



# 'HQWDO ,PSODQWV DQG 'HQWXUHV 2SHQ \$FFHVV

-RVKXD DQG &DUPHO 'HQW ,PSODQW

6KRUW &RPPHQWU\

20,&6 ,QWH\

## 1FSJPEPOUBM TUBUVT

-DPHV -RVKXD \*DEULHOOD &DUPHO

0DVWHU RI 6FLHQFH LQ \$OLQLFDO 3V\FKRORJ\ \$ELOHQH &KULVWL

&RUUHVSRLQLQJ DXWKRU -RVKXD - 0DVWHU RI 6FLHQFH LQ \$OLQLFDO 3V\FKRORJ\ \$ELOHQH &KULVWL  
MRVKXDBMDPHV #\DKRR FRP

5HFHLYHG-GDWH \$FFHVVHG GDWH 3XEOLVKHG GDWH )HE

&RSULJKW < -RVKXD - HW DO 7KLV LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XQGHU WKH WHUPL  
EP /LFHQVH il SUSjH D VODEM / A`pA`%QEd pOV`\* @ \('SUS@@ &0 <lpH @&P\$@ &p\

UHFHVLRQ OHYHO SHULRGRQWDO SRFNHG GHSWK DQG FDOFXOXV ZHUH PDGH E\

GHWDO H[DPHQHU \$VVHVPHQWV ZHUH PDGH DW WKH PHVLREXFFDO DQG PLG

EXFFDO VLWHV RI DOO IXOO\ HUXSWHG SHUPDQHQW WHHWK SUHVHQW LQ WZR

UDQGRPO\ VHOHFWHG TXDGUDQWV RQH PD[LQDU\ DQG RQH PDQGLXODU \$OO

GDWD ZHUH ZHLJKWHG DQG VWDQGDUG HUVRUZHODXODWHG E\ VSHFLDO

WR DGMXHW RRUW DPHOH GHVLJQ \$OWKRXJK RYHU RI SHUVRQV

DQG WKH XVH RI D FRPELQDWLRQ RI SUR  
HvHFVLRQ H DFFHSHWDEOH 5HJDUGLQJ WKH I  
> @HPLHQW DQLO LV D QHZ PHGLFDWLRQ  
PLGD]RODP LQFUHDDVHWKRU SHUFXIDOXV FR  
PLGD]RODP DORQH \$OLQLFDO WZR VVXGLHV  
DWWDFKPHQW /\$ RQO\ H[KLELWHG FRPELQDWLRQ GHVXVWRUHV \$OWHGDV  
PP 3UHYDOHQFH RI PRGHUDWH DQG ZYXGHHW DPHG WRQH YDOHQH H DQ & FRLOO  
LQFUHDDVHG ZLWK DJH ZKLOH SUHYDOHQFH SRFNHG GD]RU DP NHW DPHW  
PP GLGHORV DWD VXJJHVW WKDW WKH \$EUHDVLRQ SUHYDOHQFH RI \$SLWDO 'HQ  
ZLWK DJH LV PRUH DVVRFLDWHG ZLWK LQFUHDDVLRQ SUHYDOHQFH LQFOXVLRQ  
WKDQ ZLWK FKDQJHV LQ WKH SUHMDQFRURI SRFNHV RU DJH GL  
QPEHUDRHFVHW HV ZLWK DGYDQFHG FRQGLWLRQV IRU ORVV RI  
DWWDFKPHQW SRFNHG GHSWK RU UHFHVLRQ ZDV QRW ODUJH IRU DQ\ DJH JURXS  
'LvhUH QHSUHYDOHQFH RI PRGHUDWH DQG VYHUH ORVV RI DWWDFKPHQW  
PRGHUDWH DQG GHHS SRFNHV DQG UHFHVLRQ ZHUH IRXQG DPRQJ JHQGHU  
DQG UDFH HWKQLFLW\ JURXS )HPDOHV H[KLELWHG EHWWHU SWKLRG DWDQ KHD  
WKDQ PDOHV DQG QRQ +LVSDQLF ZKLWV WKH LQWHUJHW EHWWHU SWKLRG DWDQ  
KHDWK WKDQ HLWKHU QRQ +LVSDQLF FRPHQ RROH IRU DQ \$PHULFDQV UREOHV 3  
3URS DQ R UDFH HRODP 3NHW DPHR H H O WHHQH GSRQWDO ZRUM WLGHP RRUW DPHSDQ  
VLJQL}RQW WHU LQ UHPLHQW DQLO JURXS H DFK JURXS ZDVLJQL}RQW VRDW D I  
F SRZHU RI CE . XVLLQJ D\WKH  
HWLPDWHG WBLVKRIZODFWLH PHDQ RI %,6 LQ  
WKH WZR JURXS > @ 6HGDWLRQ SDVHURFF  
REWDLQLQJ LQIRUPHG FRQVHQW IURP WK  
GHFHVVDU\ LQVWUXFWLRQV IRU WKH VHGD  
ZHUH DVNHG WR UHWHU LQ WKH PRUQLQJ I  
HDW E\ PRXWK RU QRQ SHU RV IRU W  
SHUIRUPHG DW 'HSDUWPHQW RI +RVSLWDO  
OHGLFDO 6FLHQFHV ,VIDKDQ ,UDQ 5DQG  
IROORZV 2Q WKH GD\ RI WKH SURFHGXUH  
ZKLFK RQO\ WKH DQHVWKHVLRORJLVW ZDV  
RWKHU UHVHDUFKHU ZHUH DZDUH RI FRG  
LQWR WZR JURXS EHWHURG ZLWK 305 R  
HYHQ FRGHV SURWRRO PLGD]RODP NH  
LOW DPHRORJLVW WKH YROXVHG LQ FRVH  
VHGDWLRQ ZLWK VKRUWHU UNJRY DQ PLGD]RODP R  
> @ FRGHV PLGD]RODP SURWRRO UHPLHQ  
LQWUDYHQRXVO\ &RPSDUDWLRQV H DWD

DQ EH FRQFOXGHG WKDW LQWUDYHQRXV H DWD  
FRPELQDWLRQ H DWD  
RI SURWRRO IHQWDO DQ DPHRORJLVW WKH YROXVHG LQ FRVH  
VHGDWLRQ ZLWK VKRUWHU UNJRY DQ PLGD]RODP R  
> @ FRGHV PLGD]RODP SURWRRO UHPLHQ  
LQWUDYHQRXVO\ &RPSDUDWLRQV H DWD

&LWDWLRQKXD -

3HULRGRQWDO VWDWXV 'HQW ,PSODQWV 'HQWXUHV

3DJH RI

'HQWDO 5HVHDFK -RXUQDO 0LGD]RODP )LYHP JNORUSURWRFRU'+ 0LQW] .3 %ULV  
 NJ DQG UHPLHQWDQLO ZHUH SXPSHG LQVWURUJRXV\$FWLQREDFLWQXJPEW  
 H GHSWK RI VHGDWLRQ %,6 KHDUW UDWK WKH QXPEHU RI UHVSLUDWLRQV  
 EORRG SUHVXUH DQG R[\JHQ VDWXUDWLRQ SHUHQWVJHV ZHQH UHFURUHQFK  
 HYHU\ PLQ E\ WKH HQHVRVROHVLVWRQWUHQNLQ' EHWDOOH DVVRF  
 ZKLFK LV HVVHQWDO IRU JHQHUDO DQHVWKHVLDRU GHHS VHGDWLRQ ZDV  
 SHUIRUPHG IRU ERWKQULXSRQV IRU FDUU\PHQJRXW WKH  
 SURFHGXUH ZHUH HYDOXDWHG E\ DQRWKU UHVHDFKHU EDVHG RQ WKH HQWDO  
 6HGDWLRQ 7HDFKHUV \*URXS '67\* > @ VFDQH DQG UHFURUGH LQ VSHELDQ  
 GDWD VKHHWV \$W WKH HQG RI WKH SURFHGXUH HDFK SDWLHQW ZDV PROWLWRUH  
 WKH UHFURUHQ URRP DQG WKH WLPH QHHGHG IRU UHFURUHQ ZDV UHFURUGH  
 \$VHDFKLHYLQJ WKH QHFHVVDU\ FRQGLWLRQV IRU EHLO#GLVFKDFHG EDVHG RQ  
 WKH SRVW DQHVWKHWF GLVFKDUJH VFRLOLQVWVSHQDP@QJHDFKSDWVHQMGZDV  
 GLVFKDUJHG EDVHG RQ WKRURXJK FRXQVHDFKSDWLHQWRI\@SKRQH \$  
 QXPEHU IRU HPHUJHQF\ FDOOV

5HIHUHQFHV

- \*DOEUDLWK \*0 6WHHG 5% 6DQGHUV -- 3DQGH\ -3 7XPRU QHFURVLV
- IDFWRU DOSKD SURGXFWQR@HFVXDP@QKFRDWHV +D\HV 7D\ORU \*:
- IDFWRU JHQRW\SH - 3HULRGRQWRO DQG VHYHUH SHULRGRQWDO GLVHVVH LQ W
- :H\DOV 3HDOOVWHLQ 0( &KXUDN \$3 )RUUH\WV 2DPD(SLGGHRLRQ
- H DVVRFLDWLRQ EHWZHHQ RVWHRSHQLD DQG SHULRGRQWDO DWWDFKPHQW ORVV LQ
- ROGHU ZRPHQ - 3HULRGRQWRO
- \*ULVHQ %HFNHU 05 /\RQV 65 0RHVFEKUHJHU 0/ /H\ (- HW DO
- 3UHYDOHQFH RI 3RUS\URPRQDV JLQJLYDOLV DQG SHULRGRQWDO KHDOWK
- VWDWXV - &OLQ 0LFURELRO