



				1
				3
	PD PO			5
				11
				13
A1				15
A2				16
	(A2-D)	(A2-A)	(A2-B)	(A2-C)
A3		Atg		21
		(A3-A)	(A3-B)	(A3-C)
A4				25
		(A4-A)	(A4-B)	
A5				28
A6				29
	(A6-C)	(A6-A)	(A6-B, A6-D)	
A7				34
		(A7-A)	(A7-B)	(A7-C)
A8			NF- B	38
(	)			
B1				39
(	(B1-A)		(B1-B)	

B2	ATP				42
	(	(B2-A)	(B2-B)	(B2-C)	
	(B2-D))				
B4					47
		(B4-A)	(B4-B)	(B4-C)	
	(B4-E)	(B4-F)	(B4-G)		
B5	RNA				54
		(B5-A)	(B5-B)	(B5-C)	
	(B5-D)	(B5-E)			
					61
A1					63
A2		DOCK2			64
		(A2-A)	(A2-B)	(A2-C)	
A3					69
		(A3-A)	(A3-B)		
A4					73
		(A4-A)	(A4-B)	(A4-C)	
A5					78
		(A5-A)	(A5-B)	(A5-C)	
	(A5-D)	(A5-E)			
A6				AdipoR/AMPK	85
	/ACC	(A6-A)	(A6-B)	(A6-C)	
B1					89
		(B1-A)	(B1-B)		
B2					92

	(B2-A)	(B2-B)	(B2-C)	(B2-D)
B3	NPP			98
	(B3-A)	(B3-B)	(B3-C)	
B4				103
	(B4-A)	(B4-B)		
				107
A1				109
	(A1-A)	(A1-B)		
A2				112
A3				113
A4				114
	(A4-A)	(A4-B)		
A5				117
	(A5-A)	(A5-B)		
A6		SIRT3		121
	(A6-A)	(A6-B)		
B1				124
	(B1-A)	(B1-B)		
B3				127
B4				128
	(B4-A)	(B4-B)		

B5				132
	(B5-D)	(B5-A)	(B5-B)	(B5-C)
B6				137
	(B6-C)	(B6-A)	(B6-B)	
C1				141
	(C1-E)	(C1-A)	(C1-B)	143
	(C1-C)		(C1-D)	
C1				151
	(C1-C)	(C1-D)	X	153
		(C1-A)	(C1-E)	(C1-B)
C1				159
	(C1-D)	(C1-A)	(C1-B)	(C1-C)
C1				169
	(C1-E),	(C1-A)	(C1-B),	(C1-C),
		(C1-F),	(C1-G)	
				183
				185
				187
				189



3000

19

5

2

3

4

22 6

23

23 5

PD PO

7









**PD PO**



(Nat. Struct. Mol. Biol. 2011)

Immunity. 2010

Nature 2010, Nature

Nature 2011

Sec

Nature 2008, 2011

(Science

2011)

Nature 2011, PNAS 2011

Nature Struct. Mol. Biol. 2008

Nature

2009, Nature 2009, Nature Structural and Molecular Biology 2009, Mol. Cell  
2010, NAR 2010, Nature 2010

(NF - B Essential modulator)

NF - B

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RNA

Gh1 RNA

Nature 2010)

Nature

2008, 2009

Science

3

PO

PD

4

14













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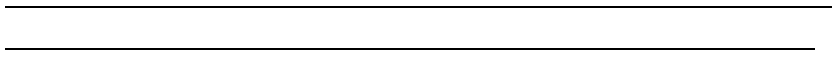
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26S

26S

10

4

100 26S

5

1 26S

[Redacted box]

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26S

[Redacted]

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26S

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[Redacted box]

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NMR

NMR

NMR  
NMR

X

NMR

senior author

[Redacted]

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Atg

\_\_\_\_\_

\_\_\_\_\_

Atg

X

Atg

PAS

NMR

SAIL

Atg



Atg



Atg



Atg

PDB

Nature Science  
EMBO J

Agt

Atg

NMR

SAIL

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Atg

\_\_\_\_\_

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Atg

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Atg

[Empty rectangular box]

Atg

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SAIL NMR

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SAIL

NMR

SAIL

NMR

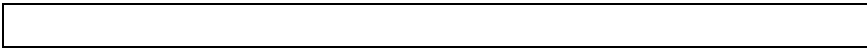
21

D

SAIL

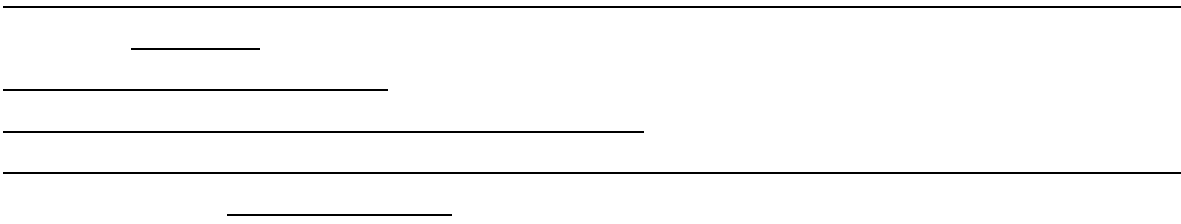
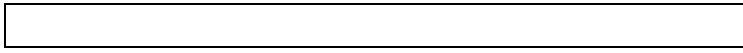
SAIL

SAIL



NMR

20



PAD4

PD



[Redacted]

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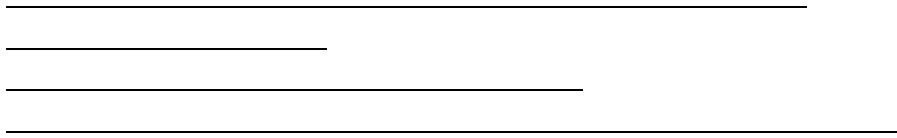
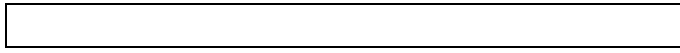
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**TFIIE**

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**TFIEa**



Voltage-Sensitive Phosphatase (VSP) Voltage Sensor Only Protein (VSOP)

PDB

PTEN

VSP VSOP

PTEN

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PDB

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PDB

PDB

[Redacted]

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[Redacted box]

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COPII



X NMR X NMR

X NMR

- -

-ZO

NMR PDZ

X NMR



[Redacted]

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\_\_\_\_\_

\_\_\_\_\_

X

X

NMR

[Redacted]

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X

PDB

FAT-Dachsous

X

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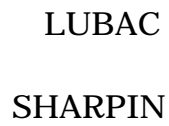
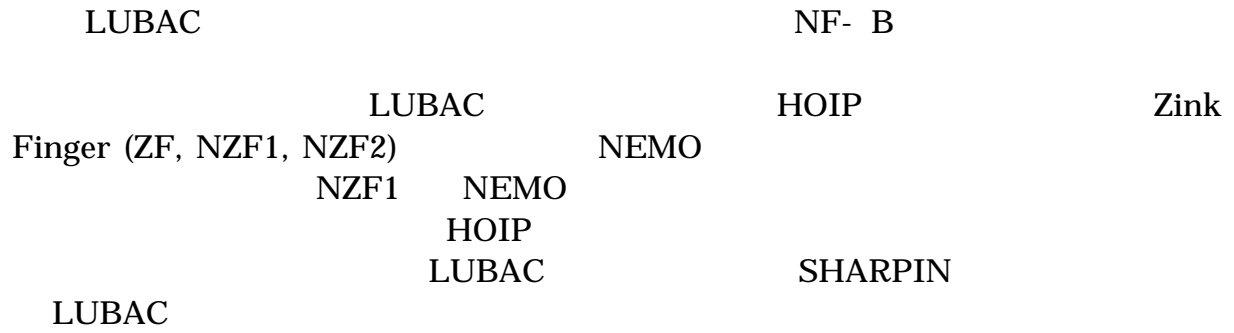
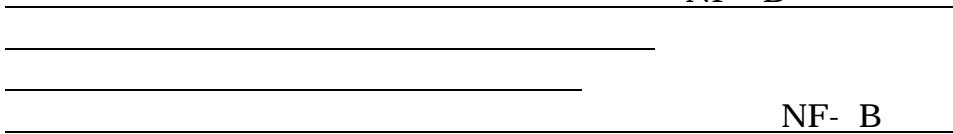
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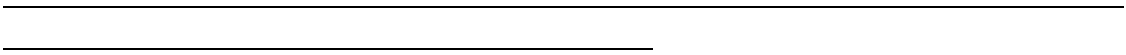
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FAT      Dachsous

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NF- B

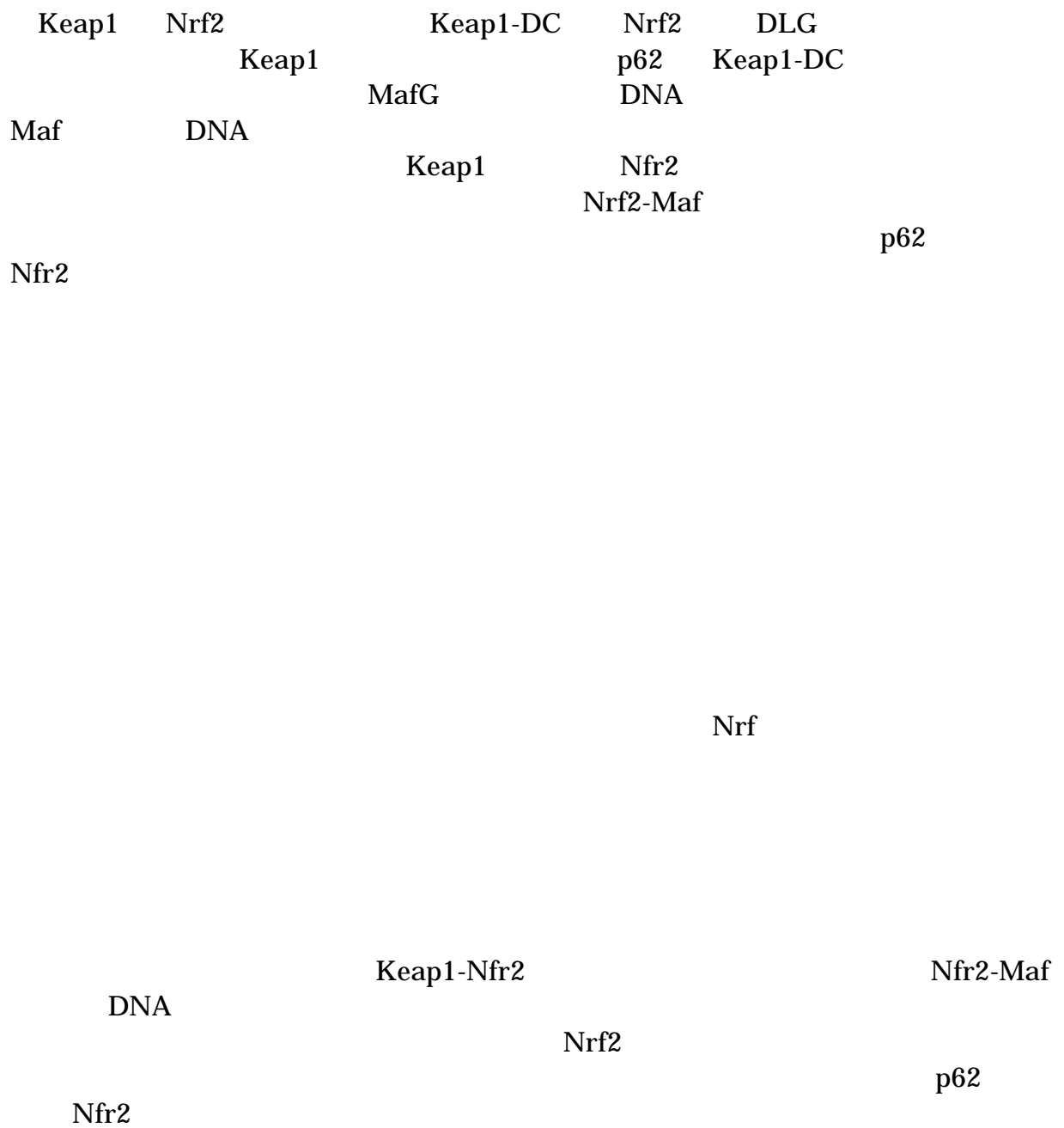
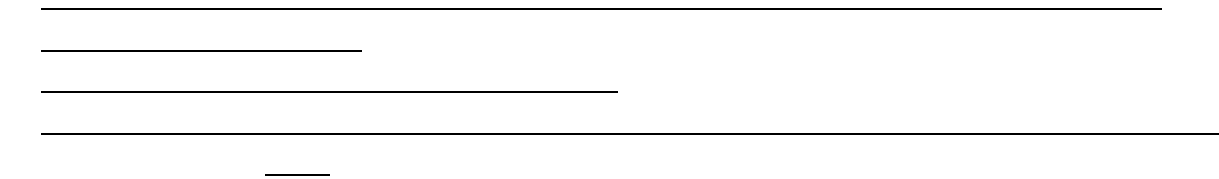


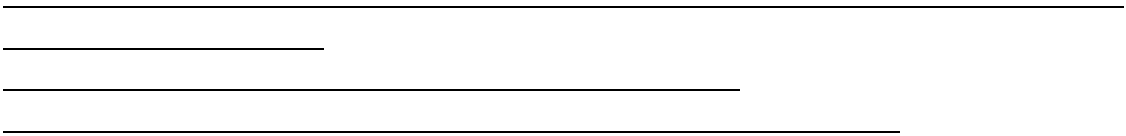
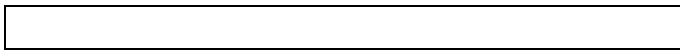


Keap1 Nrf2 Keap1-DC Nrf2 DLG  
Keap1 Keap1  
p62 Keap1-DC MafG  
DNA DNA  
Keap1 Maf Nrf2  
Nrf2-Maf  
p62 Nrf2

Nrf

DNA Keap1-Nrf2 Nrf2-Maf  
Nrf2  
Keap1-Nrf2 Keap1 Nrf2





Keap1  
 Nrf2DLG/ETGE Keap1 DC  
 X

X

Keap1-Cul3-Roc1

X      2      Keap1      Keap1      2  
                                          1      5

ATP

PDB

NMR



[Empty rectangular box]

ATP

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ATP

\_\_\_\_\_

NMR

22

[Empty rectangular box]

ATP

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

H<sup>+</sup>-ATP

F<sub>0</sub>

NMR

\_\_\_\_\_

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PDB

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ATP

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NMR

\_\_\_\_\_

NMR

\_\_\_\_\_

ATP

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\_\_\_\_\_

22

19

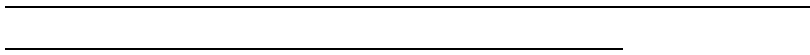
21

2

F0F1ATPase

2

22



V-ATPase

ATP

X

1

ATPase

V-ATPase

X

ATP

V-

PDB

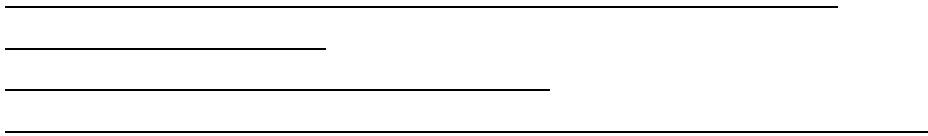
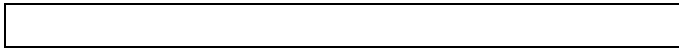
*in silico*

V-ATPase

V-ATPase

V-ATPase

V-ATPase



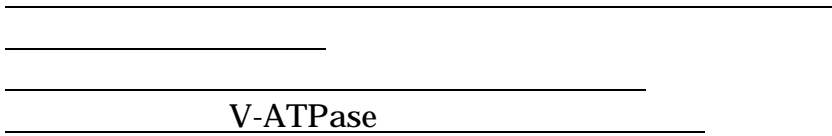
V-ATPase V-ATPase

V-ATPase

ATP V-ATPase

V-

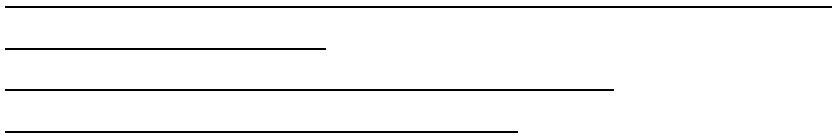
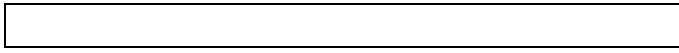
ATPase



V-ATPase

PDB

V-ATPase

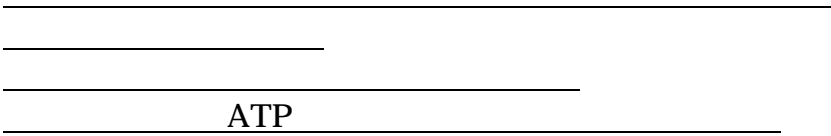


palmerolide

V-ATPase

V-ATPase





ABC

PDB

ATP

ABC

19

21

19

21  
GFP

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\_\_\_\_\_

ATPase

V-

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T. thermophilus V-ATPase

V-ATPase

A<sub>3</sub>B

ATPase  
X

ATPase

V-ATPase

\_\_\_\_\_

RNA

\_\_\_\_\_

\_\_\_\_\_

PDB

RNA

[Empty rectangular box]

RNA

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

RNA

\_\_\_\_\_

PDB

[Empty rectangular box]

RNA

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Argonaute

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[ ]

RNA

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\_\_\_\_\_

RNA

RNA

\_\_\_\_\_

RNA

PDB



RNA



RNA



RNA

tRNA



[ ]

RNA

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RNA

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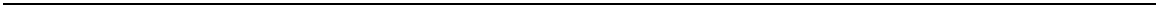
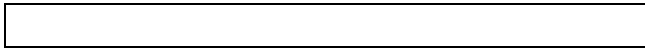
PDB

PDB









TLR9

DNA

DOCK2

DOCK2

DOCK2 DOCK2 DOCK2 Rac

DHR- DOCK N SH ELMO DOCK  
DOCK Rac DOCK2 DHR-2 Rac DOCK2 SH3 ELMO

3  
DOCK2

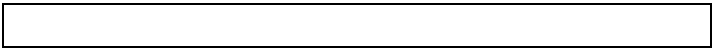
2

Science

DOCK2

1





DOCK2



DOCK2



Science

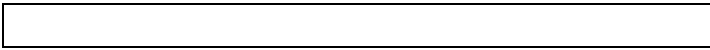
1

DOCK2

3







DOCK2



DOCK2



DOCK2

DOCK2



2

Nox2 C  
Nox2  
11

NADPH

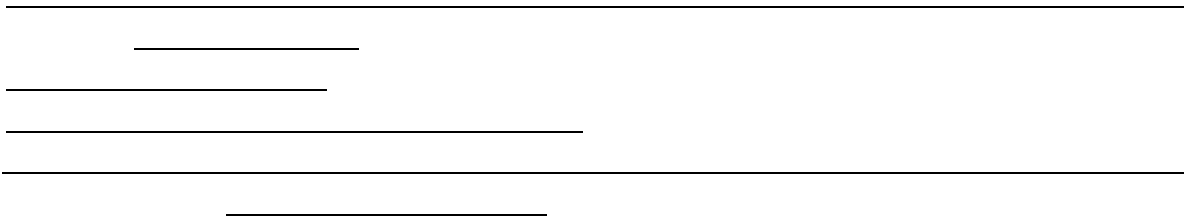
Ca++

Nox2

Nox2

NMR

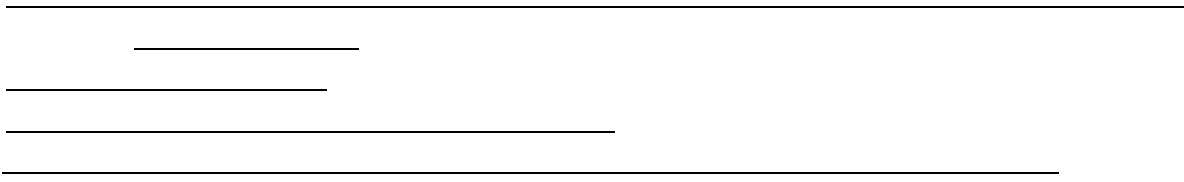
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Nox2    NADPH

Nox

Nox2    NADPH



Nox C

Nox

Nox2 NADPH

Nox

p PX  
Nanodisc

p  
PI

PI



A5226A

16

13

N

4

1

A5226A

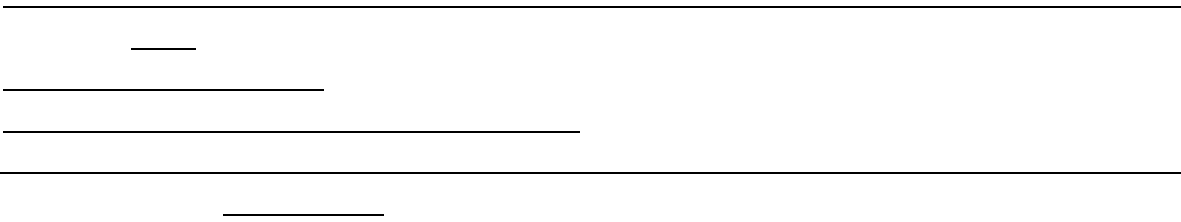
PDB

PDB

2

*In silico*





A5226A

PDB

[Redacted]

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X

A5226A

Fab

X

[Redacted]

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[Redacted]

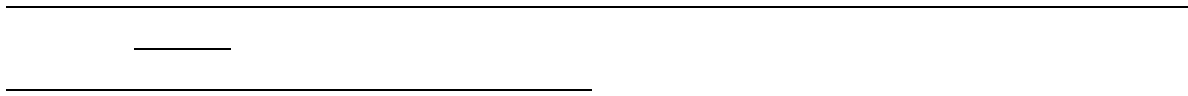
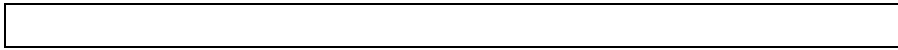
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[Redacted]

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[Redacted]

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DHOD QFR TAO

*in silico*

*in silico*

*T. cruzi* DHOD

TAO

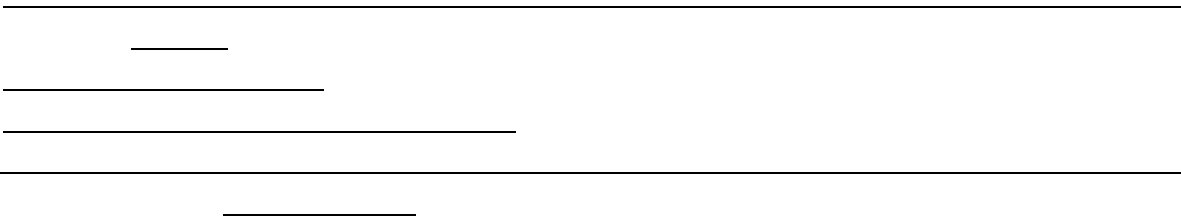
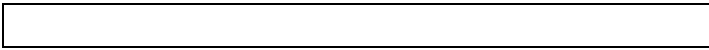
*in silico*

PDB

*silico*

*in*

TLO



4

*T. cruzi* DHOD

*in silico*

[Redacted]

\_\_\_\_\_

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\_\_\_\_\_

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\_\_\_\_\_ X

9

5

ATC, DHOD, GK, OFR, TAO

[Redacted]

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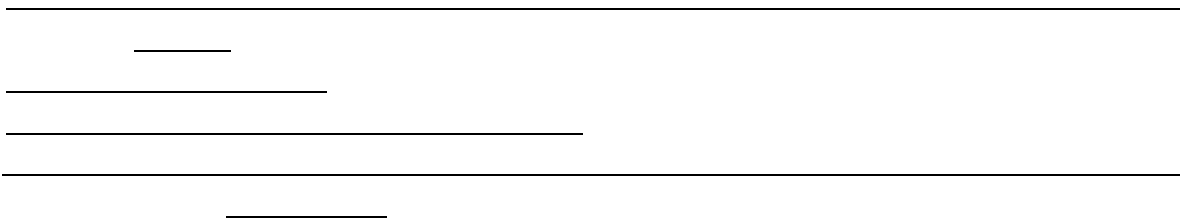
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DHOD

3





*In silico*

DHOD  
II

TcDHOD

200

[Redacted]

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\_\_\_\_\_

\_\_\_\_\_

		<i>In silico</i>
<i>in silico</i>	DHOD	DHOD, ATC,GK



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AdipoR/AMPK /ACC

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Nature

(AdipoR)

(Ad)

AdipoR

ACC1,AMPK  
AdipoR

AdipoR

AdipoR

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AdipoR/AMPK /ACC

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AdipoR/AMPK /ACC

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\_\_\_\_\_

AdipoR

AMPKKs,AMPK,ACC

AdioR1

Nature  
2

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AdipoR/AMPK /ACC

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AdiopoR,ACC,AMPK,AMPKKs

AdpoR

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AdipoR/AMPK /ACC

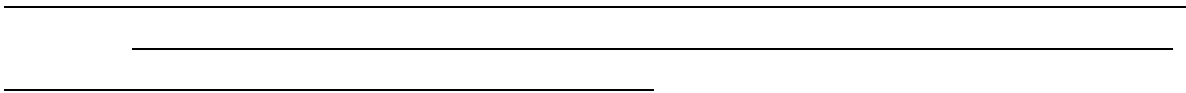
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AMPKK/AMPK/ACC

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AMPK                      AMPK    CAMKK  
AMPK                                              AMPK  
AMPK                                              ACC



CCR2 C

NMR CCR2 C

CCR2

[Redacted]

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\_\_\_\_\_

NMR            CCR2    C



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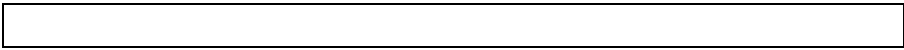
\_\_\_\_\_

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\_\_\_\_\_

NMR            CCR2    C



VDR

TGF-

Smad

VDR

PPAR VDR

TGF-

PPAR VDR

PPAR VDR

Smad

*vivo*

*in*

3

48

non-genomic action

PPAR VDR non-genomic

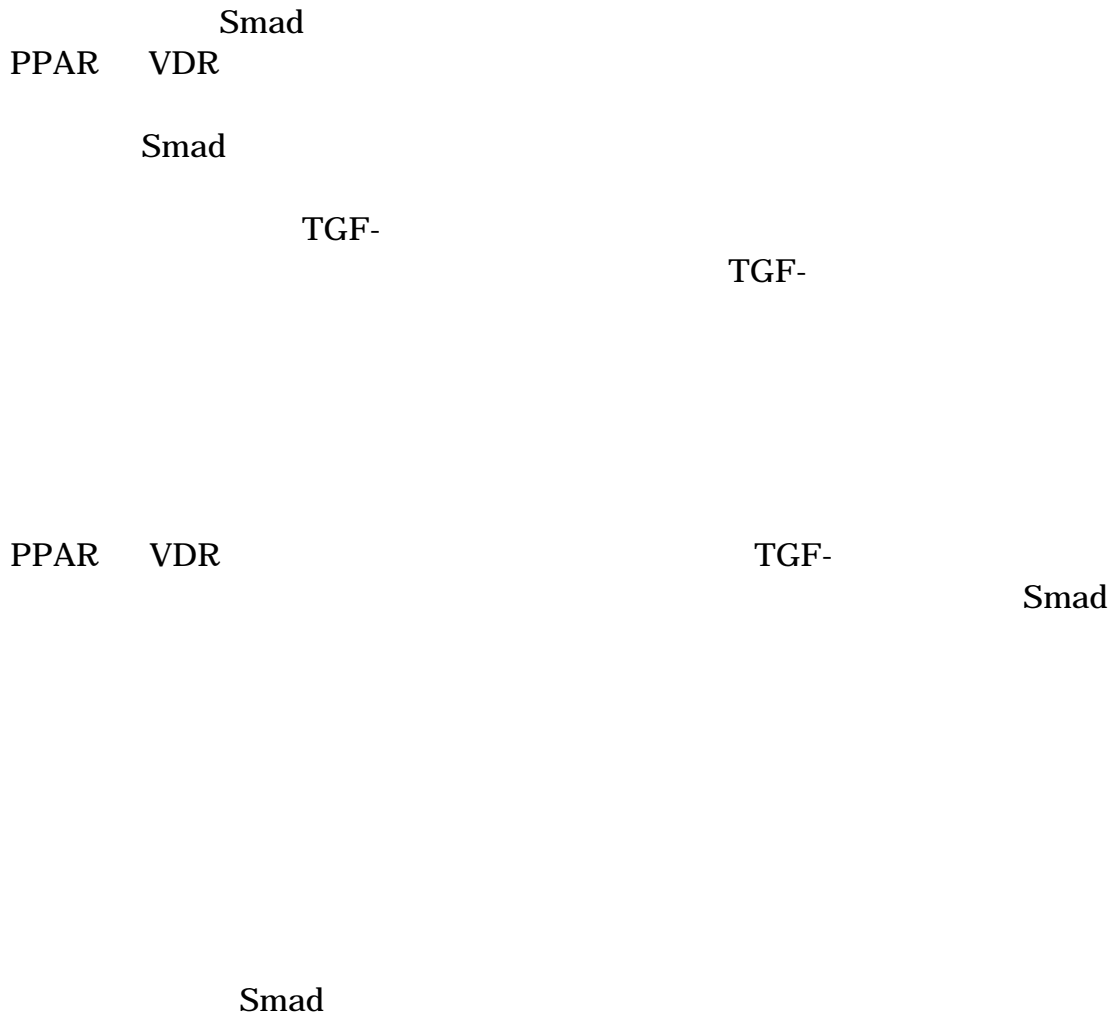
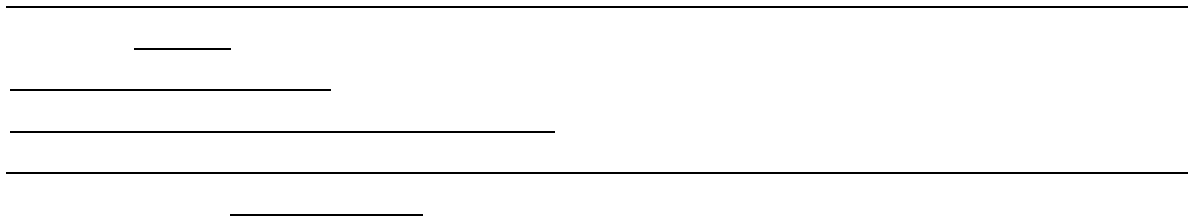
TGF-

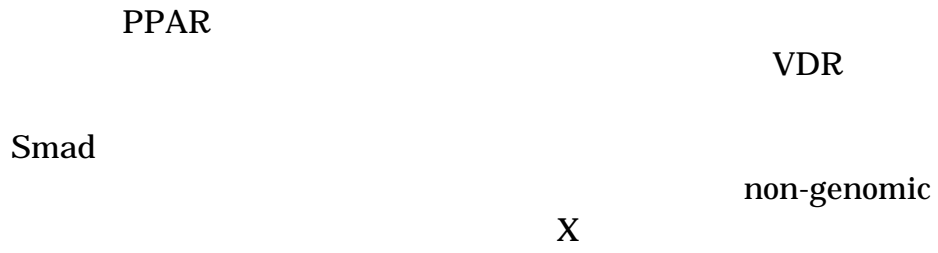
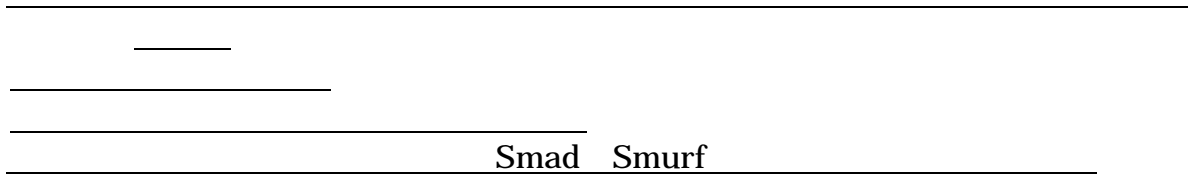
Smad

Smad/Nuclear receptor

TGF-

POC

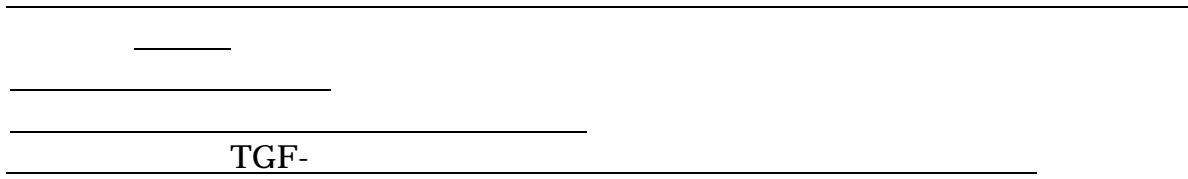




Smad

Smad

[Empty rectangular box]



PPAR VDR

PPAR VDR

PPAR VDR

Smad

[Redacted]

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[Redacted]

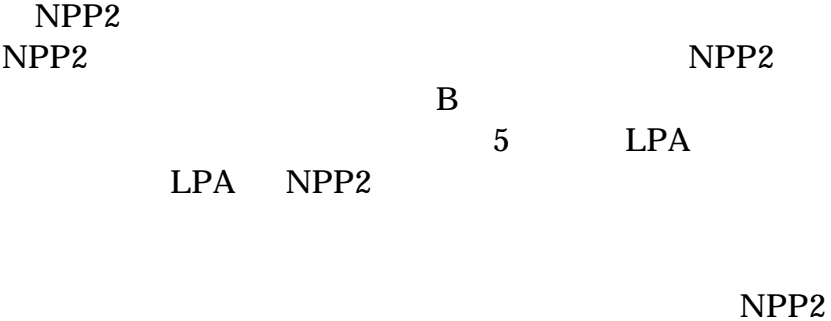
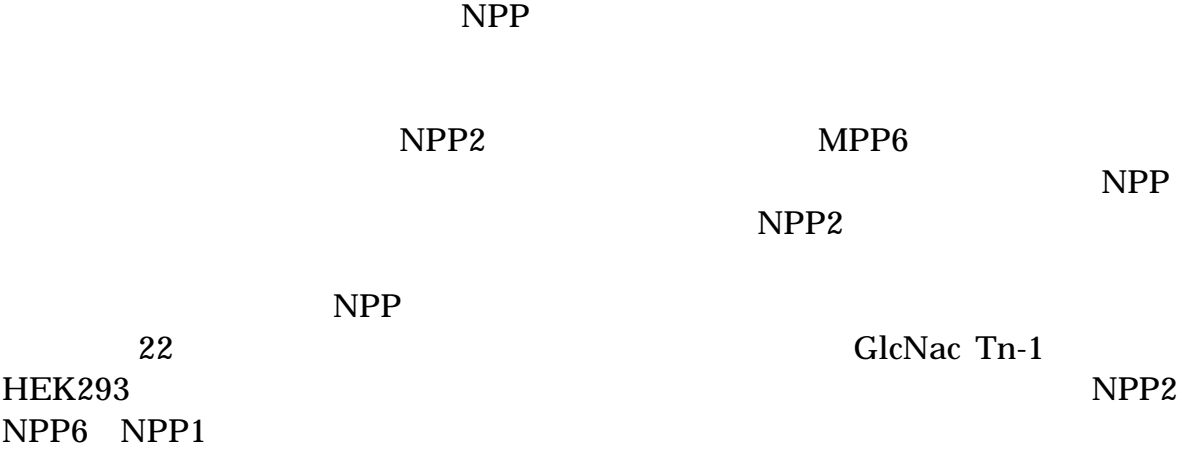
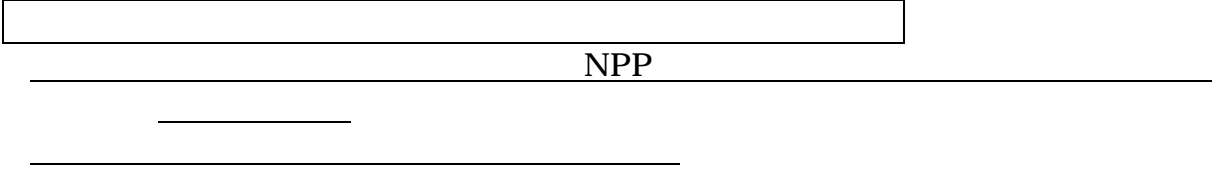
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[Redacted]

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NPP2







NPP



NPP



NPP2

MPP6

NPP

NPP2

NPP

22

GlcNac Tn-1

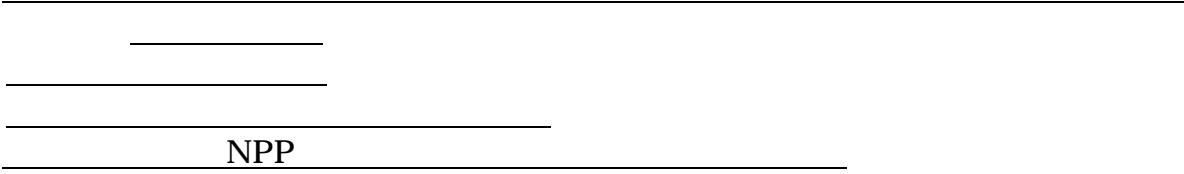
HEK293

NPP2

NPP6 NPP1

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NPP



NPP2

MPP6

NPP

NPP2

NPP

22

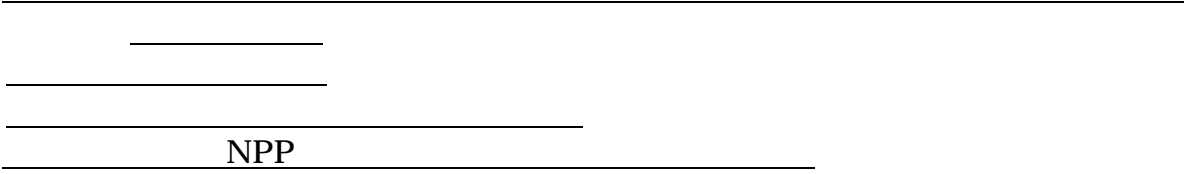
GlcNac Tn-1

HEK293  
NPP6 NPP1

NPP2

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NPP



NPP2

MPP6

NPP

NPP2

NPP

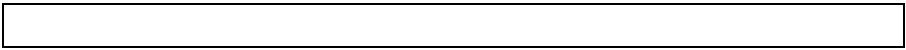
22

GlcNac Tn-1

HEK293  
NPP6 NPP1

NPP2

HEK293



2

Sema6A

Plexin-A2

6

Nature Immunol

Sema6A-Plexin-A2

[Redacted]

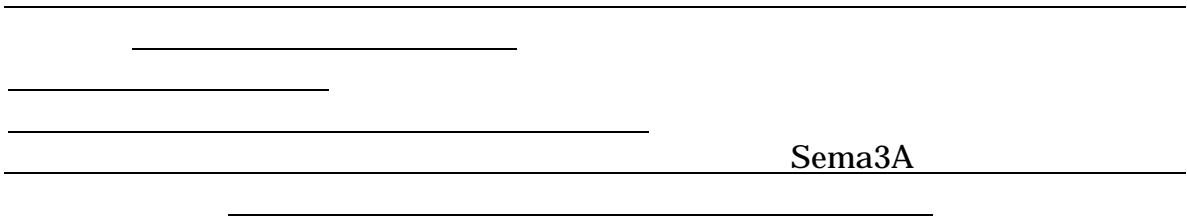
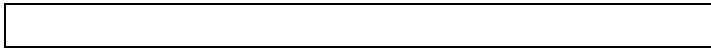
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Sema3A

3A

Sema3A

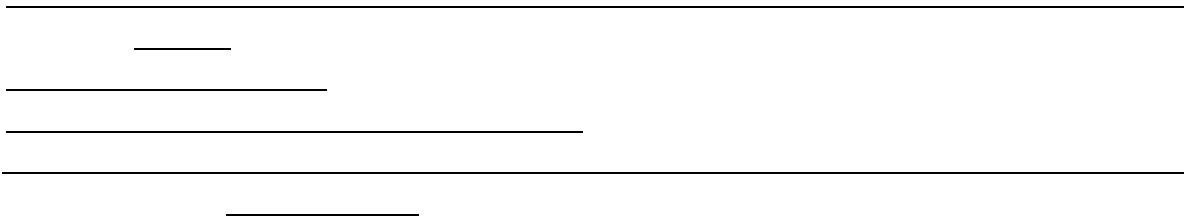












(PBAN) (PBANR) 2 PBAN  
NMR PBAN C  
C  
PBANR  
PBAN PBANR

PBAN PBANR

[Redacted]

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\_\_\_\_\_  
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(PBAN)

(PBANR)

PBANR

10

PBANR

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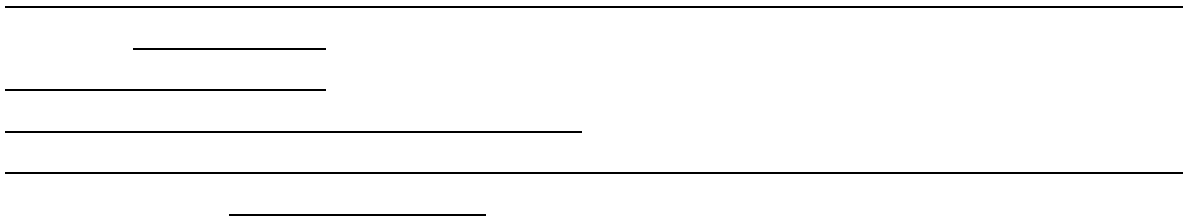
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A-

A-

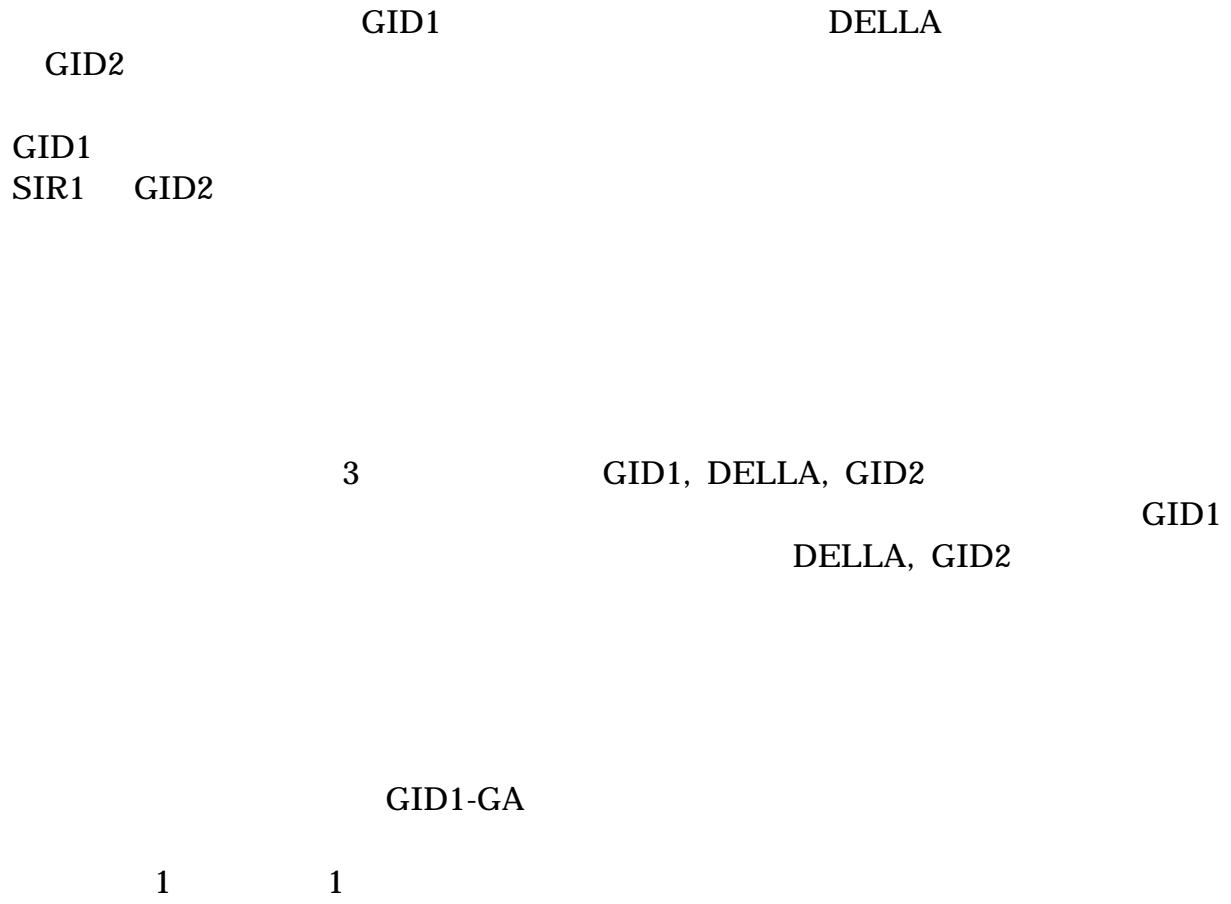
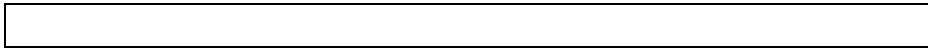


ABA AREB1  
X  
ABA

AREB1

ABA X

ABA





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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

GID1

GA-GID1

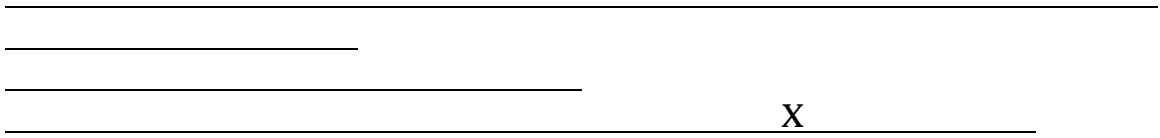
GID1-GA

DELLA

GID2

GID1

DELLA GID2



GA-GID1  
SIR1    GID2

GA-GID1

2



(MexB )

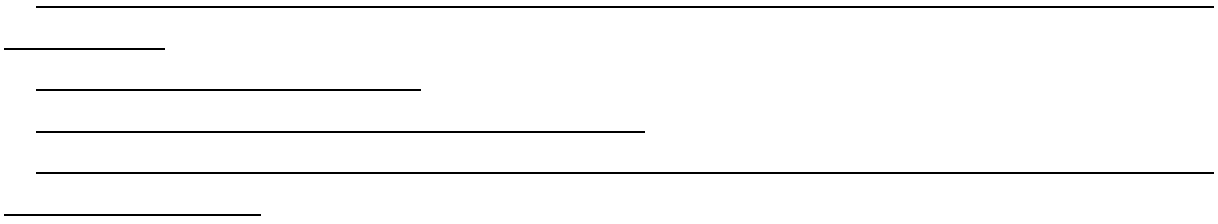
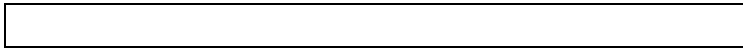
AcrB

PDB

MexB

ArcB

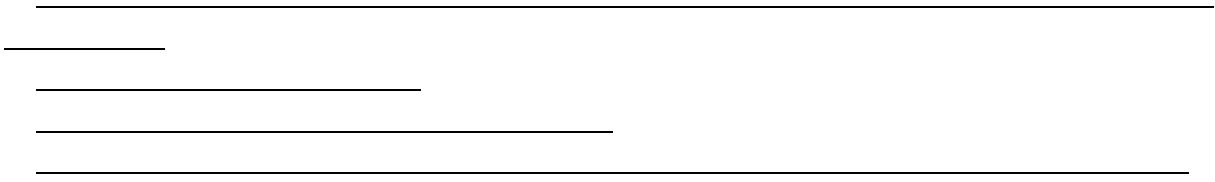
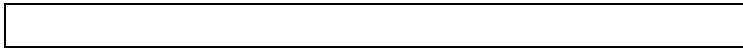




PDB

AcrB

PDB



MexB

OprM      MexA  
            X  
            MexB    MexA

PDB



SIRT3



SIRT3

SIRT3

SIRT3

SIRT3

SIRT3

SIRT3

shRNA

SIRT3

*in vitro*

SIRT3



SIRT3



SIRT3



SIRT3

2

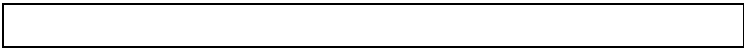
SIRT3

SIRT3  
SIRT3-

SIRT3

SIRT3





SIRT3



SIRT3 *in vivo*



SIRT3  
SIRT3

SIRT3

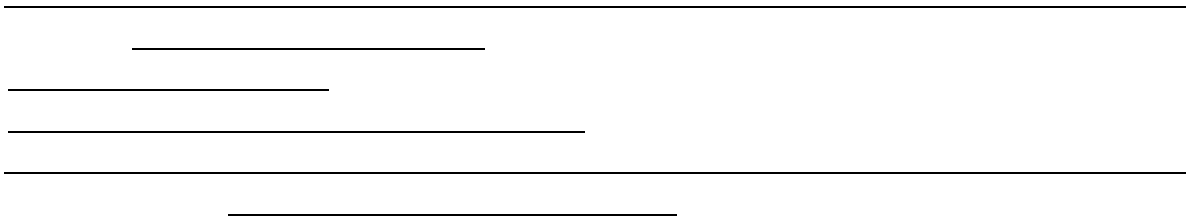
SIRT3

SIRT3



ESP

ESP1



ESP

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\_\_\_\_\_

\_\_\_\_\_

ESP

ESP

ESP-

(Nature

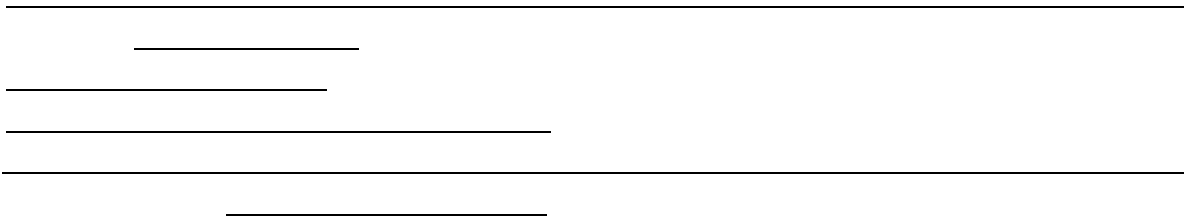
ESP  
)

ESP

ESP-

ESP  
)

(Nature



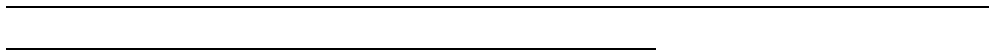
*Sphingomonas*

A1

X

ABC

ABC



AMP phosphorylase  
*Tk*-Rubisco

X

Rubisco

PDB

*Thermococcus kodakaraensis* (Tk) AMP phosphorylase, ribose-1,5-  
bisphosphate (R15P) isomerase

T Rubisco Rubisco  
AMP phosphorylase R15P isomerase

Tk-Rubisco



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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Thermococcus kodakaraensis* Tk) AMP phosphorylase, ribose-1,5-  
bisphosphate (R15P) isomerase

T Rubisco Rubisco  
AMP phosphorylase R15P isomerase

Tk-Rubisco



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Tk-Rubisco

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Rubisco

Rubisco Tk-

Rubisco Rubisco

palustris 3 Rhodopseudomonas

vitro 71% kcat/Km 57% in

Rhodopseudomonas palustris 3 (SP5-V330T)

55%

*Tk*-Rubisco

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[Redacted]

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PDB

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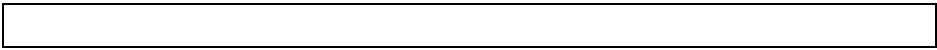
2

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OsRbohB  
Defensome

OsRac1

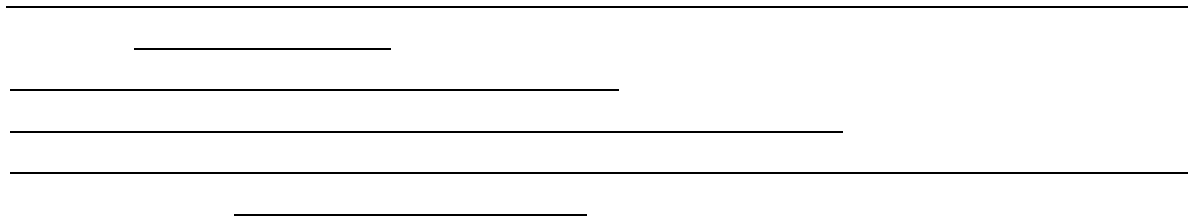
OsRac1

pCold-GST

NADPH

Rac  
Rac

H19-H21



OsRbohB  
Defensome

OsRac1

OsRac1

OsFD1

Defensome

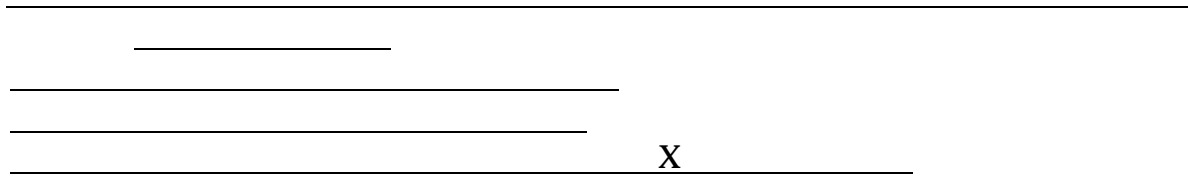
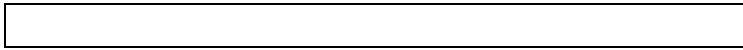
14-3-3

GF14b

bZIP

H19-H21



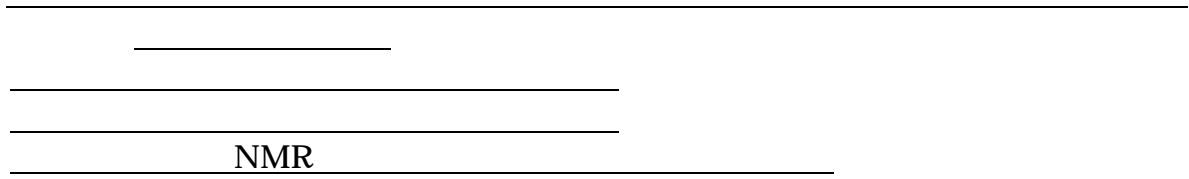


Rac  
Rboh N C

NADPH (RbohB) (B6-B) Rac

NADPH Rac

NADPH



pCold-GST

OsRbohB

OsFD1

14-3-3

GF14b

bZIP

Defensome

19

21

NMR

C1





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Systematic approach

3000

1/10

111

27

2

6



[Redacted]

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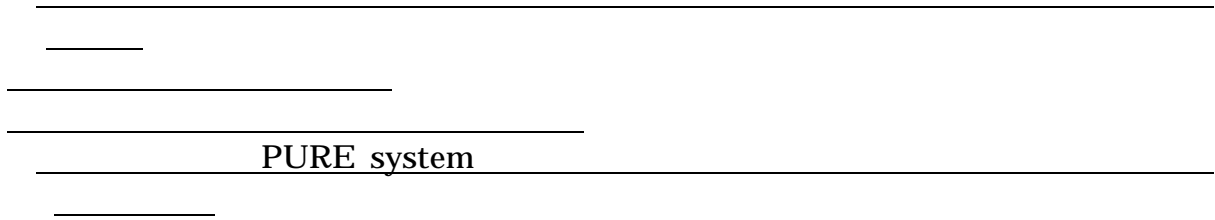
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-



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PURE system      *in vitro*

reference  
misfold  
NMR

native source      authentic

PURE system

PURE

[Redacted]

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*in vivo*

S-S

S-S

[Redacted]

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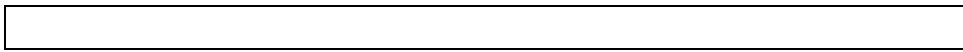
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S/N

$\mu\text{m}$

SAD/MAD

[Redacted]

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SPring-8

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**X**

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SAD  
S

S

BL-1A

[Redacted]

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[Redacted]

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6000 21 *in vivo* nM *in*

5

6000 21  
*in vivo* nM

in vivo  
perspective





21

nM

9600

400

21

nM

9600

21

nM

15

21





6480

HPLC

SIRT3

6480

HPLC

SIRT3

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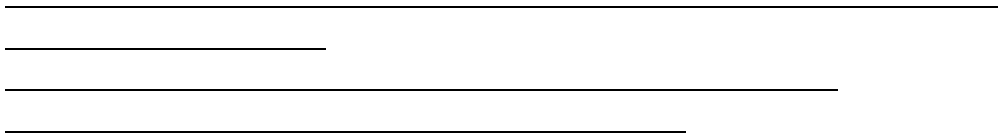
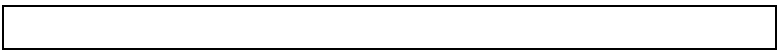
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G  
CXCR7  
*in vivo*  
GPCR  
Hydrophilic tag

GPCR  
 $\mu\text{M}$   
Eg5 nM  
GPCR

G  
CXCR7  
*in vivo*  
GPCR  
 $\mu\text{M}$   
Eg5 nM

*in vivo*



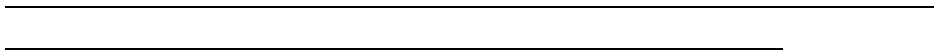
IC50	nM	ALK
Library	X	Focused
IC50	nM	ALK











14

18

3000

DB

DB

CASAdb

PCIdb

FUJIdb

DB

DB

DB

CASAdb

PCIdb

FUJIdb

web

PREIMS

LIMS

Spring-8

Photon Factory

X

LIMS

DB

[Empty rectangular box]

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3

DB  
FUJIdb      DB      CASAdb      PCIdb

DB

DB  
FUJIdb      DB      CASAdb      PCIdb  
YouTube      TargetTanpaku  
DB

DB

[Redacted]

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261

1420                      Spring-8   Photon Factory   X

(TPPE)

261

X

Spring-8   Photon Factory

1420

PREIMS

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C1

website

[Empty rectangular box]

[Four horizontal lines]

2

CASP

CASP9

ToSY





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web

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Nox

60

Nox

1



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Scri pps

MRC

EMBL Max Pl anck











