

0DULMXDQD 9LROHQFH DQG /DZ

1RUPDQ 6 0DQQHFKH2EHQEDUQVFKHLGW

6WXGLHV 6KRZ DQ \$VVRFLDWLRQ EHWZHHQ 0DULMXDQD DQG  
0HQWDO RU 3K\VLFDQ &RQVHTXHQFHV

6WXGLHV VKRZ YLROHQFH DQG DJJUHVVLRQ ZLWK PDULMXDQD XVH

0DULMXDQD LQWR[LFDWLRQ UHVXOWV LQ SDQLF UHDFWLRQV DQG SDUDQRLG  
IHHOLQJV ZKRVH V\PSWRPV V\PSWRPV V\PSWRPV V\PSWRPV @  
RI FRQWURO DQG SDQLF LV DVVRFLDWHG ZLWK YLROHQFH > @ \$OVR  
PDULMXDQD XVH LQFUHDVHV KHUW UDWK ZKLFK PD\ EH DVVRFLDWHG ZLWK  
YLROHQW EHKDYLRXU > @

:KHQ SHRSOH VWRS XVLQJ PDULMXDQD WKH\ PD\ H[SHULHQFH D YDULHW\ RI  
ZLWKGUDZDO V\PSWRPV LQFOXGLQJ VOHHS GLVWXUEDQFH LUULWDELOLW\ RU  
UHVWOHVQHV ORVV RI DSSHWLWH DQ[LHW\ DQG VZHDWLQJ > @  
([SHULHQFLQJ DQ\ RI WKHVH V\PSWRPV FDQ PDNH D SHUVRQ DQJU\ UDQJLQJ  
IURP PLOG LUULWDWLRQ WR YLROHQW UDJH 0DULMXDQD ZLWKGUDZDO FDQ OHG  
LQWLPLGDWLQJ YLROHQW RU EXOO\LQJ EHKDYLRU HQGDQJHULQJ WKH SHUSHWUD  
RU RWKHU SHRSOH DQG SURSHUW\ > @

,Q LQFDUFHUDWHG VXEMHFWV VWXGLHV IRXQG WKDW RQH WKLUG RI WKH VXEMH  
WKDW FRPPLWWHG KRPLFLGH KDG XVHG PDULMXDQD WZHQW\ IRXU KRXUV  
EHIRUH WKH KRPLFLGH )XUWKHU Wkuhh TXDUWHUV RI WKRVH VXEMHFWV ZHUH

2VDP ELQ /DGH QDUDQRLD 3V\FKRVLV

7DEON PDULMXDQD XVHV DQG V\PSWRPV

'LVFXVVLQR

:H DSSO\ WKH UHVXOWV RI WKH UHVHDUFK UHJDUGLQJ WKH UROH RI PDULMXDQD  
LQ YLROHQFH :H XVH FRQFHSWV VXFK DV SHUVRQDOLW\ FKDQJHV SHUSHWUDWR  
YLROHQFH DQG SV\FKRVLV WR HWDEOLVK RXU DVVRFLDWLRQ RI PDULMXDQD ZL  
WKH XQIRUWXQD SWUSFWHMLV WR LOOXVWUDWH QHJDWLYH EXW  
SUHYHQWDEOH WUDJLF RXWFRPHV GXH WR PDULMXDQD DQG LWV UROH LQ YLROH  
H RYHUDOO REMHFWLYH LV WR LGHQWLI\ WKH UROH RI PDULMXDQD DQG WR VXJJ  
LW LV DYRLGDDEOH DQG FDXVDO QDWXUH LQ LQGXFLLQJ YLROHQFH > @  
,Q DOO WKH FDVHV VHOHFWHG PDULMXDQD XVH ZDV SUHVHQW )RU VRPH RI WK  
LQGLYLGXDOV PDULMXDQD XVH ZDV

3V\FKRVLV &KDUW

H UHYLHZ GRHV QRW SURYH D FDXVDO UHVHVDVRSUHWKVS EHWZHHQDRIBBUOXDQD 0  
DQG YLROHQFH LQ WKHVH FDVHV 5DWKHUFLXWFKVWDEOLVKHV D KLJKO\ GRFXPHQV  
DVVRFLDWLRQ EHWZHHQ PDULMXDQD DQG YLROHQFHJ\$D\$HUBO2VWPDQ%LQ/CQHCHG I  
FDXVDWLRQ FDQ EH DSSOLHG WR LOOXVWUDWHWKWGLWRDVS RFWDWLRQ1<\$'OHRDQVAVD  
fEXW IRUG WKH DFWLRQV RU FLUFXPVWDQFHLMXWQCHLQHRQDZFRKROGLQFRWDXDYA  
RFFXUUHG \$ SUR[LPDWH FDXVH LV WKH UHVXOWYDZDV fRXJHFAHIDLEHWGDEQVPHGHRVQ  
WKH IDFWV DQPRDVFWRQ\ OHJDO DQG YLROHQFHVWPRQDXFDQDQELV JURZHUV ,QW -  
YLROHQFH LQ WKHVH FDVHV ZDV WKH XVH DQG LQWR[LFDWLRQ IURP PDULMXDQD  
1R RWKHUHXDQVHCHVHTXLUHPHQWV

## &RQFOXVLRQ

\$FFRUGLQJ WR UHVHDFK VWXGLHV PDULMXDQD XVH FDXVHV DJJUHVVLYH  
EHKDYLURU FDXVHV RU H[DFHUEDWHV SV\FKRVLV DQG SURGXFH SDUDQRLDV  
HVHVFHWVWYH EHHQ LOOXVWUDWHG WKURXJK FDVH VWXGLHV RI KLJKO\  
SXEOLFLJHG LQFLGHQWVSDRQKMLJKWHQHGSROLWLFDO

HVFDVHV FRQWDLQ H[DPHSHV RI UHSHDWHG LOOXVWUDWLRQV RI DJJUHVVLRQ  
SV\FKRVLV DQG SDUDQRLD E\ PDULMXDQD XVHUV DQG LQWR[LFDWLRQ  
8OWLPDWHO\ ZLWKRXW WKH XVH DQG LQWR[LFDWLRQ RI PDULMXDQD WKH SRRU  
MXGJPHQW DQG PLVSHUFHSWLRQV GLVSOD\HG E\ WKHVH LQGLYLGXDOV ZRXOG QR  
KDYH EHHQ SUHVHQW UHGXFQJ WKH ULVN IRU DFWLRQV WKDW UHVXOW LQ VHQV  
GHDWKV

,PSRUW WR WKHVH DVVHUVLRQV LV WKDW WKH FXUUHQW PDULMXDQD LV IDU P  
SRWHQW LQ 7+& FRQFHQWUDWLRQV WKH SV\FKRDFWLYH FRPSRQHQW  
\$FFRUGLQJO\ DQG GHPRQVUDWHG LQ GLUHFV VWXGLHV PRUH SRWHQW  
PDULMXDQD UHVXOWV LQ D JUHDWHU ULVN IRU SDUDQRLG WKLQNQJ DQG SV\FKR  
,Q WXUQ SDUDQRLG EHKDYLURU LQFUHDVHV WKH ULVN IRU SDUDQRLG EHKDYLURU  
DQG SUHGLFWDEO\ DVVRFLDWHG ZLWK DJJUHVVLYH DQG YLROHQW EHKDYLURV

0DULMXDQD XVH FDXVHV YLROHQW EHKDYLURU WKURXJK LQFUHDVHG  
DJJUHVVLYHQHV SDUDQRLD DQG SHUVRQDOLW\ FKDQJHV PRUH VXVSLFLRXV  
DJJUHVVLYH DQG DQJHU

5HFHQW LOOLFLW DQG fPHGLFDO PDULMXDQDg HVSHFLDOO\ JURZQ E\ FDUH  
JLYHUV IRU PHGLFDO PDULMXDQD LV RI PXFK KLJK SRWHQF\ DQG PRUH OLNHO\  
WR FDXVH YLROHQW EHKDYLURU

0DULMXDQD XVH DQGLWVODGGEHFRQVVLGHUHG LQ FDVHV  
RI DFWV RI YLROHQFH DV LWV UROH LV SURSHUO\ DVVLJQHGH WR LWV KLJK DVVRFL

5HFRJQLJH WKDW KLJK SRWHQF\ PDULMXDQD LV D SUHGLFWDEOH DQG  
SUHYHQWDEOH FDXVH RI WUDJLF YLROHQW FRQVHTXHGHV

## 5HIHUHQFHV

H 1HZ <RUN 7LPHV :KDW KDSSHQHGH LQ IHUJXVRQ"  
&11 7UD\YRQ PDUWLQ VKRRWLQJ IDVW IDFWV  
3%6 1HZVKRXU &KLFDJR UROHNDWDO\DSKLF YLGHRI  
VKRRWLQJ \HDU ROG /DTXDQ OF'RQDOG  
/DQVLQJ VWDWH MRXUQDO WLLPDVWLRSH RI IDWDO GHYHQ JXLOIRUG  
&11 :KDW ZH NQRZ GRQdW NQRZ DERXW )UHGGH \*UD\DV GHDWK  
\$GGLFWLRQ 0DULMXDQD DQG GULYLQJ LPSDLUPHQW  
1DWLRQDO ,QVWLWXWH RQ 'UXJ \$EXVH 'UXJ IDFWV 'UXJJHG GULYLQJ  
/LYH VFLHQFH 5LGLQJ KLJK 3RW VPRNLQJ GULYHUV HYDGH EORRG WHVWV  
135 3ODQQHG SDUHQQKRRG VKRRWLQJ VXVSHFW 5REHUW /HZLV GHDU WR  
DSSHU LQ FRXUW ORQGD\  
1%& QHZV \*XQPDQ NLOOV LQFOXGLQJ IDPLO\ WKHQ KLPVHOI LQ  
0LVVRXUL VKRRWLQJ UDPSDJH  
H 1HZ <RUN 7LPHV -DUHG /HH /RXJKQHU  
&%6 QHZV 'JKRNKDU SDRQKMLJKWHQHGDVUQDHY  
%URWKHUV

\*RRGPDQ - 3DFNDUE 00~XHGFH