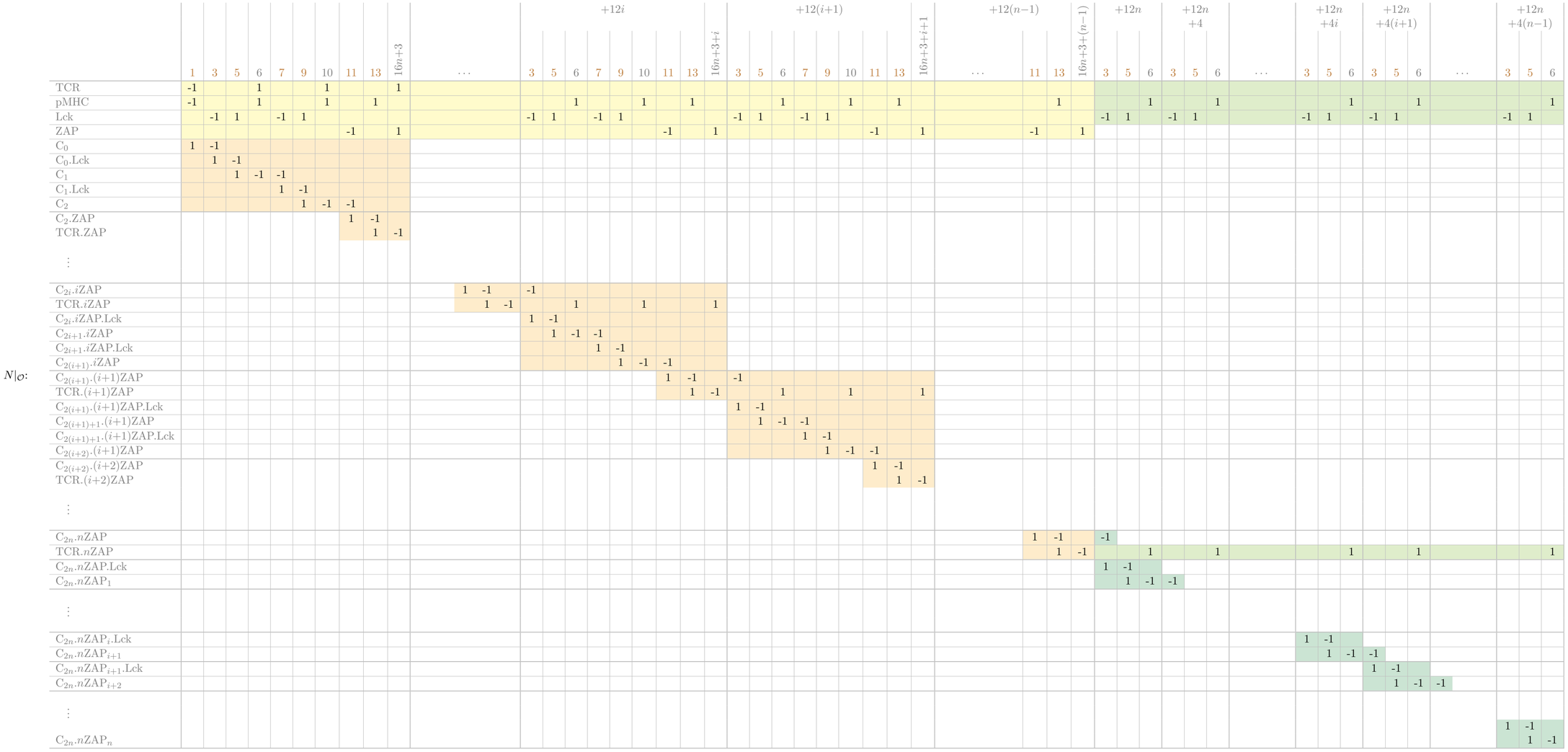
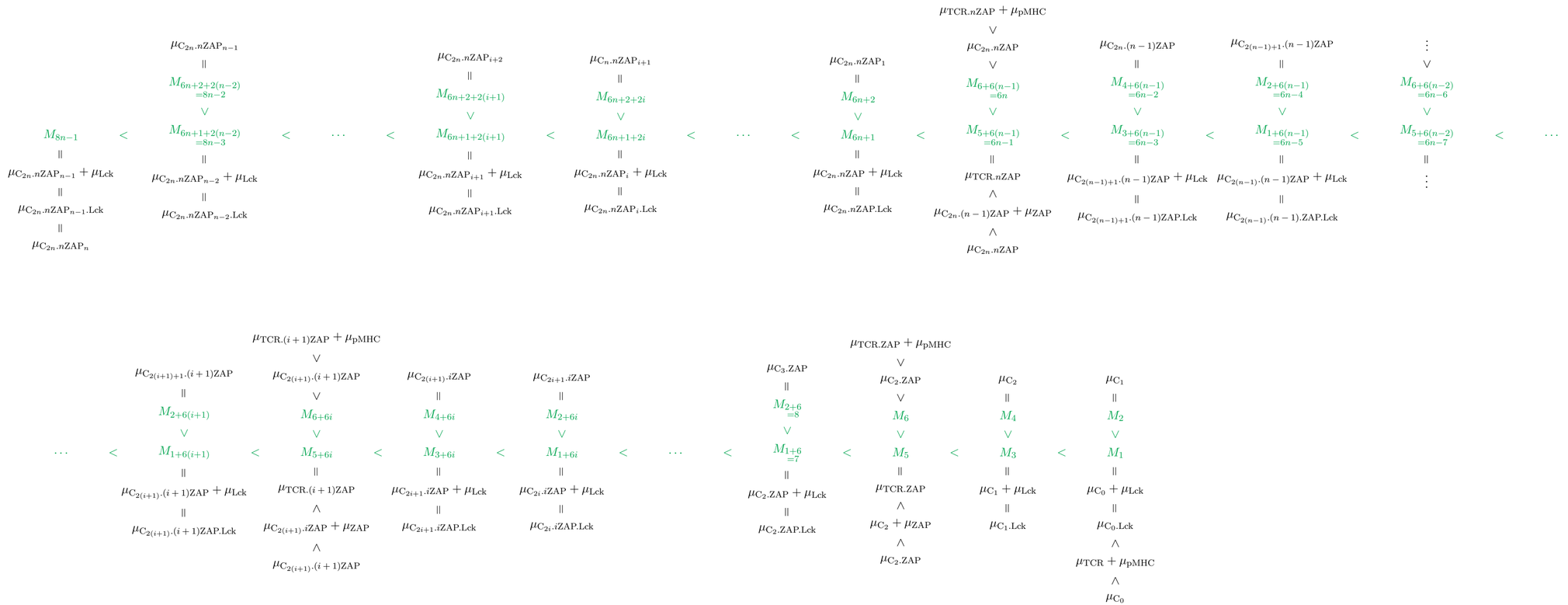
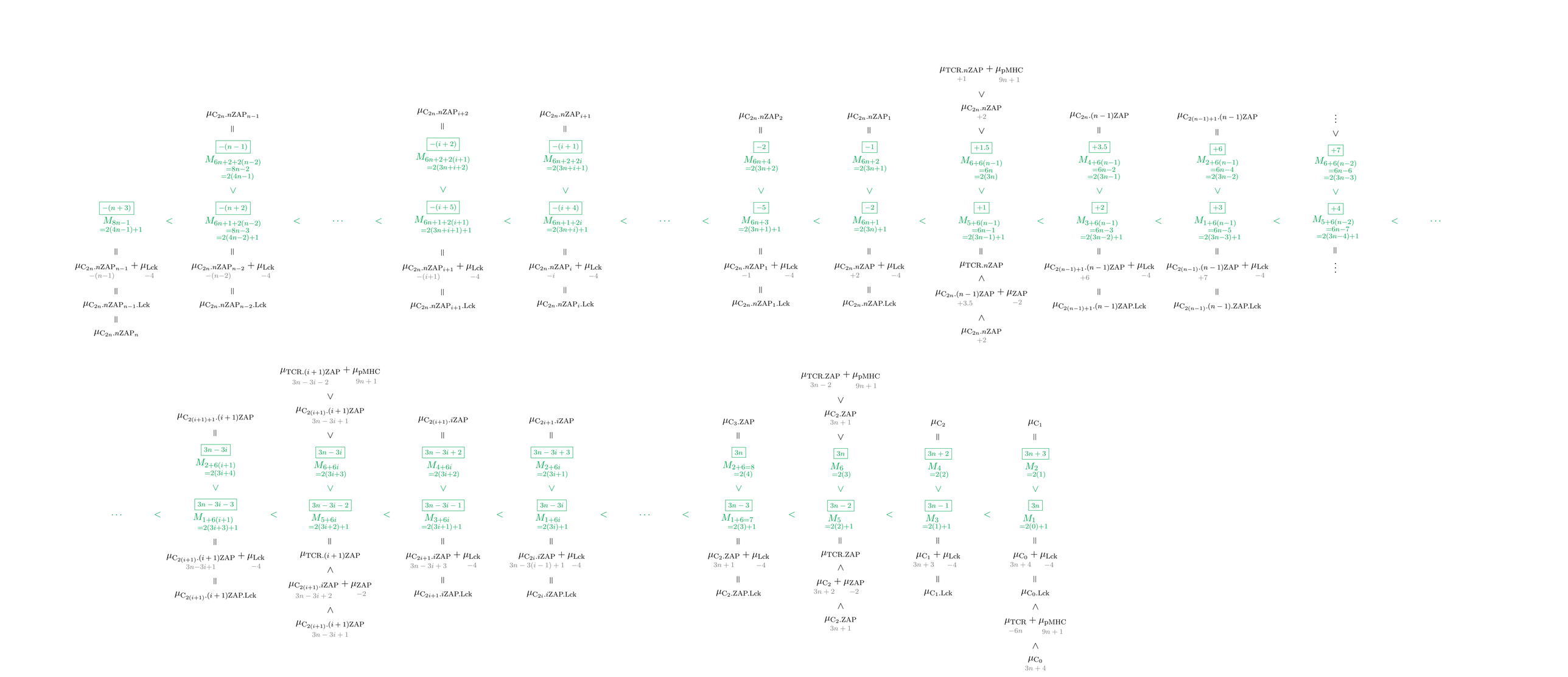

$N|\mathcal{O}$:
1 3 5 6 7 9 10 11 13 $16n+3$ ⋯ +12i +12$(i+1)$ +12$(n-1)$ +12n +12n +4 ⋯ +12n +4i +12n +4$(i+1)$ ⋯ +12n +4$(n-1)$
TCR
pMHC
Lck
ZAP
C_0
C_0.Lck
C_1
C_1.Lck
C_2
C_2.ZAP
TCR.ZAP
⋮
C_{2i}.iZAP
TCR.iZAP
C_{2i}.iZAP.Lck
C_{2i+1}.iZAP
C_{2i+1}.iZAP.Lck
$C_{2(i+1)}$.iZAP
$C_{2(i+1)}$.$(i+1)$ZAP
TCR.$(i+1)$ZAP
$C_{2(i+1)}$.$(i+1)$ZAP.Lck
$C_{2(i+1)+1}$.$(i+1)$ZAP
$C_{2(i+1)+1}$.$(i+1)$ZAP.Lck
$C_{2(i+2)}$.$(i+1)$ZAP
$C_{2(i+2)}$.$(i+2)$ZAP
TCR.$(i+2)$ZAP
⋮
C_{2n}.nZAP
TCR.nZAP
C_{2n}.nZAP.Lck
C_{2n}.nZAP$_1$
⋮
C_{2n}.nZAP$_i$.Lck
C_{2n}.nZAP$_{i+1}$
C_{2n}.nZAP$_{i+1}$.Lck
C_{2n}.nZAP$_{i+2}$
⋮
C_{2n}.nZAP$_n$


M_{8n-1}
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}.\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP}_n}$
$<$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}}$
$M_{6n+2+2(n-2)} = 8n-2$
$M_{6n+1+2(n-2)} = 8n-3$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-2}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-2}.\mathrm{Lck}}$
$<$
$\cdots$
$<$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+2}}$
$M_{6n+2+2(i+1)}$
$M_{6n+1+2(i+1)}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+1}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+1}.\mathrm{Lck}}$
$<$
$\mu_{C_n.n\mathrm{ZAP}_{i+1}}$
$M_{6n+2+2i}$
$M_{6n+1+2i}$
$\mu_{C_{2n}.n\mathrm{ZAP}_i} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP}_i.\mathrm{Lck}}$
$<$
$\cdots$
$<$
$\mu_{C_{2n}.n\mathrm{ZAP}_1}$
M_{6n+2}
M_{6n+1}
$\mu_{C_{2n}.n\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2n}.n\mathrm{ZAP.Lck}}$
$<$
$\mu_{\mathrm{TCR}.n\mathrm{ZAP}} + \mu_{\mathrm{pMHC}}$
$\mu_{C_{2n}.n\mathrm{ZAP}}$
$M_{6+6(n-1)} = 6n$
$M_{5+6(n-1)} = 6n-1$
$\mu_{\mathrm{TCR}.n\mathrm{ZAP}}$
$\mu_{C_{2n}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{ZAP}}$
$\mu_{C_{2n}.n\mathrm{ZAP}}$
$<$
$\mu_{C_{2n}.(n-1)\mathrm{ZAP}}$
$M_{4+6(n-1)} = 6n-2$
$M_{3+6(n-1)} = 6n-3$
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP.Lck}}$
$<$
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP}}$
$M_{2+6(n-1)} = 6n-4$
$M_{1+6(n-1)} = 6n-5$
$\mu_{C_{2(n-1)}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2(n-1)}.(n-1).\mathrm{ZAP.Lck}}$
$<$
$\vdots$
$M_{6+6(n-2)} = 6n-6$
$M_{5+6(n-2)} = 6n-7$
$\vdots$
$<$
$\cdots$
$\cdots$
$<$
$\mu_{\mathrm{TCR}.(i+1)\mathrm{ZAP}} + \mu_{\mathrm{pMHC}}$
$\mu_{C_{2(i+1)+1}.(i+1)\mathrm{ZAP}}$
$M_{2+6(i+1)}$
$M_{1+6(i+1)}$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP.Lck}}$
$<$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}}$
M_{6+6i}
M_{5+6i}
$\mu_{\mathrm{TCR}.(i+1)\mathrm{ZAP}}$
$\mu_{C_{2(i+1)}.i\mathrm{ZAP}} + \mu_{\mathrm{ZAP}}$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}}$
$<$
$\mu_{C_{2(i+1)}.i\mathrm{ZAP}}$
M_{4+6i}
M_{3+6i}
$\mu_{C_{2i+1}.i\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2i+1}.i\mathrm{ZAP.Lck}}$
$<$
$\mu_{C_{2i+1}.i\mathrm{ZAP}}$
M_{2+6i}
M_{1+6i}
$\mu_{C_{2i}.i\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_{2i}.i\mathrm{ZAP.Lck}}$
$<$
$\cdots$
$<$
$\mu_{C_3.\mathrm{ZAP}}$
$M_{2+6} = 8$
$M_{1+6} = 7$
$\mu_{C_2.\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$\mu_{C_2.\mathrm{ZAP.Lck}}$
$<$
$\mu_{\mathrm{TCR.ZAP}} + \mu_{\mathrm{pMHC}}$
$\mu_{C_2.\mathrm{ZAP}}$
M_6
M_5
$\mu_{\mathrm{TCR.ZAP}}$
$\mu_{C_2} + \mu_{\mathrm{ZAP}}$
$\mu_{C_2.\mathrm{ZAP}}$
$<$
μ_{C_2}
M_4
M_3
$\mu_{C_1} + \mu_{\mathrm{Lck}}$
$\mu_{C_1.\mathrm{Lck}}$
$<$
μ_{C_1}
M_2
M_1
$\mu_{C_0} + \mu_{\mathrm{Lck}}$
$\mu_{C_0.\mathrm{Lck}}$
$\mu_{\mathrm{TCR}} + \mu_{\mathrm{pMHC}}$
μ_{C_0}


$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}}$
$-(n-1)$
$M_{6n+2+2(n-2)}$
$=8n-2$
$=2(4n-1)$
$-(n+3)$
M_{8n-1}
$=2(4n-1)+1$
$-(n+2)$
$M_{6n+1+2(n-2)}$
$=8n-3$
$=2(4n-2)+1$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}} + \mu_{\mathrm{Lck}}$
$-(n-1)$ -4
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-2}} + \mu_{\mathrm{Lck}}$
$-(n-2)$ -4
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-1}}.\mathrm{Lck}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{n-2}}.\mathrm{Lck}$
$\mu_{C_{2n}.n\mathrm{ZAP}_n}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+2}}$
$-(i+2)$
$M_{6n+2+2(i+1)}$
$=2(3n+i+2)$
$-(i+5)$
$M_{6n+1+2(i+1)}$
$=2(3n+i+1)+1$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+1}} + \mu_{\mathrm{Lck}}$
$-(i+1)$ -4
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+1}}.\mathrm{Lck}$
$\mu_{C_{2n}.n\mathrm{ZAP}_{i+1}}$
$-(i+1)$
$M_{6n+2+2i}$
$=2(3n+i+1)$
$-(i+4)$
$M_{6n+1+2i}$
$=2(3n+i)+1$
$\mu_{C_{2n}.n\mathrm{ZAP}_i} + \mu_{\mathrm{Lck}}$
$-i$ -4
$\mu_{C_{2n}.n\mathrm{ZAP}_i}.\mathrm{Lck}$
$\mu_{C_{2n}.n\mathrm{ZAP}_2}$
-2
M_{6n+4}
$=2(3n+2)$
-5
M_{6n+3}
$=2(3n+1)+1$
$\mu_{C_{2n}.n\mathrm{ZAP}_2} + \mu_{\mathrm{Lck}}$
-1 -4
$\mu_{C_{2n}.n\mathrm{ZAP}_2}.\mathrm{Lck}$
$\mu_{C_{2n}.n\mathrm{ZAP}_1}$
-1
M_{6n+2}
$=2(3n+1)$
-2
M_{6n+1}
$=2(3n)+1$
$\mu_{C_{2n}.n\mathrm{ZAP}_1} + \mu_{\mathrm{Lck}}$
$+2$ -4
$\mu_{C_{2n}.n\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{\mathrm{TCR}.n\mathrm{ZAP}} + \mu_{\mathrm{pMHC}}$
$+1$ $9n+1$
$\mu_{C_{2n}.n\mathrm{ZAP}}$
$+2$
$+1.5$
$M_{6+6(n-1)}$
$=6n$
$=2(3n)$
$+1$
$M_{5+6(n-1)}$
$=6n-1$
$=2(3n-1)+1$
$\mu_{\mathrm{TCR}.n\mathrm{ZAP}}$
$\mu_{C_{2n}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{ZAP}}$
$+3.5$ -2
$\mu_{C_{2n}.n\mathrm{ZAP}}$
$+2$
$\mu_{C_{2n}.(n-1)\mathrm{ZAP}}$
$+3.5$
$M_{4+6(n-1)}$
$=6n-2$
$=2(3n-1)$
$+2$
$M_{3+6(n-1)}$
$=6n-3$
$=2(3n-2)+1$
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$+6$ -4
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{C_{2(n-1)+1}.(n-1)\mathrm{ZAP}}$
$+6$
$M_{2+6(n-1)}$
$=6n-4$
$=2(3n-2)$
$+3$
$M_{1+6(n-1)}$
$=6n-5$
$=2(3n-3)+1$
$\mu_{C_{2(n-1)}.(n-1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$+7$ -4
$\mu_{C_{2(n-1)}.(n-1)\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{C_{2(n-1)}.(n-1)\mathrm{ZAP}}$
$+7$
$M_{6+6(n-2)}$
$=6n-6$
$=2(3n-3)$
$+4$
$M_{5+6(n-2)}$
$=6n-7$
$=2(3n-4)+1$
$\mu_{C_{2(i+1)+1}.(i+1)\mathrm{ZAP}}$
$3n-3i$
$M_{2+6(i+1)}$
$=2(3i+4)$
$3n-3i-3$
$M_{1+6(i+1)}$
$=2(3i+3)+1$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$3n-3i+1$ -4
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{\mathrm{TCR}.(i+1)\mathrm{ZAP}} + \mu_{\mathrm{pMHC}}$
$3n-3i-2$ $9n+1$
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}}$
$3n-3i+1$
$3n-3i$
M_{6+6i}
$=2(3i+3)$
$3n-3i-2$
M_{5+6i}
$=2(3i+2)+1$
$\mu_{\mathrm{TCR}.(i+1)\mathrm{ZAP}}$
$\mu_{C_{2(i+1)}.i\mathrm{ZAP}} + \mu_{\mathrm{ZAP}}$
$3n-3i+2$ -2
$\mu_{C_{2(i+1)}.(i+1)\mathrm{ZAP}}$
$3n-3i+1$
$\mu_{C_{2(i+1)}.i\mathrm{ZAP}}$
$3n-3i+2$
M_{4+6i}
$=2(3i+2)$
$3n-3i-1$
M_{3+6i}
$=2(3i+1)+1$
$\mu_{C_{2i+1}.i\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$3n-3i+3$ -4
$\mu_{C_{2i+1}.i\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{C_{2i+1}.i\mathrm{ZAP}}$
$3n-3i+3$
M_{2+6i}
$=2(3i+1)$
$3n-3i$
M_{1+6i}
$=2(3i)+1$
$\mu_{C_{2i}.i\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$3n-3(i-1)+1$ -4
$\mu_{C_{2i}.i\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{C_3.\mathrm{ZAP}}$
$3n$
$M_{2+6=8}$
$=2(4)$
$3n-3$
$M_{1+6=7}$
$=2(3)+1$
$\mu_{C_2.\mathrm{ZAP}} + \mu_{\mathrm{Lck}}$
$3n+1$ -4
$\mu_{C_2.\mathrm{ZAP}}.\mathrm{Lck}$
$\mu_{\mathrm{TCR.ZAP}} + \mu_{\mathrm{pMHC}}$
$3n-2$ $9n+1$
$\mu_{C_2.\mathrm{ZAP}}$
$3n+1$
$3n$
M_6
$=2(3)$
$3n-2$
M_5
$=2(2)+1$
$\mu_{\mathrm{TCR.ZAP}}$
$\mu_{C_2} + \mu_{\mathrm{ZAP}}$
$3n+2$ -2
$\mu_{C_2.\mathrm{ZAP}}$
$3n+1$
μ_{C_2}
$3n+2$
M_4
$=2(2)$
$3n-1$
M_3
$=2(1)+1$
$\mu_{C_1} + \mu_{\mathrm{Lck}}$
$3n+3$ -4
$\mu_{C_1}.\mathrm{Lck}$
μ_{C_1}
$3n+3$
M_2
$=2(1)$
$3n$
M_1
$=2(0)+1$
$\mu_{C_0} + \mu_{\mathrm{Lck}}$
$3n+4$ -4
$\mu_{C_0}.\mathrm{Lck}$
$\mu_{\mathrm{TCR}} + \mu_{\mathrm{pMHC}}$
$-6n$ $9n+1$
μ_{C_0}
$3n+4$