFK  
VWLPXODWHV DGHQ\ODWH F\FODVH LQ SLWXLWDU\ FHOOV %LRFKHP %LRSK\ 5HV  
&RPPXQ  
0L\DWD \$ -LDQJ / 'DKO 5' .LWDGD & .XER . HW DO ,VRODWLRQ RI D

:X =/ &LDOOHOD -5 )ORRG '\* 2 .DQH 70 %R]\F]NR &R\QH ' HW DO