Glf_jrqtcpxcgaflgq

G Epslbj_ecl

1 **Hirnstimulation – Historischer Überblick . 3**
Afpgqrg_l U, Fcqq
/,/ Fgqrmpgqafcp ā`cp`jgai, ... 2
/,/,/ Clrugaijsle bcp kmrmpgqafcl Imprcvpcgxsle gl Rgcpcvncpg kclrcl , ... 2
/,/,0 Cpqrc cjcirpgqafc Pcgxtcpqsafc_k kclqafjgafcl Ecfgpl, ... 3
/,0 Bcp @ceg l l bcp K_elcrqrg ksj_rgml lcptĘqcp Qrpsi+ rspcl, ... 5
/,0,/ DpĞfc Tcpqsafc kgr_jrcplgcpclbcl K_elcrdcjbcpl , ... 5
/,0,0 K_elcrqrg ksj_rmpcl dĞp Cglxcjpcgxc , ... 5
/,1 Bgc CgldĞfpsle bcp RKQgl bgc ijglgqafc Lcspmjmegc, ... 6
/,1,/ Rcaflgqafc Clrugaijsle bcp K_elcrqrg ksj_rgml, ... 6
/,1,0 Ijglgqafc Clrugaijsle bcp K_elcrqrg ksj_rgml xs bg_elmqrgqafcl Xucaicl , ... 7
/,1,1 Fck kclbc NfĈlm kclc slb Slrcpqsafslecl xsp imprgi_jcl Cppce`_picgr, ... /0
/,2 Rfcp_ngctcpqsafc kgr pRKQ , ... /1
/,3 Ejcgafqrpm kpcgxsle bcq Imprcv, ... /2
Jgrcp_rsp , ... /2

2 **Hirnstimulation – Technische Grundlagen 17**
Rfmk_q Ucwf+F_pruge Pmk_l Qgc`lcp
0,/ CgldĞfpsle, ... /6
0,0 K_elcrqqafc slb cjcirpgqafc Dcjbcp, ... /6
0,0,/ Epslbj_ecl - b_q k_elcrqqafc Dcjb, ... /6
0,0,0 Xcgr_`fĈlegec K_elcrdcjbcp - b_q cjcirpgqafc Dcjb , ... /6
0,0,1 Mnrg k_jc Nsjqb_scp `cg bcp K_elcrqrg ksj_rgml /7
0,1 ?sd`_s tml Qrg ksj_rgml qecpĈrcl, ... /7
0,1,/ Kmlmnf_qgqafc K_elcrqrg ksj_rmpcl, ... 0.
0,1,0 @gnf_qgqafc K_elcrqrg ksj_rmpcl, ... 0/
0,1,1 Pcncrgrgtc K_elcrqrg ksj_rmpcl, ... 0/
0,1,2 ?le_`c bcp Pcgxqr Ĉpic , ... 0/
0,1,3 EcpĈrc dĞp Kcfpd_afnsjqc , ... 0/
0,2 Qrg ksj_rgml qqnsjcl , ... 00
0,2,/ Dcjb - Dcjbep_bgclr, ... 00
0,2,0 Qnsjcldcjb - Qnsjclecm kcrpgc , ... 01
0,2,1 Pcgxugpisle bcp Qnsjcl - Rgcdclpcgafucgrc , , , 02
0,2,2 Qnsjcltcpjsqrc - Qnsjclcpu Ĉpksle, ... 02
0,2,3 ?isqrqqafcq ?prcd_ir `cg Qnsjcl , ... 03
0,3 Qqafcpfcgrq_qncirc bcp rp_lqip_lgcjjcl K_elcrqrg ksj_rgml, ... 03
Jgrcp_rsp , ... 04

3 **Hirnstimulation – Physiologische Grundlagen 27**
F_pruge Pmk_l Qgc`lcp+ Sjd Xgck_ll
1,/ CgldĞfpsle, ... 06
1,0 ?jjec kcglc @crp_afrslecl , ... 06
1,0,/ Bgc ncpgnfcpc cjcirpgqafc Lcspmqrg ksj_rgml, , , 06
1,0,0 Lcspm_l_rm kgqafc Epslbj_ecl , ... 1/
1,0,1 ?limnnjsle bcq cjcirpgqafcl Dcjbcq_l bgc imprgi_jc lcspml_jc ?irgtgrĈr , ... 11
1,1 Rp_lqip_lgcjjc Qrg ksj_rgml bcq npg kĈpcl kmrmpgqafcl Imprcv , ... 13
1,1,/ Rp_lqip_lgcjjc cjcirpgqafc Qrg ksj_rgml bcq npg kĈpcl kmrmpgqafcl F_lb_pc_jq, ... 15
1,1,0 Rp_lqip_lgcjjc K_elcrqrg ksj_rgml bcq npg kĈpcl kmrmpgqafcl F_lb_pc_jq, ... 16
1,1,1 Rp_lqip_lgcjjc K_elcrqrg ksj_rgml bcq npg kĈpcl kmrmpgqafcl @cgl_pc_jq , ... 20
1,1,2 Imprgimqng l_jc ?irgtgcpsle bcp qng l_jcl Kmrml lcspmlc , ... 20
Jgrcp_rsp , ... 22

4 **Sicherheitsaspekte und Anwendungsrichtlinien 47**
U_jrcp N_sjsq+F_pruge Pmk_l Qgc`lcp
2,/ Qgafcpfcgrq_qncirc, ... 26
2,/,/ Cngjcnrgqafc ?ldĈjjc , ... 26
2,/,0 ?isrc qclqmpgqafc CĬcirc , ... 3.
2,/,1 ?isrc imelgrgtc CĬcirc, ... 3.
2,/,2 Slcpu Ğlqafrc J_lexcgrugpislecl , ... 3/
2,0 ?luclbsleqpgafrjglgcl, ... 30
2,0,/ RKQgk Cglxcjpcgx+ mbcp Bmnncjpcgxkmbsq, , , , 30
2,0,0 Pcncrgrgtc RKQ , ... 30
2,1 Rp_lqip_lgcjjc Ejcgafqrpm kqrg ksj_rgml , ... 32
Jgrcp_rsp , ... 33

GG Pmsrglcbg_elmqrgi8 Imafpcxcnrc

5 **Motorisch evozierte Potenziale – Eine Einführung 59**
?j_gl l_cjgl+J_le
3,/ Cgljcgrsle , ... 4.
3,0 ?jjec kcglc Tmpecfclqucgqc `cg bcp ?`jcgrsle bcq KCN, ... 4.
3,0,/ Qafpgrr /8 ?l`pglecl bcp M`cp¬Ĉafclcjcirpmbcl , ... 4.
3,0,0 Qafpgrr O8 Rcaflgqafc Cglqrcjjslecl _k ?`jcgrcecpĈr , ... 4/
3,0,1 Qafpgrr 18 Nj_rxgcpsle bcp Qrg ksj_rgml qqnsjc Ğ`cp bck kmrmpgqafcl Imprcv , ... 41
3,0,2 Qafpgrr 28 U_fj bcp PcgxglrclqgrĈr , ... 41
3,0,3 Qafpgrr 38 UgjjiĞpjgafc ?lqn_llsle bcq Xgcjksqicjq , ... 42

3,0,4 Qafpgrr 4 ?sdxcgafIsle bcp KCN , , , , , , , , , , , 43
3,0,5 Qafpgrr 5 ?sqkcqqcl bcq KCN slb @cpcafIsle bcq ?knjgrsbclosmrgclrcl , , , , , , , , , , , , 44
3,1 Qncxg_jslrcpqsafslecl, , , , , , , , , , , , , , , 45
3,1,/ Clrj_bsleqtcpf_jrcl cglxcjlcp kmrmpgqafcp Cglfcgrcl , 45
3,1,0 ?sdxcgafIsle bcp RKQ glbsxgcprcl @cucesle mbcp Ksqicjip_dr , , , , , , , , , , , , , , , , , , 46
Jgrcp_rsp , 46

6 Bestimmung der zentralmotorischen Leitungszeit. 71

Djmpg_l KĞjjcp SjdXgck_ll*

4,/ @cqrgkksle bcp imprgimksqisjĈpcl Jcgrsleqxcgr , 50
4,/,/ Qafpgrr / ?sılbcl bcq mnrgk_jcl Pcgxmprcq Ğ`cp bck Kmrmpimprcv , , , , , , , , , , , , , , 50
4,/,0 Qafpgrr 0 @cqrgkksle bcp cpdmpbcpjgafcl PcgxqrĈpic, 50
4,/,1 Qafpgrr 1 Tmpgllcpt_rgml bcq Xgcjksqicjq , , , , 50
4,/,2 Qafpgrr 2 Kcqqucgbcpfmjslecl slb ?squcprsle , 51
4,0 @cqrgkksle bcp ncpgnfcpcl kmrmpgqafcl Jcgrsleqxcgr , 51
4,0,/ Kcqqkcrfmbcl , 51
4,0,0 @cucprsle bcp Kcrfmbcl , , , , , , , , , , , , , , 52
4,0,1 Np_irgqafcq Tmpecfcl , , , , , , , , , , , , , , , , , 53
4,1 @cpcaflsle bcp xclrp_jkmrmpgqafcl Jcgrsleqxcgr , 53
4,2 Qncxg_jslrcpqsafslecl dp_irgmlgcprc Jcgrsleqxcgrkcqqslecl , , , , , , , , , , , , , , 54
4,3 D_jj`cgqngcj , 55
Jgrcp_rsp , 56

7 Motorisch evozierte Potenziale der Arm- und Handmuskeln 79

*Fcjec Rmni_*

5,/ Glbgi_rgmlcl , 6.
5,0 BspafdĞfpsle bcp Slrcpqsafsle , , , , , , , , , 6.
5,0,/ Tmp`cpcgrsle , 60
5,0,0 @cqrgkksle bcp ncpgnfcp kmrmpgqafcl Jcgrsleqxcgr , 60
5,0,1 Rp_lqip_lgcjjc Qrgksj_rgml bcq npgkĈpcl kmrmpgqafcl F_lb_pc_jq , , , , , , , , , , , , , , , 63
5,1 Npm`jckc `cg bcp Slrcpqsafsle , , , , , , , , , 65
Jgrcp_rsp , 66

8 Motorisch evozierte Potenziale der Bein- und Fußmuskeln. 89

Bcrjcd Aj_sq

6,/ Rp_lqip_lgcjjc Qrgksj_rgml bcq npgkĈpcl kmrmpgqafcl @cgl_pc_jq, , , , , , , , , , , , , , , 7.
6,/,/ ? sılbcl bcq mnrgk_jcl rp_lqip_lgcjjcl Pcgxmprcq , 7.
6,/,0 @cqrgkksle bcp cpdmpbcpjgafcl rp_lqip_lgcjjcl PcgxqrĈpic, 70
6,/,1 Tmpgllcpt_rgml bcq Xgcjksqicjq , , , , , , , , , 70
6,0 P_bgisjĈpc slb bgqr_jc Qrgksj_rgml bcq slrcpcl Kmrmlcspmlq , 70
6,0,/ D+Ucjjcl+Kcrfmbc , , , , , , , , , , , , , , , , , , 71
6,0,0 Rp_lqisr_lc K_elcrqrgksj_rgml bcp jsk`_jcl Lcptclusxcjl , , , , , , , , , , , , , , , , , , 71
6,0,1 Rp_lqisr_lc cjcirpgqafc Qrgksj_rgml bcp jsk`_jcl Lcptclusxcjl , , , , , , , , , , , , 71
6,1 ?`jcgrrcaflgi , 72
6,2 Lmpkucprc, 73
6,2,/ Bgqr_jc ncpgnfcpc Qrgksj_rgml kgr bcp D+Ucjjcl+Kcrfmbc , , , , , , , , , , , , , , , , , , 73
6,2,0 Npmvgk_jc K_elcrqrgksj_rgml bcp jsk`_jcl Lcptclusxcjl , , , , , , , , , , , , , , , , , , 74
6,2,1 Npmvgk_jc cjcirpgqafc Qrgksj_rgml bcp jsk`_jcl Lcptclusxcjl , , , , , , , , , , , , , , , , , , 74
6,3 D_jj`cgqngcj , 75
Jgrcp_rsp , 75

9 Motorisch evozierte Potenziale der kranialen Muskeln. 99

Ncrcp N, Sp`_l

7,/ CgldĞfpsle, /..
7,0 Qrgksj_rgml bcp Ecqgafrqksqisj_rsp &L, d_xg_jgq' /..
7,0,/ Glbgi_rgmlcl slb KĘejgafigcrcl , , , , , , , , , , /..
7,0,0 Slrcpqsafsleqrcaflgi , , , , , , , , , , , , , , , , /..
7,0,1 Xclrp_jc D_xg_jgqn_pcqc , , , , , , , , , , , , , , , /.0
7,0,2 Ncpgnfcpc D_xg_jgqn_pcqc , , , , , , , , , , , , , , /.0
7,1 D_jj`cgqngcjc , /.1
7,2 Qrgksj_rgml bcp Xslecl ksqisj_rsp &L, fwnmejmqqsq' , , , , , , , , , , , , , , , , , , /.2
7,3 Qrgksj_rgml bcp I_sksqisj_rsp &L, rpgecklgsq' /.3
7,4 Qrgksj_rgml bcp tmk L, _aacqqmpgsq gllcptgcprcl F_jqksqicjl , , , , , , , , , , , , , /.4
Jgrcp_rsp , /.5

10 Motorisch evozierte Potenziale der axialen und proximalen Muskeln 109

?lbpc_q Dcp`cpr

/.,/ Cgljcgrsle , //.
/.,0 Slrcpqafgcbc slb Eckcglq_kicgrcl xugqafcl bgqr_jcl* npmvgk_jcl slb _vg_jcl Ksqicjl , , , , //.
/.,1 ?`jcgrsle tml qncxgcjjcl Ksqicjl , , , , , , , , , ///
/.,1,/ K, bcjrmgbcsq , ///
/.,1,0 K, cpcarmp qngl_c , , , , , , , , , , , , , , , , , , ///
/.,1,1 K, ncarmp_jgq slb K, j_rgqqgksq bmpqg , , , , , , , //1
/.,1,2 Bg_nfp_ek_ , //2
/.,1,3 K, qnfglarcp _lg cvrcplsq* K, qnfglarcp spcrfp_c slb K, `sj`ma_tcplmqsq , , , , , , , , , , , , , , //2
/.,1,4 Oscpecqrpcgdrc Ksqisj_rsp bcq Nf_pwlv slb ûqmnf_esq, //3
Jgrcp_rsp , //3

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I_g K, PĘqjcp

//,/ Lcspmnfwqgmjmegqafcp Fglrcpepslb , , , , , , , , /0.
//,/,/ Bcqwlafpmlgq_rgml bcp glbsxgcprcl Kmrmlcspmlclrj_bslecl , , , , , , , , , , , , , , /0.
//,/,0 Kcfpd_afclrj_bslecl tml Kmrmlcspmlcl , , , /0.

//,/,1 Npglxgn bcp Rpgnjc+Qrgk sj_rgm lqrcaflgi , , , , , , /0/
//,0 Np_irgqafcq Tmpecfcl , , , , , , , , , , , , , , , , , , /01
//,0,/ Tmp_sqqcrxslecl slb Epslbq Ĉrxjgafcq , , , , , , /01
//,0,0 ?`jcgrsle, /01
//,0,1 Ncpgnfcpc bgqr_jc Qrgk sj_rgml , , , , , , , , , , , /03
//,0,2 Npmvgk_jc Lcptclqrgk sj_rgml , , , , , , , , , , , /03
//,0,3 Rp_lqip_lgcjjc Qrgk sj_rgml , , , , , , , , , , , , , /04
//,0,4 @cqrgk ksle bcp Pcgxglrcpt_jjc , , , , , , , , , , /04
//,1 Kcqqslecl slb @cpcaflslecl, , , , , , , , , , /04
//,2 Ijglgqafc ?luclbsle bcp
Rpgnjc+Qrgk sj_rgm lqrcaflgi , , , , , , , , , , , , , /04
//,3 Jgkgr_rgm lcl bcp RQR, , , , , , , , , , , , , , , , , /06
//,4 D_jj`cgqngcjc , /07
Jgrcp_rsp , /1/

12 Transkutane Magnetstimulation peripherer Nerven 133

Afpgqrg_l @gqafmi

/0,/ K_elcrqgk sj_rgm lncpgnfcpcp Lcptcl, , , , , , /12
/0,/,/ Epslbj_ecl bcp ncpgnfcpcl K_elcrqgk sj_rgml /12
/0,/,0 Tmprcgj bcp K_elcrqrgk sj_rgm lncpgnfcpcp
Lcptcl , /12
/0,/,1 L_afrcgjc bcp K_elcrqrgk sj_rgm lncpgnfcpcp
Lcptcl , /12
/0,/,2 Fglucgqc xsp rcaflgqafcl Bspafd Ğfpsle, , , , , /13
/0,0 Bgpcirc Ksqicjqrgk sj_rgml , , , , , , , , , , , , , /14
Jgrcp_rsp , /14

13 Besonderheiten im Kindes- und Jugendalter 139

Djmpg_l Fcglcl Tcpcl_ @pmb`cai*

/1,/ ?jr cpqqncxg«qafc @cqm lbcpfcgrcl , , , , , , , , /2.
/1,/,/ Lcspm_l_rm kgqafc slb lcspmnfwqgmjmegqafc
@cqm lbcpfcgrcl , /2.
/1,/,0 Imlqcosclxcl d Ğp bgc KCN+?`jcgrsle gk
lglbcq_jrcp, /2/
/1,0 Cjcirpmnfwqgmjmegqafc lcllucprc slb
np_irgqafcq Tmpecfcl , , , , , , , , , , , , , , , , , , /2/
/1,0,/ @cqrgk ksle bcp xclrp_jk mrmpgqafcl
Jcgrsleqxcgr &XKJ' , /20
/1,0,0 @cqrgk ksle bcp imprgi_jcl kmrmpgqafcl
Pcgxqafucjjc, /20
/1,0,1 Mpe_lgq_rgm lqrwn bcp imprgimqngl_jcl @_fl `cg
Xcpc`p_jn_pcqcl slb iglbjgafck Qafj_e_ld_jj , /21
/1,1 Qncxgcjjc cjcirpmnfwqgmjmegqafc lcllucprc slb
np_irgqafcq Tmpecfcl , , , , , , , , , , , , , , , , , , /21
/1,1,/ Glrcpfck gqnfĈpgqafc Fckksle , , , , , , , , , /21
/1,1,0 Glrp_imprgi_jc Fckksle slb @_flsle, , , , , /22
/1,2 Ijglgqafc Dp_ecqrcjjslecl , , , , , , , , , , , , , /23
/1,2,/ D_xg_jqn_pcqc , /23
/1,2,0 Ksjrgnjc Qijcpmqc, , , , , , , , , , , , , , , , , , , /23
/1,2,1 Pcrr+Qwlbpmk , /23
/1,2,2 JĈfksle gk P_fkcl cglcp qmk_rmdmpkcl
QrEpsle, /23
/1,2,3 Clrugaijsleqlcspmjmegc bcp iglbjgafcl
Kmrmpgi , /23
/1,2,4 Xcpc`p_jn_pcqcl slb iglbjgafcp Qafj_e_ld_jj , , /24
Jgrcp_rsp , /24

GGG Qncxgcjjc Bg_elmqrgi8 Imafpcxcnrc

14 Kortikale Reizschwelle 149

Dpgcbck_ll ?ugqxsq Fcjksr Dcgqrlcp*

/2,/ Tmp`ckcpisle , /3.
/2,0 Epslbj_ecl imprgi_jcp Pcgxqafucjjcl , , , , , , , /3.
/2,0,/ RKQ+glbsxgcprc Cpcgelgqqc , , , , , , , , , , , , , , /3/
/2,0,0 Tmk nfwqgmjmegqafcl xsk k_rfck_rgqafcl
Npm`jck, /3/
/2,1 Pcxcnrc dĞp bgc QafĈrxsle imprgi_jcp
Pcgxqafucjjcl , /31
/2,1,/ Lgafrbspafd Ğfp`_p* m`qmjcr slb glc ıxgclr8
Jcgrjglgclpcxcnrc , /31
/2,1,0 Bspafd Ğfp`_p* _`cp glc ıxgclr8
B_q Kgjjq+Lgrfg+Tcpd_fpcl , , , , , , , , , , , , , , , /32
/2,1,1 C ı xgclr*_`cp epm`8 Qafucjjclh_eb kgrrcjq
@gqcirgml , /32
/2,2 Glrcpnpcr_rgml imprgi_jcp Cppce`_picgrq+
qafucjjclqafĈrxslecl , , , , , , , , , , , , , , , , , /33
/2,2,/ Nfwqgi_jgqafc Cgl¬sqqd_irmpcl, , , , , , , , , , , /33
/2,2,0 Nfwqgmjmegqafc* n_rfmjmegqafc slb
nf_pk_imjmegqafc Cgl¬sqqd_irmpcl , , , , , , , , /35
/2,2,1 QafucjjclqafĈrxslecl slrcpqafgcbjgafcp
RKQ+glbsxgcprcp Cpcgelgqqc, , , , , , , , , , , , , , /35
Jgrcp_rsp , /36

15 Kortikale Innervationsstille 159

Kgaf_cjMprf Pcglcp @clcaic*

/3,/ Bc« lgrgml slb Nfwqgmjmegc, , , , , , , , , , , , , , /4.
/3,0 Kcrfmbcl slb Npmrmimjjc , , , , , , , , , , , , , , , /4/
/3,0,/ RKQ+Tcpqsafqnpmrmimjj , , , , , , , , , , , , , , , /4/
/3,0,0 ?squcprsle , /40
/3,0,1 Cgl¬ sqqepĘÓcl , /40
/3,1 D_jj`cqqngcjc , /41
Jgrcp_rsp , /43

16 Kortikale Doppelpulsprotokolle 167

K_rfg_q U_fj Sjd Xgck_ll*

/4,/ Bmnncjnsjqnpmrmimjjc* bgc xucg Ğ`cpqafucjjgec
Qrgksjg ejcgafcp Glrcl qgrĈr `cgj_lecl
Glrcpqrgksjsqglrcpt_jjcl tcpuclbcl
&/.-03. kq' , /46
/4,/,/ Rcaflgqafc Tmp_sqqcrxslecl xsp @cqrgk ksle
bcp JGAG slb JGAD , , , , , , , , , , , , , , , , , , , /46
/4,/,0 @cqrgk ksle bcp JGAG slb JGAD , , , , , , , , , , /47
/4,/,1 Nfwqgmjmegqafc Epslbj_ecl , , , , , , , , , , , , /47
/4,0 Bmnncjnsjqnpmrmimjjc* bgc cglcl cpqrcl
slrcpqafucjjgecl slb cglcl xucgrcl
Ğ`cpqafucjjgecl Qrgksjsq `cg isp xcl Glrcp+
qrgksjsqglrcpt_jjcl tcpuclbcl &/-0. kq', , , , /5.
/4,0,/ Rcaflgqafc Tmp_sqqcrxslecl xsp @cqrgk ksle
tml QGAG slb GAD, , , , , , , , , , , , , , , , , , , /5.
/4,0,0 @cqrgk ksle bcp QGAG slb GAD , , , , , , , , , , /5.
/4,0,1 Nfwqgmjmegqafc Epslbj_ecl , , , , , , , , , , , /50

/4,1 Bmnncjnsjqnpmrmimjjc* bgc cglcl cpqrcl Ğ`cp+ qafucjjgecl slb cglcl xucgrcl slrcpqafucjjgecl Qrgksjsq `cg qcfp ispxcl Glrcp+ qrgksjsqglrcpt_jjcl tcpuclbcl &.*3-3 kq', , , , /51
/4,1,/ Rcaflgqafc Tmp_sqqcrxslecl xsp @cqrgk ksle bcp Q&AD, /52
/4,1,0 @cqrgk ksle bcp Q&AD, , , , , , , , , , , , , , , , , , /52
/4,1,1 Nfwqgmjmegqafc Epslbj_ecl , , , , , , , , , , , , /52
/4,2 D_jj`cgqngcj, /53
Jgrcp_rsp , /53

17 Afferente Konditionierung 177
Kmlgi_ NĘrrcp F_pruge Pmk_l Qgc`lcp*

/5,/ Cgljcgrsle , /56
/5,0 ? İcpclrc lmlbgrgmlgcpsle kgrrcjq ncpgnfcpcp cjcirpgqafcp Qrgksj_rgml, , , , , , , , , , , , , , , , /56
/5,0,/ ? İcpclrc qclqmkmrmpgqafc Fckksle ispxcp J_rclx , /56
/5,0,0 ? İcpclrc qclqmkmrmpgqafc Fckkslej_lecp J_rclx , /61
/5,0,1 Xclrp_jc pcxgnpmic qclqmkmrmpgqafc Fckksle /62
/5,1 Qmlqrgec _İcpclrc lmlbgrgmlgcpsleq+ n_p_bgekcl , /63
/5,1,/ ? İcpclrc lmlbgrgmlgcpsle bspaf lmxgxcnrgtc Qrgksj_rgml, /63
/5,1,0 ? İcpclrc lmlbgrgmlgcpsle bspaf kcaf_lgqafc Qrgksj_rgml, /63
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2.,/ ?sde_`cl_`fÊlegec Kmbsj_rgml bcp imprgim+ kmrmpgqafcl Cvxgr_`gjgrÊr, ... 176
2.,/,/ @cucesleq`cm`_afrsle 176
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2.,0 l_prgcpsle imprgim kmrmpgqafcp PcnpÊqclr_rgmlcl . . . . . 2..
2.,0,/ Np_irgqafc BspafdĞfpsle, ... 2./
2.,0,0 D_jj`cgqngcjc 2.0
2.,1 Imlrcvr_`fÊlegec Imllcirgtgr Êr 2.1
2.,2 N_qq_ecpc Dslirgmlqslrcp`pcafsle, ... 2.2
2.,2,/ @cucesleq_squ_fjgk bmpq_jcl npÊkmrmpgqafcl Imprcv, ... 2.2
2.,2,0 Ep cgİslirgml slb tgqsmkmrmpgqafc Glrcep_rgml gk N_pgcr_jj_nncl, ... 2.4
2.,2,1 Dslirgmlqslrcp`pcafslegk qsnnjckclrĈpcl kmrmpgqafcl ?pc_j 2.4
2.,3 Imlbgrgmlgcpsle kgr bcp pRKQ, ... 2.5
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2/,/ Cgljcgrsle 2/0
2/,0 Dslirgmlqslrcp`pcafsle uĈfpclb cglcp ?secl+ `cucesleq_sde_`c `cg ecqslbcl Npm`_lbcl 2/1
2/,0,/ l_prgcpsleqcvncpgkclrc xsp Jmi_jgq_rgml misjmkmrmpgqafcp Dslirgmlcl, ... 2/1
2/,0,0 Afpmlmkcrpgc tml pcjct_lrcl Dslirgmlcl cglcp misjmkmrmpgqafcl Pcegml 2/2
2/,0,1 Dslirgmlqslrcp`pcafsle kgr Bmnncjnsjqcl slb ispxcl Pcgxqcpgcl, ... 2/3
2/,1 Imlbgrgmlgcpclbc pRKQ `cg ecqslbcl Npm`_lbcl, ... 2/3
2/,2 Glrcpdcpclx uĈfpclb cglcp ?secl`cucesleq+ _sde_`c `cg N_rgclrcl, ... 2/3
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20,/ Kmrmpgqafcq Jcplcl slb RKQ - cglc CgldĞfpsle, ... 200
20,0 Imlbgrgmlgcpclbc CİcircCglcp pRKQ _sd kmrmpgqafc Jcplnpmxcqqc, ... 200
20,0,/ Lgcbcpdpcosclrc pRKQ, ... 201
20,0,0 Fmafdpcosclrc pRKQ, ... 202
20,1 ?isrc Dslirgmlqslrcp`pcafsle uĈfpclb kmrmpgqafcp Jcpl_sde_`cl, ... 202
20,2 Af_p_ircpgqgcpsle rp_glgleqglbsxgcprcp TcpÊlbcpslecl, ... 203
20,2,/ Cglxcjnsjq+RKQ8 Jcpl`cbglerc ëlbcpslecl bcp imprgimqngl_jcl Cppce`_picgr, ... 203
20,2,0 Bmnncjnsjq+RKQ8 Jcpl`cbglerc ëlbcpslecl bcp glrp_imprgi_jcl Cppce`_picgr, ... 204
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21,/ Lcspmugqqclqaf_drjgafc Dp_ecqrcjjslecl, ... 21.
21,0 Dslirgmlqdĕpbcplbc CİcircbcpRKQ, ... 210
21,0,/ Qrgksj_rgml uĈfpclb mbcp ispx tmp bcp BspafdĞfpsle cglcp Qnp_af_sde_`c, ... 210
21,0,0 JÊlecp_lf_jrclbc Dĕpbcpsle tml Qn_afdslirgmlcl kgr bcp pRKQ 211
21,1 Dslirgmlqfckkclbc RKQ+Cİcirc, ... 211
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21,1,0 JÊlecp_lf_jrclbc QrĕpsletmlQn_afdslirgmlcl kgr bcp pRKQ 213
21,2 RKQ xsp @cqrgkksle bcp dslirgmlcjjcl Glrcp_irgml tml Ecfgplpcegmlcl 213
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22,/ CgldĞfpsle, ... 22.
22,0 Qnsjclnmqgrgmlgcpsle, ... 22.
22,1 ?isrc QrĕpsleBcp qmk_rmqclqmpgqafcl U_fplcfksle, ... 22.
22,1,/ Glrp_kmb_jc Pcgxtcp_p`cgrsle . . . . . 22.
22,1,0 Rp_lqkmb_jc Pcgxtcp_p`cgrsle, ... 22/
22,2 ?lf_jrclbc @ccglnsqqsle bcp qmk_rmqclqmpgqafcl U_fplcfksle 22/
22,2,/ Dpcosclx_`fÊlegec Imlbgrgmlgcpsleqc İcirc bcp pcecjkĈÓgecl pRKQ, ... 22/
22,2,0 Ucgrcpc rp_lqip_lgcjjc Imlbgrgmlgcpsleq+ npmrmimjjc 222
22,3 Rp_lqip_lgcjjc Kmbsj_rgml tml qclqmpgqafcl Jcplnpmxcqqcl, ... 222
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23,1 Tgqscjjc Tcp_p`cgrsle gl fĕfcpcl tgqscjjcl ?pc_jcl . . . . . 23.
23,1,/ @cuceslequ_fplcfksle, ... 23.
23,1,0 M`hcircpicllsle, ... 23/
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tml ?sdkcpiq_kicgrqnpmxcqqcl , , , , , , , , , , 24.
24,0,/ Jmi_jgqgcpsle gltmjtgcprcp Fgplpcegmlcl , , , , , 24.
24,0,0 Dslirgmlcjjc Qncxg_jgqgcpsle cglxcjlcp
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24,1,/ ?isrc Dslirgmlqslrcp`pcafsle uĈfpclb
cglcp ?sdkcpiq_kicgrq_sde_`c, , , , , , , , , , , 242
24,1,0 JĈlecp_lf_jrclbc Kmbsj_rgml tml
?sdkcpiq_kicgrqnpmxcqqcl , , , , , , , , , , , , , , 243
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25,1 ?p`cgrqecbĈafrlgq , , , , , , , , , , , , , , , , , , , 25/
25,1,/ Tcp`_jcq ?p`cgrqecbĈafrlgq , , , , , , , , , , , , 25/
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27,0,0 Slrcpqsafslecl kgrlcspmnfwqgmjmegqafcl
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27,0,1 Lcspmnqwafmjmegqafc Slrcpqsafslecl kgr
ckmrgml_j+imelgrgtcl N_p_bgekcl, , , , , , , , , 271
27,1 Ugpislebcp pRKQ_sdglbsxgcprcCkmrgmlcl
`cgecqslbcl Npm`_lbcl, , , , , , , , , , , , , , , , 272
27,2 Kcrfmbgqafc @cqafpĈlislecl , , , , , , , , , , , 272
27,3 Bgqisqqgml slb ?sq`jgai , , , , , , , , , , , , , , , 272
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TGG Glbsirgml tml Nj_qrgxgrĈr - Kcrfmbcl

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3.,/ CgldĞfpsle, 3..
3.,0 Cİ circ bcp pRKQ_sdbgc imprgi_jc Cppce`_picgr
gkkmrmpgqafcl Qwqrck, , , , , , , , , , , , , , , , , 3./
3.,0,/ @_flsleslb Fckksle bcp imprgi_jcl
Cppce`_picgr, 3./
3.,0,0 Cgl¬ sqq tml Nsjqiml«esp_rgml slb
EcpĈrcrcaflgi, 3.1
3.,0,1 Cİ circ_sdbgc imprgi_jc Cppce`_picgrgl
clrdcplrcl Fgplpcegmlcl , , , , , , , , , , , , , , , , 3.1
3.,1 Imlbgrgmlgcpclbc CİcircbcppRKQ_sd
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3.,2 Lcsc Qrgksj_rgmlqnpmrmimjjc , , , , , , , , , , , 3.2
3.,2,/ Pcncrgrgtc Bmnncjnsjqqrgksj_rgml , , , , , , , , 3.2
3.,2,0 Q_jtcl_prgec pRKQ , , , , , , , , , , , , , , , , , , 3.3
3.,2,1 N__pge+_qqmxg_rgtc pRKQ, , , , , , , , , , , , , , , 3.5
3.,3 Cgl¬ sqq lcspm`gmjmegqafcp D_irmpcl, , , , , , , , 3.6
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3/,/ CgldĞfpsle, 3/2
3/,0 Ecn__prc_qqmxg_rgtc Qrgksj_rgml -
Glbsirgml JRN+Ĉfljgafcp Nj_qrgxgrĈr, , , , , , , , , 3/2
3/,0,/ Pcgxnpmrmimjj , 3/2
3/,0,0 Nfwqgmjmegqafc Cgeclqaf_drcl tml
N?Q+glbsxgcprcp JRN+Ĉfljgafcp Nj_qrgxgrĈr , , , , , 3/3
3/,0,1 Dslirgmlcjjc Pcjct_lx N?Q+glbsxgcprcp JRN+Ĉfljgafcp
Nj_qrgxgrĈr, 3/5
3/,0,2 Ijglgqafc Pcjct_lx N?Q+glbsxgcprcp
JRN+Ĉfljgafcp Nj_qrgxgrĈr, , , , , , , , , , , , , , , , 3/6
3/,1 Ecn__prc_qqmxg_rgtc Qrgksj_rgml -
Glbsirgml JRB+Ĉfljgafcp Nj_qrgxgrĈr, , , , , , , , , 3/7
3/,1,/ Pcgxnpmrmimjj , 3/7

3/,1,0 Nfwqgmjmegqafc Cgeclqaf_drcl N?Q+glbsxgcprcp JRB+Ĉfljgafcp Nj_qrgxgrĈr , , , , , , , , , , , , , , , 3/7
3/,1,1 Dslirgmlcjjc Pcjct_lx N?Q+glbsxgcprcp JRB+Ĉfljgafcp Nj_qrgxgrĈr , , , , , , , , , , , , , , , 30.
3/,1,2 Ijglgqafc Pcjct_lx N?Q+glbsxgcprcp JRB+Ĉfljgafcp Nj_qrgxgrĈr , 30.
3/,2 ?sq`jgai, 30/
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30,0,/ Cgl¬ sqq kmrmpgqafcl Jcplclq_sdbgc rp_lqip_lgcjj_sqecjĘqrc@cucesle , , , , , , , , 302
30,0,0 Cgl¬ sqq kmrmpgqafcl Jcplclq_sdbgc imprgimkmrmpgqafc Cppce`_picgr, , , , , , , , , , 304
30,0,1 Cgl¬ sqq kmrmpgqafcl Jcplclq_sdbgc glrp_imprgi_jc Bmnncjnsjqcppce`_picgr , , , , , , 304
30,1 Lcspmnf_pk_imjmegqafc@ccgl¬sqqsle bcq kmrmpgqafcl Jcplclq , , , , , , , , , , , , , , , , , , 305
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31,0 Np_irgqafc BspafdĞfpsle, , , , , , , , , , , , , , , , , 314
31,1 Lcspm`gmjmegqafcp Ugpisleqkcaf_lgqksq , , , 315
31,2 ?squgpislecl_sd kmrmpgqafc slb tgqscjjc Fgpldslirgmlcl , 317
31,3 Ijglgqafc Cİcirc , 32.
31,4 ?sq`jgai, 32.
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32,/ CgldĞfpsle, 322
32,0 Kmbsj_rgml tml Nj_qrgxgrĈr bspaf Bgqglfg`grgml 323
32,0,/ Kmbsj_rgml qrgksj_rgmlqglbsxgcprcp Nj_qrgxgrĈr bspaf Bgqglfg`grgml, , , , , , , , , , , , , , , , , , , 323
32,0,0 Kmbsj_rgml Ğ`sleq_`fĈlegecp Nj_qrgxgrĈr bspaf Bgqglfg`grgml, , , , , , , , , , , , , , , , , , , 324
32,1 Kmbsj_rgml tml Nj_qrgxgrĈr bspaf lcspmkmbsjgcpclbc Kcbgi_kclrc , , , , , , , , 324
32,1,/ Kmbsj_rgml qrgksj_rgmlqglbsxgcprcp Nj_qrgxgrĈr bspaf lcspmkmbsjgcpclbc Kcbgi_kclrc , , , , 324
32,1,0 Kmbsj_rgml Ğ`sleq_`fĈlegecp Nj_qrgxgrĈr bspaf lcspmkmbsjgcpclbc Kcbgi_kclrc , , , , 325
32,2 FmkĘmqr_rgqafc Kcr_nj_qrgxgrĈr , , , , , , , , , , 325
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