

## Appendix 1. IL-2 の転写、産生に関する化学物質、シグナル伝達物質についての文献情報

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	<i>in vitro/ in vivo</i>	<i>in vivo effects</i>	Reference
1	DMSO		negative	human	PBMC		de Abreu Costa et al. Molecules 2017
2		Prox1	negative	human	PBMC		Zhang et al. Oncotarget 2017
3		PTEN	negative	mice			Kim et al. J Exp Med 2017
4	Lysophosphatidylserine	LPS3/GPR174	negative	mice			Shinjo et al. Biochem Biophys Res Commun 2017
5	-	DOCK8, STAT5, actin dynamics, immune synapse, Treg	positive	mice	<i>in vivo</i>		Janssen et al. JCI Insight 2017
6	-	DOCK8, STAT5, Treg	positive	mice	<i>in vivo</i>		Singh et al. JCI Insight 2017
7	-	IFNGR1, CD4 T-cell	positive	Human	<i>in vivo</i>		Khanolkar et al. J Allergy Clin Immunol 2017
8	Zoledronic acid	NFAT, Treg, calcium signaling	negative				Sarhan et al. Oncoimmunology 2017
9	IL-33, IgE	FcεRI, MAPK, mast cell	positive	mice	bone marrow		Salamon et al. Clin Exp Allergy 2017
10	extracts from Magnoliae Flos		negative	human	cell line		Nguyen et al. Chem Pharm Bull (Tokyo) 2017
11		AhR	positive	mice			Ehrlich et al. Eur. J. Immunol 2017
12		DNA-PKcs, calcineurin, NFAT	positive	human	PBMC, cell line		Wiese et al. PLoS One 2017
13		PKC-θ, effector T-cells	positive	mice			Alharshawi et al. Sci Rep 2017
14		IL-23	negative	human, mice			Dai et al. J. Immunol 2017
15		MTOM (adjuvant)	positive	mice			Yu et al. Front Immunol 2017
16	Recombinant AlaDH		positive	human			Movahedi et al. Iran J Med Sci 2017
17		miR-200a-3p, CtBP2 Complex	positive	mice			Katsuyama J Immunol 2017
18			negative	human	PBMC		Zhou et al. Medicine (Baltimore) 2017
19	Bryoria sp. (Lichen-Forming Fungus) Extracts		negative	mice			Hwang et al. J Microbiol Biotechnol 2017
20	Tricholoma populinum Lange		negative	human	cell line		Merdivan et al. Z Naturforsch C 2017
21	Ctr1f8, Ctry68, Ctry2908		negative	human	PBMC		Ding et al. Peptides 2017
22		Microvesicles released by apoptotic human neutrophils	negative	human			Shen et al. Eur J Immunol 2017
23	Acetylcholine	Nicotinic acetylcholine receptor, Ca channel	positive	Human	cell line		Mashimo et al. Life Sci. 2016
24	Nevirapine		positive	Rat	<i>in vivo</i>		Bekker et al. Adv Pharmacol Sci. 2016
25	Oleic acid		positive	Human	PBL		Passos et al. Lipids Health Dis. 2016
26	-	Ets-2	negative	Human	PBMC		Panagoulas et al. J Biol Chem. 2016
27	Quinolinone	NF-κB, NFAT	negative	Human	cell line		Kwak et al. Bioorg Med Chem. 2016
28	Ochratoxin A	MAPK	positive	Human	cell line		Darif et al. J. Toxicol Sci. 2016
29	-	Signaling lymphocytic activation molecule-associated protein (SAP)	positive	Human	PBL		Karampetsou et al. J Immunol. 2016
30	-	Let-7i	positive	Human	PBL		Zhang et al. Sci Rep. 2016
31	-	4-1BB	positive	Mice			Barsoumian et al. PLoS One. 2016
32	-	Itk	positive	Mice			Gomez-Rodriguez et al. Nat Commun. 2016
33	alpha-Hederin	miRNA-133a	positive	Rat			Ebrahimi et al. Drug Dev Res. 2016
34	-	Glycerol 3-Phosphate Acyltransferase	positive	Human	cell line		Faris et al. Lipids. 2016
35	-	CD147, PMCA4	negative	Human	cell line		Supper et al. J Immunol. 2016
36	Astaxanthin		positive	Mice			Lin et al. Int J Mol Sci. 2015
37	Fingolimod	PP2A, IL-33	negative	Mice			Ottenlinger et al. Eur J Immunol. 2016
38	TIM-3	NFAT	negative	Human	cell line		Tomkowicz et al. PLoS One. 2015
39	-	Homeodomain Only Protein (Hopx)	negative	Mice			Jones et al. J Immunol. 2015
40	-	Eos	positive	Mice			Rieder et al. J Immunol. 2015
41	Silver nanoparticles, Gold nanoparticles	MAPK	negative	Human	cell line		Parnsamut et al. Genet Mol Res. 2015
42	-	4-1BB	positive	Mice			Oh et al. PLoS One. 2015
43	Interferon beta	cAMP responsive element modulator	negative	Mice			Otero et al. J Immunol. 2015
44		Cdk5	positive	Mice			Lam et al. Cell Cycle. 2015
45	T cell activation inhibitor, mitochondrial		negative	Mice			Vogel et al. J Immunol. 2015
46	MAPK Phosphatase 7	ERK	negative	Mice			Zhang et al. J. Immunol. 2015
47	-	ATG5	positive	Mice			Liu et al. Microbes Infect. 2015
48	-	Gas/cAMP Signaling	positive	Human	cell line, PBL		Hynes et al. J Mol Signal. 2015
49	-	DNA methylation	negative	Cat			Miller et al. J. Immunol. 2015
50	Tuberostemone O		negative	Mice			Jung Jang et al. Chem Biodivers. 2014
51	-	miRNA-155	positive	Human			Lashine et al. Lupus. 2015
52	IL-33		positive	Mice			Matta et al. J Immunol. 2014
53	PM2.5	Orai1, CaN-NFAT	negative	Human	cell line		Tong et al. Arch Environ Contam Toxicol. 2013
54		Ets-1	positive	Human	PBL		Tsao et al. Proc Natl Acad Sci USA. 2013
55	Ganoderma lucidum		positive	Human	PBMC		Habjanic et al. New Biotech. 2015
56	perfluorooctanesulfonic acid (PFOS)		negative	Human	cell line, PBL		Middgett et al. J Appl Toxicol. 2015
57	afatoxin B1		negative	Avian	<i>in vivo</i>		He et al. Biol Trace Elem Res. 2014
58		Ikaros	negative	Mice			O'Brien et al. J Immunol. 2014
59	anti-TNF antibodies		negative	Human	<i>in vivo</i>		Katz et al. Clin Res Hepatol Gastroenterol. 2014
60	Delphinidin	NFAT, Store-operated calcium entry	positive	Human	cell line		Jara et al. Cell Biochem Biophys. 2014
61	Acacia ferruginea		positive	Mice	<i>in vivo</i>		Sakthivel et al. Asian Pac J Cancer Prev. 2013
62		Ndfip1	negative	Mice			Ramos-Hernández et al. J. Immunol. 2013
63	Diphenyl Phosphine Oxide-1	Kv1.3 Potassium Channel	negative	Human	cell line		Zhao et al. PLoS One. 2013
64	TGN1412 (CD28 agonistic mAb)		positive	Human	PBMC		Eastwood et al. Br J Clin Pharmacol. 2013
65		CD39/Adenosine Pathway	negative	Human	PBL		Jenabian et al. PLoS Pathog 2013
66	Vitamin D3		negative	Human	PBL		Czifra et al. Rheumatol Int 2014
67	Benzo[a]pyrene	Nrf2 pathway	negative	Human	cell line		Murugaiyan et al. Toxicol Appl Pharmacol 2013
68	Aflatoxin B1		negative	Avian			Chen et al. Res Vet Sci 2013
69	H1N1 influenza		positive	Human			Weaver et al. PLoS One 2013
70		PKCα PKCβ	positive	mice			Lutz-Nicoladoni et al. Immunol Lett 2013
71		SF2/ASF	positive	Human			Moulton et al. Proc Natl Acad Sci U S A 2013
72		Oligodeoxynucleotides Expressing Polyguano	positive	Mice			Kobayashi et al. J Immunol 2013
73		MCPIP1, (ARE-independent)	negative	Human, Mice			Li et al. PLoS One 2012
74		microRNA-9/Blimp-1	positive(microRN	Human	PBL		Seddiki et al. Eur J Immunol 2012
75	Zinc		positive	mice	cell line		Daaboul et al. Metallomics 2012
76	Cimetidine		positive	mice			Jafarzadeh et al. J Immunotoxicol 2013
77		CaMK4	negative	Human, Mice			Koga et al. J Immunol 2012
78		GB Virus C Envelope Protein E2	negative	Human	cell line		Bhatarai et al. J Immunol 2012
79	Cyclophosphamide		negative	mice			Lee et al. Inflamm Res 2012

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	in vitro/ in vivo	in vivo effects	Reference
80		SJSZ glycoprotein (38 kDa)	positive	mice			Lee et al. Inflamm Res 2012
81		CD40-CD154 Signaling	positive	mice			Cuss et al. J Immunol 2012
82	TGF-β		negative				Das et al. Mucosal Immunol 2013
83	Zearalenone		positive	chicken			Wang et al. ScientificWorldJournal 2012
84	ulinastatin, docetaxel		positive	mice	primary xenografts		Zhong et al. Cancer Biother Radiopharm 2012
85		miR-9/Blimp-1	positive	microRNAs	human		Thiele et al. Eur J Immunol 2012
86		DNAM-1	positive	mice			Welch et al. Virology 2012
87		SJSZ glycoprotein (38 kDa)	positive	mice			Lee et al. Int Immunopharmacol 2012
88	diosgenin		negative	rat	brain		Ho et al. Chin J Physiol 2012
89	lipoteichoic acid		positive	human	PBMC		Mat et al. Int Immunopharmacol 2012
90	heparin-binding hemagglutinin (HBHA)		positive	human	PBMC		Loxton et al. Clin Vaccine Immunol 2012
91		IL-21	negative	Mice			Altridge et al. Blood 2012
92	Streptavidin		negative	Human	PBMC		Yomogida et al. Cytokine 2012
93	Manganese		negative	cock			Liu et al. Biol Trace Elem Res 2012
94	DNCB, DNFB, Oxazolone, Eugenol, α-hexylcinnamaldehyde, nickel sulfate, SDS, PABA, potassium bichromate, trimellitic anhydride, phthalic anhydride, sodium hexachloroplatinate		positive	(DNCB, DNFB, Oxazolone, Eugenol, α-hexylcinnamaldehyde, nickel sulfate, SDS, PABA), negative (potassium bichromate, trimellitic anhydride, phthalic anhydride, sodium hexachloroplatinate)	mice		Goutet et al. Toxicol Appl Pharmacol 2012
95		CREMa	negative	mice			Lippe et al. J Mol Cell Biol 2012
96	oxazolone, DNCB, PPD, cobalt chloride, isoeugenol, 2-MBT, Citral, Hexyl cinnamic aldehyde, Eugenol, Phenyl benzoate, Imidazolidinyl urea, ethylene glycol dimethacrylate, xylene, nickel chloride		positive	mice			Jung et al. Toxicol Lett 2012
97	Vernonia cinerea L. vernolide-A		positive	mice			Pratheeshkumar et al. Immunopharmacol Im
98		Ligation of the CD2 co-stimulatory receptor	positive	mice, human			Cheadle et al. Gene Ther 2012
99	NK026680		negative	rat			Shibasaki et al. Transpl Immunol 2012
100		IRF-4, c-Rel	positive	Human, M	cell line		Shindo et al. Cytokine 2011
101		Histone 3 Lysine 9 (H3K9) Methyltransferase	negative	mice			Wakabayashi et al. J Biol Chem 2011
102	Selenium		positive	chicken			Peng et al. Biol Trace Elem Res 2011
103	Ethanol		negative	Human	PBMC, cell line		Ghare et al. Alcohol Clin Exp Res 2011
104	Plasmodium berghei ANKA		positive	mice			Sarfo et al. Malar J 2011
105	vanadium		negative	Broiler			Deng et al. Biol Trace Elem Res 2011
106	live or inactivated NDV		negative	chicken			Balenović et al. Acta Vet Hung 2011
107		Runx1	negative	Mice			Wong et al. J Biol Chem 2011
108		Dictyostelium differentiation-inducing factors	(positive)	human	cell line		Takahashi et al. Life Sci 2011
109	Dynorphin A (1-17)		negative				Gein et al. Bull Exp Biol Med 2010
110	iron, retinol		positive	human			Sun et al. Asia Pac J Clin Nutr 2010
111		microRNA-181c	negative	Human	PBMC, cell line		Xue et al. Mol Immunol 2011
112		delta-like ligand 4 (DLI4)	negative	Mice			Jang et al. J Immunol 2010
113		TGM2 gene SNP rs4811528		human			Bradford et al. J Neuroimmunol 2011
114	hepatitis C virus non-enveloped capsid-1	p38 kinase	positive	human	PBMC, cell line		Serti et al. Cell Mol Life Sci 2011
115	Molybdenum		negative	Broiler			Xiao et al. Biol Trace Elem Res 2011
116	lupane-triterpene glycosides from Acanthopanax koreanum		positive				Nhiem et al. Bioorg Med Chem Lett 2010
117	oxazolone		positive	mice			Ahlfors et al. Scand J Immunol 2010
118	Cyclosporine A		negative	human	whole blood		Brandt et al. Cytometry A 2010
119	Enzymatic Extract from Ecklonia cava	NF-κB	positive	mice			Ahn et al. Mar Biotechnol 2011
120	Decalepis hamiltonii Wight and Arn		negative	mice, hum	cell line, PBMC		Ashalatha et al. J Ethnopharmacol 2010
121	Coenzyme Q10		negative	Human	PBMC		Bessler et al. J Nutr Sci Vitaminol 2010
122	TRAF6, TGF-β		positive	(TRAF6)	mice		Cejas et al. Blood 2010
123	ciprofloxacin	mitochondrial respiratory complex I	negative	human			Kaminski et al. J Immunol 2010
124	1α,25(OH)2D3		negative	Human	cell line		Mätiläinen et al. J Steroid Biochem Mol Biol
125	actinomycin D		negative	Human	cell line		Mätiläinen et al. J Steroid Biochem Mol Biol
126	Galpha12		positive	mice			Won et al. Biochem Biophys Res Commun 2010
127	zinc		positive	mice, hum	cell line, PBMC		Kaltenberg et al. Eur J Immunol 2010
128	Anti-IL-6 receptor antibody		negative	mice			Yoshida et al. Eur J Pharmacol 2010
129	TOM1L		positive	Human	cell line		Elmarghani et al. Mediators Inflamm 2009
130	Nodosin		negative	mice			Li et al. Am J Chin Med 2010
131	Silymarin		negative	mice			Charagozloo et al. Pharmacol Res 2010
132	microRNA-146a		negative	human	PBL		Curtale et al. Blood 2010
133	OD27		positive	mice			Peperzak et al. J Clin Invest 2010
134	ATP, P2X7 receptor, FAK, p38		positive	human	cell line		Yu et al. Am J Physiol Cell Physiol 2010
135	Liver Stage Antigen-1 (LSA-1) formulated with AS01 or AS02		positive	human			Cummings et al. Vaccine 2010
136	undeca-2E-ene-8,10-dienoic acid isobuty	PPAR γ	negative	Human	cell line		Spelman et al. International immunopharmacol
137	PTPN22		negative	human			Chuang et al. Genes and immunity 2009
138	CD44		positive	Human, Mice			Bollyky et al. J Immunol 2009
139	Dictyostelium-derived factors (DIFs)		negative	Human	cell line		Takahashi et al. Life Sci 2009
140	PD-1		negative	mice			Chikuma et al. J Immunol 2009
141	4-1BB		positive	human			Kassu et al. Clin Immunol 2009
142	Fluorine		negative	chicken			Chen et al. Biol Trace Elem Res 2009
143	ZEB1		negative	Mice	cell line		Wang et al. Int Immunol 2009
144	HIV Gag p24		positive	Human			Ndongala et al. Clin Immunol 2009
145	CCR5		positive	mice			Camargo et al. J Immunol 2009
146	melatonin receptor		positive	Human	cell line, PBMC		Lardone et al. Cell Mol Life Sci 2009
147	T-bet, IL-12, IFN-α		positive	(IFN-α), human	PBMC		Davis et al. J Immunol 2008
148	andrographolide		negative	Human	cell line		Carretta et al. Eur J Pharmacol 2009
149	xanthohumol		positive	mice	cell line		Choi et al. Int Immunopharmacol 2009
150	Fibrinogen-like protein 2/fibroleukin		positive	Human, Mice			Su et al. World J Gastroenterol 2008
151	Blimp-1		negative	mice			Wang et al. J Immunol 2008
152	BACH2		positive	Human			Lesniewski et al. Leukemia 2008
153	Flubendazole®, CGP 20376		positive	human			Saunders et al. Parasitol Res 2008
154	TSST-1	HDAC	negative	mice			Kametani et al. Immunol Lett 2008
155	Lipopolysaccharide, hypoxia/ischemia		positive	rat	microglia in neonatal brain		Girard et al. Neuroreport 2008
156	2-arachidonyl glycerol		negative	Human	cell line		Rockwell et al. Biochem Pharmacol 2008
157	PTPN22 R620W		positive	human			Lefvert et al. J Neuroimmunol 2008
158	Gastrin, secretin, GIP, VIP		positive/negative	Human	PBMC		Abdalla et al. Iran J Immunol 2008
159	Boerhaavia diffusa		positive	mice			Manu et al. J Exp Ther Oncol 2008
160	quercetin		negative	mice			Yu et al. Biochem Pharmacol 2008

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	<i>in vitro/ in vivo</i>	<i>in vivo effects</i>	Reference
161	Protein-bound polysaccharide K		positive	mice			Asai et al. Cancer Immunol Immunother 2001
162	paeonol		positive	mice			Sun et al. Eur J Pharmacol 2008
163	TGF-β		negative	Human	PBMC		Das et al. J Immunol 2008
164	IKK γ (NEMO)		positive	Human	cell line		Shifera et al. Mol Immunol 2008
165	NPe6 (photodynamic therapy)	GADD-45 α VEGF	positive				Ohtani et al. Int J Oncol 2008
166	SNPs upstream of the minimal promoter		positive	mice			del Rio et al. Genes Immun 2008
167	Amentoflavone		positive	mice			Guruvayoorappan et al. J Exp Ther Oncol 20
168	Nitric oxide		positive	mice			Niedbala et al. Proc Natl Acad Sci U S A 200
169	FR235222 (HDAC inhibitor)		negative	human	cell line		Matsuoka et al. Int Immunopharmacol 2007
170	histone deacetylase	HDAC4/N-CoR complex	positive	human	cell line		Matsuoka et al. Biochem Pharmacol 2007
171	hexosamine biosynthesis pathway		negative	human	cell line		Huang et al. Cell Immunol 2007
172	NF90		positive	mice			Shi et al. J Exp Med 2007
173	ganoderic acid Me		positive	mice			Wang et al. Int Immunopharmacol 2007
174	zymosan (particulate yeast preparation)	Syk-dependent ERK activation	positive	mice			Slack et al. Eur J Immunol 2007
175	Ku80, Ku70, NF90		positive (Ku80, N	human	cell line		Shi et al. Nucleic Acids Res 2007
176	ICER/CREM		negative	mice			Bodor et al. Eur J Immunol 2007
177	NF-ATc2 (the calcineurin-dependent transcription factor)		positive	human			Kytaris et al. J Immunol 2007
178	IL-4, IL-7, IL-12, IL-27, STAT5, STAT4, STAT6		negative	mice			Villarino et al. J Exp Med 2007
179	Blimp-1		negative	mice			Gong et al. J Immunol 2007
180	NAB2		positive	mice			Collins et al. J Immunol 2006
181	AMP-activated protein kinase (AMPK)		negative	human	cell line		Jhun et al. Biochem Biophys Res Commun 2
182	protein kinase D2 (PKD2)(serine/threonine kinase)		negative	human, M	cell line		Irie et al. Int Immunol 2006
183	Sodium arsenite		negative	mice			Conde et al. Arch Toxicol 2007
184	sulforaphane (a Naturally Occurring Isothiocyanate from Broccoli)		positive	mice			Thejass et al. Immunopharmacol Immunotoxicol
185	Soluble Mouse B7-H3		negative	mice			Xu et al. Cell Mol Immunol 2006
186	Protein Kinase C, Ras-ERK Pathway		positive	mice			Hickman et al. J Immunol 2006
187	Monoclonal anti-double-stranded DNA antibodies cross-react with phosphoglycerate kinase 1		negative	human	cell line		Luan et al. Clin Immunol 2006
188	B7-H4 (B7- family member)		negative	Human	PBMC		Mao et al. Acta Pharmacol Sin 2006
189	IL-27 (IL-6/IL-12 family cytokine)	SOCS3	negative	mice			Owaki et al. J Immunol 2006
190	α-tocopherol		positive (low dos	mice	splenocyte		Hsieh et al. Nutrition 2006
191	mercuric chloride		negative	mice			Santarelli et al. Int Immunopharmacol 2006
192	Commiphora mukul (medicinal plant)		negative	human, mice			Manjula et al. Int Immunopharmacol 2006
193	coagulin-H (Withanolide, naturally occurring steroidal lactones)		negative	human			Mesaik et al. Mol Immunol 2006
194	IL-27 (IL-6/IL-12 family cytokine)		negative	mice			Villarino et al. J Immunol 2006
195	Low Molecular Weight Thiols		positive	mice			Hadzic et al. J Immunol 2005
196	Wiskott- Aldrich syndrome protein		positive	mice			Cianferoni et al. J Allergy Clin Immunol 2005
197	HIV-2-Gag-p26		positive	human			Alatrakchi et al. Aids 2006
198	Chlamydia trachomatis		negative	Human			Wang et al. Clin Exp Immunol 2005
199	transforming growth factor-β-activated kinase 1 (TAK1)		positive				Sakurai et al. FEBS Lett 2005
200	RelA, T-βet		positive (RelA)/n	human			Hwang et al. J Exp Med 2005
201	CC-4047 (Actimid, Celgene, Immunomodulatory drugs (IMiDs))	AP-1	positive	Human			Payvandi et al. J Interferon Cytokine Res 20
202	Vilon, Epithalon, Cortagen (synthetic peptides)		positive	rat			Kazakova et al. Bull Exp Biol Med 2005
203	Protein phosphatase 2A (PP2A)		negative	Human			Katsiari et al. J Clin Invest 2005
204	SOCS2		positive	Human			Tannahill et al. Mol Cell Biol 2005
205	2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP)		Negative	mice			Yun et al. Toxicology 2006
206	simian immunodeficiency virus	MAP kinase	positive	human			Muckenfuss et al. Mol Immunol 2006
207	Kruppel-like factor 2 (zinc finger transcription factor)		positive				Wu et al. J Immunol 2005
208	Melatonin		positive	human	cell line		Lardone et al. J Cell Physiol 2006
209	C-type lectin OCILRP2/Clr-g and its ligand NKR1F costimulate		positive	mice			Tian et al. Cell Immunol 2005
210	Dendritic cell (DC)-specific intercellular cell adhesion molecule-3 (ICAM-3)-grabbing non-integrin (DC-SIGN)		positive	human	cell line, PBMC		Martinez et al. Int Immunol 2005
211	Andrographolide (main labdane diterpene present in Andrographis paniculata)		negative	mice			Burgos et al. Planta Med 2005
212	5-aminoimidazole-4-carboxamide ribonucleoside (AICAR)(the dephosphorylated form of AICAR ribotide (also termed "ZMP"), an intermediate of purine biosynthesis)	GSK-3 phosphorylation ↓, NF-AT activation ↓	negative	Human	cell line		Jhun et al. Biochem Biophys Res Commun 2
213	histone H3 acetylation		positive	mice			Wang et al. Biochem Biophys Res Commun
214	Systemic lupus erythematosus serum IgG	OREM, CaMKIV	negative	human			Juang et al. J Clin Invest 2005
215	Anthrax lethal toxin	MAPK ↓	negative	human	cell line		Fang et al. J Immunol 2005
216	Signals from CD28		positive	mice			Thomas et al. J Immunol 2005
217	IFN-γ		negative	mice		CTL ↓	Hidalgo et al. Am J Transplant 2005
218	Splice Variant of the TCR ζ mRNA Lacking Exon 7		negative	human	cell line		Tsuzaka et al. J Immunol 2005
219	adenosine A2A receptor		negative	mice		reduced CD4 Th1 and CD8 Tc1 cell expansion to alloantigen, reduced antigen-specific CD4 Th1 cell numbers	Erdmann et al. Blood 2005
220	Cyclosporin A	NF-κB/RelA activation induced by CD28 costimulatory signaling ↓	negative	human			Nishiyama et al. Int Immunopharmacol 2005
221	TGF-β1	Smad3	negative	mice			McKarns et al. J Immunol 2005
222	CD40/CD40L interaction		positive	mice		Treg ↑	Guiducci et al. Eur J Immunol 2005
223	CD45 signals outside of lipid rafts		positive	mice	cell line		Zhang et al. J Immunol 2005
224	Arginine methylation, protein arginine methyltransferases		positive	human	cell line		Richard et al. Biochem J 2005
225	Tristetraprolin		negative	Human, Mice			Ogilvie et al. J Immunol 2005
226	CD28	PI3K	positive	mice			Sanchez-Lockhart et al.
227	IFN-β	GD28/CTLA-4-mediated pathway	negative	human			Espejo et al. Mult Scler 2004
228	Docosahexaenoic Acid (DHA)		negative	mice			Fan et al. J Immunol 2004
229	low-density shock waves (LDSWs)		positive				Yu et al. Acta Biochim Biophys Sin 2004
230	Caspase		positive	human	cell line		Falk et al. J Immunol 2004
231	catecholamine		negative	rat			Peng et al. Acta Pharmacol Sin 2004
232	TNF Receptor Type-2 (p75)		positive	mice			Kim et al. J Immunol 2004
233	IL-15		positive	Human, Mice			Feau et al. Blood 2005
234	Ceramide		negative	human	cell line		Abboushi et al. J Immunol 2005
235	Trypanosoma cruzi membrane mucin AgC10		negative	mice			Alcaide et al. Int Immunol 2004
236	Wiskott-Aldrich Syndrome Protein		positive	mice			Cannon et al. J Immunol 2004
237	p38 MAPK		negative	human	PBMC		Veiopoulou et al. Neuroimmunomodulation ;
238	Phosphorylated Protein Kinase A-R11 β		negative	human	cell line, PBMC		Elliott et al. J Immunol 2004
239	Mercury, Lead, Cadmium		positive (Cadmium	human	cell line		Colombo et al. Clin Immunol 2004
240	killed Salmonella enteritidis vaccine		positive	chicken			Okamura et al. Comp Immunol Microbiol Infect

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	in vitro/ in vivo	in vivo effects	Reference
241	Helicobacter pylori vacuolating toxin (VacA)		negative	human	PBMC		Sundrud et al. Proc Natl Acad Sci U S A 2004
242	acetylcholine		positive	rat			Qui et al. Lymphology 2004
243	Carbon Monoxide		negative	human	PBMC	T Cell Proliferat	Pae et al. J Immunol 2004
244	Immunophilin ligand (cyclosporin A, FK506 and rapamycin)		negative	rat	astrocyte		Gabryel et al. Pol J Pharmacol 2004
245	North American ginseng (Panax quinquefolium)		positive	mice			Wang et al. Int Immunopharmacol 2004
246	retinoic acid		positive	human	PBMC		Engedal et al. Int Immunol 2004
247	Schnurri-3 (zinc finger transcription factor recognition component, KRC)		positive	human, mice	cell line		Oukka et al. J Exp Med 2004
248	Cimetidine		positive	human		lesional skin of viral warts	Mitsuishi et al. Eur J Dermatol 2003
249	Experimental Respiratory Syncytial Virus Infection		positive	mice			Chang et al. J Immunol 2004
250	Vaccinia Virus-Infected Cells	NF-90 translocation	positive	human	cell line		Langland et al. J Interferon Cytokine Res 2003
251	Protein kinase Cbeta 1		positive	human	cell line		Dreikhausen et al. Int Immunol 2003
252	IKK $\gamma$ /NEMO		positive	human	cell line		He et al. Eur J Immunol 2003
253	CD28, ICOS		positive	human	PBMC		Parry et al. J Immunol 2003
254	Sodium arsenite		negative	human	PBMC	proliferation of PHA-activated T cells ↓	
255	high flaxseed diet (rich in $\alpha$ -linolenic acid)		no change	Rat	spleen cell	Concanavalin A	Babu et al. Food Chem Toxicol 2003
256	sesquiterpene lactone (traditional medicine)		negative	human	whole blood		Humar et al. Biochem Pharmacol 2003
257						type 1 diabetes	
258	YM-58483 (Pyrazole Derivative)		negative	human	cell line		Ozer et al. J Pediatr Endocrinol Metab 2003
259	c-Rel		positive	mice			Ishikawa et al. J Immunol 2003
260	SS-A/Ro52		positive	human	cell line	Sjögren's syndr	Rao et al. J Immunol 2003
261	cAMP response element modulator (CREM)		negative	human	PBMC		Ishii et al. J Immunol 2003
262	Extracellular ATP		positive	mice	antigen-specific T cells		Tenbrock et al. J Immunol 2003
263	melatonin, PGE2		positive (melatonin)	human	PBMC		Langston et al. J Immunol 2003
264	filarinasis		positive	human	serum		Carrillo-Vico et al. Faseb J 2003
265	Bovine Leukemia Virus		negative	Cow	CD4+ T Cells		el-Sharkawy et al. J Egypt Soc Parasitol 2003
266	Retinoic Acid		positive	human	PBMC		Amills et al. Virology 2002
267	cAMP response element modulator (CREM)		negative	human	PBMC		Ertesvag et al. J Immunol 2002
268	interferon alpha-2b		positive	human	serum		Tenbrock et al. J Immunol 2002
269	DOCK2		positive	human	cell line		Mazur et al. Med Sci Monit 2001
270	E55+ murine leukemia retrovirus		negative	mice			Nishihara et al. Biochem Biophys Res Commun
271	fibroblast growth factor receptor 1 upon its engagement by CD56		positive	human	cell line		Elrefaie et al. Virology 2002
272	FR900482, FK317		positive (FR900482)	human	cell line	Vascular Leak ↓	Kos et al. Immunol Cell Biol 2002
273	Shc	c-Rel	positive	human	cell line		Beckerbauer et al. Chem Biol 2002
274	NFAT		positive	human			Iwashima et al. Proc Natl Acad Sci U S A 2002
275	Vomitoxin (deoxynivalenol)	NRE-A ↓	positive	mice	cell line		Oum et al. Mol Cells 2002
276	IL-1b		positive	human	cell line		Yang et al. Toxicology 2002
277	cannabinol		positive	mice	cell line		Rodriguez-Juan et al. Tissue Cell 2001
278	IL-4	PPAR $\gamma$ , 12/15-Lipoxygenase Ligands	negative	human	PBMC		Jan et al. Mol Pharmacol 2002
279	CD3 $\zeta$ Signaling and CD28 Costimulation		positive	human	cell line		Yang et al. J Biol Chem 2002
280	HIV protease inhibitor		negative	human			Hombach et al. J Immunol 2001
281	Antithrombin III		negative	human, rat			Lucia et al. AIDS 2001
282	LFA-1		positive	mice			Zuo et al. Transpl Immunol 2001
283	calpain (calcium-activated neutral proteinase)		negative	human	PBMC		Abraham et al. J Immunol 2001
284	Vitamin E		positive	mice			Schaecher et al. J Neuroimmunol 2001
285	Glucocorticoid, Cyclosporine	IkBa	positive	human	PBMC		Adolfsson et al. J Immunol 2001
286	condyloma acuminata		negative	human	PBMC		Briggs et al. J Clin Pharmacol 1999
287	Caspase, Calceinurin		positive	human	cell line		Liu et al. J Tongji Med Univ 2001
288	C3-like chimeric toxin, Clostridium difficile toxin B		negative	mice			Mukerjee et al. Biochem Biophys Res Commun
289	estrogen		positive	mice			Dreikhausen et al. Eur J Immunol 2001
290	Ly49A		negative	mice	cell line		Karpuzoglu-Sahin et al. Cytokine 2001
291	Microcystin		negative	mice		down-regulation of lymphocyte functions	Roger et al. J Immunol 2001
292	Protein Kinase A, Protein Kinase A RI beta Subunit		positive	Human	PBMC		Yea et al. Toxicol Lett 2001
293	Tat, repressor complex containing NF-IL6, JunB, c-Fos and Fra-1		positive (Tat), ne	Human	PBMC		Khan et al. J Immunol 2001
294	tyrosine kinase inhibitor XR774		negative	human	cell line, PBMC		Ehret et al. Eur J Immunol 2001
295	zeta chain		positive	Human	PBMC		Sadeghi et al. Int Immunopharmacol 2001
296	Ortho-b-Hydroxy-Ethyl Rutosides (HR)		positive	human	serum		Frydecka et al. Br J Cancer 2001
297	Protein Kinase C- $\theta$	Cyclic AMP-Responsive Element-Binding Protein (CREB)	positive	Human	PBMC		de Schenquer et al. Arch Med Res 2001
298	Antibodies recognizing CD24 leucine-alanine-proline (LAP) epitope		positive	human			Solomou et al. J Immunol 2001
299	Akt		positive	mice			Salamone et al. J Leukoc Biol 2001
300	Melatonin		positive	human	cell line		Kane et al. Nat Immunol 2001
301	IL-5		negative	Rat			Guerrero et al. Ann N Y Acad Sci 2000
302	Tat		negative	human	cell line		He et al. Transplant Proc 2001
303	paracoccidioidomycosis		negative	human	PBMC		Gonzalez et al. J Immunol 2001
304	exogenous corticosterone or restraint stress		negative	mice			Benard et al. Cytokine 2001
305	Eukaryotic translation initiation factor (eIF)-6		positive	Human, M	cell line		Pruett et al. J Toxicol Environ Health A 2001
306	dehydroepiandrosterone (DHEA)		positive	human	spleen cell		Oh et al. J Immunol 2001
307	HBeAg		positive	human	serum		Young et al. Clin Exp Immunol 2001
308	Gangliosides GD1b, GT1b, and GQ1b		positive	human	cell line		Bozkaya et al. Hepatogastroenterology 2000
309	Ah receptor		positive	mice			Kanda et al. J Immunol 2001
310	Theiler's Murine Encephalomyelitis Virus		positive	mice			Jeon et al. J Immunol 2000
311	Coinfection with Borrelia burgdorferi and the agent of human granulocytic ehrlichiosis		negative	mice			Chang et al. Virology 2000
312	IL-18		positive	human			Zeidner et al. Parasite Immunol 2000
313	Adrenocorticotrophic hormone (ATCH)		positive	mice	cell line		David et al. Aids 2000
314	C/EBPb		negative	Human, Mice			Wermerskirchen et al. Life Sci 2000
315	N-acetylsphingosine		positive	rat			Berberich-Siebelt et al. Eur J Immunol 2000
316	Viscum album extract		positive	human	PBMC		Pahlavani et al. Immunopharmacology 2000
317	TGF- $\beta$ 1		positive (low dose)	mice			Kovacs et al. Biomed Pharmacother 2000
318	cigarette smoke extracts		negative	human	PBMC		McKarns et al. Immunopharmacology 2000
319	Novel Basic Leucine Zipper p21 <sup>SMT</sup> Protein		negative	human	cell line		Ouyang et al. J Allergy Clin Immunol 2000
320	CD28, LFA-1		positive	human			Iacobelli et al. J Immunol 2000

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	in vitro/ in vivo	in vivo effects	Reference
321	Garlic Extracts		positive	Rat		Proliferation of	Colic et al. Immunopharmacol Immunotoxic
322	Nodularin (cyclic peptide produced by cyanobacteria)		negative	mice			Yea et al. Toxicol Lett 2000
323	Vav1		positive	human			Hofmann et al. Oncogene 2000
324	high-mobility group I(Y) (HMGI(Y)) family		positive	human	cell line. PBMC	T Cell Proliferat	Himes et al. J Immunol 2000
325	VIP, PACAP (neuropeptides)	c-Jun 1, JunB 1	negative	mice			Wang et al. J Neuroimmunol 2000
326	Nitric oxide	Zinc Finger Transcription Factors Sp1, EGR-1	negative	mice			Berendji et al. Mol Med 1999
327	Thalidomide		positive	human			Shannon et al. Immunopharmacology 2000
328	CD28		positive	human			Appleman et al. J Immunol 2000
329	Filgrastim		negative	human			Hartung et al. J Hematother Stem Cell Res 1
330	isoproterenol		negative	human			Aihara et al. Biol Cell 1999
331	SLP-76 Cooperativity with FYB/FYN-T		positive	human	cell line		Geng et al. J Immunol 1999
332	IκB		negative	human	cell line		Khoshnan et al. J Immunol 1999
333	Jak3		positive	mice			Thomas et al. J Immunol 1999
334	nitiol (A novel sesterterpenoid)		positive	human	cell line		Kawahara et al. Chem Pharm Bull 1999
335	MuLV-Induced Lymphoma		negative	mice			Beatty et al. Virology 1999
336	satratoxins and other macrocyclic trichothecenes		positive	mice	cell line		Lee et al. J Toxicol Environ Health A 1999
337	ADP-Ribosylation of Rho by C3 Ribosyltransferase		negative	human	cell line		Angkachatchai et al. J Immunol 1999
338	IL-1	p42/p44 and p38 mitogen-activated protein kin	positive	mice	cell line		Matthews et al. Cytokine 1999
339	measles infection		negative	human	PBMC		Vinante et al. Haematologica 1999
340	HIV-exposed seronegative subjects		negative	human	PBMC		Nicastri et al. Aids 1999
341	HIV		negative	human	PBMC		Hong et al. Rev Inst Med Trop Sao Paulo 199
342	morphine		negative	rat			Gomez-Flores et al. J Interferon Cytokine Re
343	Tec kinase		positive	human	cell line		Yang et al. Eur J Immunol 1999
344	Recombinant Hepatitis C Virus Antigen		negative	human			Eckels et al. Hum Immunol 1999
345	Prostaglandin E2		negative	rat			Choudhry et al. Immunol Lett 1999
346	Fibroblast Growth Factor-1 (FGF-1)		positive	human	cell line		Byrd et al. J Immunol 1999
347	p-bromophenacyl bromide and arachidonyl trifluoromethyl ketone (Phospholipase A2 inhibitors)		negative	mice	spleen cell		Ouyang et al. Arch Toxicol 1999
348	Histamine	protein kinase A	negative	mice	spleen cell		Poluektova et al. Immunopharmacology 1999
349	Soluble Allo-MHC Class I Antigen		negative	rat			Geissler et al. Transplant Proc 1999
350	IL-1b, TGF-b		positive	mice	cell line		Siese et al. Scand J Immunol 1999
351	Ebola Virus Infection		positive	human			Villinger et al. J Infect Dis 1999
352	CD4		negative	mice			Bonnard et al. J Immunol 1999
353	Protein Kinase C-θ		positive	human	cell line		Ghaffari-Tabrizi et al. Eur J Immunol 1999
354	Propranolol		negative	mice	cell line		Zhao et al. Toxicol Appl Pharmacol 1999
355	melatonin		positive	human	PBMC		Garcia-Maurino et al. J Neuroimmunol 1998
356	L-deprenyl (irreversible monoamine oxidase-B inhibitor)		positive	rat		accompanies re	ThyagaRajan et al. J Neuroimmunol 1998
357	galection-1		no change	mice	thymocyte		
358	reactive oxygen species (ROS)		positive	human	PBMC		Tatta et al. Free Radic Biol Med 1999
359	RORgt		negative				He Immunity 1998
360	Transforming Growth Factor-Beta 1 (TGF-b1)		positive	mice	cell line		Han et al. J Pharmacol Exp Ther 1998
361	RE/AP		positive	human	cell line		Shapiro et al. J Immunol 1998
362	3BP2 (Syk Kinases-Interacting Protein, SKIPs)		positive	human	cell line		Deckert et al. Immunity 1998
363	Tpl-2		positive	Human, M	cell line		Tsatsanis et al. Oncogene 1998
364	Jun-N-terminal kinases (JNK)		positive	Human, M	cell line		Barz et al. J Immunol 1998
365	IL-1 receptor-associated protein kinase (IRAK)		positive	mice	cell line		Knop et al. Eur J Immunol 1998
366	Nit-2-a (zinc finger protein)		negative	mice			Pucci et al. Int Immunol 1998
367	surfactant-associated protein D (SP-D)		negative	human	PBMC		Borron et al. J Immunol 1998
368	Caspase-3-Like Activity		positive	human	cell line		Posmantur et al. Exp Cell Res 1998
369	ICAM-1		positive	human	PBMC		Labuda et al. Immunology 1998
370	Okadaic Acid-Sensitive Serine/Threonine Phosphatases		positive	Human, Mice			Nebf et al. J Immunol 1998
371			negative	mice	T cells with CD4-CD8- (double		Liang et al. J Biomed Sci 1998
372	V7 (CD101) Ligation		negative	human	PBMC		Soares et al. J Immunol 1998
373	Calcineurin	PKC-theta	positive	human	cell line		Werlen et al. EMBO J 1998
374	CD4 mAb		negative	human	PBMC		Woods et al. Cell Immunol 1998
375	staphylococcal enterotoxin B		positive				Assenmacher et al. Eur J Immunol 1998
376	CD2		positive	Human, M	PBMC, LPMC		Gonsky et al. J Immunol 1998
377	ZEB		negative	mice	cell line		Yasui et al. J Immunol 1998
378	acid sphingomyelinase		positive (secretor	mice			Stoffel et al. Eur J Immunol 1998
379	Delta-opioid receptors (DOR1)		positive	human	cell line		Hedin et al. J Immunol 1997
380	gp41 Envelope Protein of Human Immunodeficiency Virus	IL-10 1	negative	human	PBMC		Barcova et al. J Infect Dis 1998
381	LFA-1		positive	mice			Zuckerman et al. J Immunol 1998
382	Ly6C		negative	mice			Yamanouchi et al. Eur J Immunol 1998
383	OBF-1 (OCA-B, Bob-1)		no change	mice			Sauter et al. Immunobiology 1997
384	Vomitoxin (Deoxynivalenol)		positive	mice	cell line		Li et al. Toxicol Appl Pharmacol 1997
385	Perillic Acid		negative	Human	cell line. PBMC		Schulz et al. Biochem Biophys Res Commun
386	caloric restriction		positive				Pahlavani et al. Front Biosci 1998
387	Somatostatin		positive	human	cell line		Cardoso et al. J Cell Biochem 1998
388	CD55 (the glycosylphosphatidylinositol (GPI)-anchored)		positive	human	cell line		Tosello et al. J Inflamm 1998
389	human chorionic gonadotropin (hCG)		positive (low dos	human	PBMC		Komorowski et al. Immunol Lett 1997
390	Rap1		negative	human	cell line		Boussiotis et al. Science 1997
391	Lck SH2 Phosphotyrosine Binding Site		positive				Lewis et al. J Immunol 1997
392	Lck		positive				Chung et al. J Immunol 1997
393	Cot		positive	human	cell line		Ballester et al. J Immunol 1997
394	GABP	c-Raf	positive				Avots et al. Mol Cell Biol 1997
395	Melatonin		positive	human	PBMC		Garcia-Maurino et al. J Immunol 1997
396	Morphine		negative	mice			Roy et al. Cell Immunol 1997
397	CD28	CD28RE and NF-IL-2B AP-1 Sites	positive	human	cell line		Shapiro et al. Mol Cell Biol 1997
398	Splenopentin analogs		positive	human	PBMC		Biswas et al. Int J Immunopharmacol 1997
399	SB203580 (p38 MAP kinase inhibitor)		negative	human	PBMC		Ward et al. Biochem Soc Trans 1997
400	Phytolacca acinosa polysaccharides I		positive (once a	mice			Wang et al. Immunopharmacol Immunotoxic

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	in vitro/ in vivo	in vivo effects	Reference
401	lipid emulsion (Intralipid)		negative	human	CBMC		Sirota et al. Acta Paediatr 1997
402	thalidomide		positive	human	PBMC		Shannon et al. Immunopharmacology 1997
403	nitric oxide		negative	mice			Taylor-Robinson et al. Immunol Cell Biol 1995
404	Semliki Forest virus (SFV-A7) and bacterial lipopolysaccharide (LPS)		positive	mice			Yang et al. Scand J Immunol 1997
405	human pooled g-globulin for intravenous use (hIVIG)		negative	human	PBMC		Modiano et al. Clin Immunol Immunopathol 1997
406	immunoglobulin		negative	human	PBMC		Nachbaur et al. Immunology 1997
407	Copper		positive	human	cell line		Hopkins et al. J Nutr 1997
408	anti-CD26 antibodies	DP IV/CD26	positive				Reinhold et al. Adv Exp Med Biol 1997
409	luteinizing hormone alpha-subunit		no change	human	PBMC		Komorowski et al. Cytobios 1997
410	Beryllium		positive	human	BAL cell		Tinkle et al. J Immunol 1997
411	catalytic subunit C alpha of cyclic AMP-dependent protein kinase		positive	mice	cell line		Sugiyama et al. J Immunol 1997
412	leflunomide		negative				Cao et al. Transplant Proc 1996
413	titanium, cobalt, and chromium		negative	human	PBMC		Wang et al. J Biomed Mater Res 1996
414	12-O-TETRADECANOYL PHORBOL-13-ACETATE, OKADAIC ACID		negative	bovine			Grove et al. Cytokine 1996
415	Dexamethasone		negative	human	CBMC, PBMC		Bessler et al. Arch Dis Child Fetal Neonatal 1996
416	High Mobility Group Protein I(Y)		positive	human	cell line		Himes et al. Immunity 1996
417	c-rel		positive	human	cell line		Shapiro et al. J Exp Med 1996
418	catalytic domain of pp56(lck)		positive	human	cell line		Carrera et al. J Immunol 1996
419	BCG vaccination		positive	human			Ferreira et al. Tuber Lung Dis 1996
420	Phosphorylation of each of the distal three tyrosines of the CD28 cytoplasmic tail		positive	human	cell line		Teng et al. Tissue Antigens 1996
421	Ixodes ricinus Ticks, Tick Salivary Gland Extracts		positive	mice			Ganapamo et al. Scand J Immunol 1996
422	Histamine	reactive oxygen metabolites ↓, IFN-γ ↓	negative	human			Houze et al. Cell Biol Int 1996
423	Tricyclic antidepressants		negative	human	PBMC		Xia et al. Immunopharmacology 1996
424	Pityrosporum ovale		negative	human	PBMC		Neuber et al. Arch Dermatol Res 1996
425	candidiasis		negative	human	PBMC		Lilic et al. Clin Exp Immunol 1996
426	HTLV-I Tax	NF-AT complex	positive	human	cell line		Good et al. Embo J 1996
427	Sublethal levels of oxidative stress	c-jun ↑	negative	human	cell line		Beiqing et al. J Immunol 1996
428	surfactant-associated protein A (SP-A)		negative	human	cell line, PBMC		Borron et al. Am J Respir Cell Mol Biol 1996
429	Nitric Oxide		no change	mice			Marcinkiewicz et al. J Immunol 1996
430	Elevated glucose levels		negative	human	PBMC		Reinhold et al. Horm Metab Res 1996
431	Vav and SLP-76		positive	human	cell line		Wu et al. Immunity 1996
432	Vomitoxin		positive	mice			Ouyang et al. Toxicol Appl Pharmacol 1996
433	Cannabinoid		negative	mice	cell line		Condie et al. J Biol Chem 1996
434	S-Oxalylglutathione		negative	bovine	cell line		Grove et al. Exp Cell Res 1996
435	S-Oxalin, N-Acetyl-S-oxalylcysteamine		negative	bovine	cell line		Grove et al. Biochem Biophys Res Commun 1996
436	Trichostatin A (a potent inhibitor of mammalian histone deacetylase)		negative	human	cell line		Takahashi et al. J Antibiot 1996
437	pertussis toxin and PGE2		negative	mice	cell line		McCarthy et al. Biochem Soc Trans 1996
438	MEK1, ERK1, ERK2		positive	human, mice	cell line		Whitehurst et al. J Immunol 1996
439	CREB		positive	mice			Barton et al. CREB IL-2 1996
440	lymphocytic choriomeningitis virus		positive	mice			Cousens et al. J Immunol 1995
441	cAMP	NF-AT ↓	negative	mice	cell line		Tsuruta et al. J Allergy Clin Immunol 1995
442	Friend Immunosuppressive virus-2 (FIS-2)		negative	mice		induces a Th1	Faxvaag et al. Clin Exp Immunol 1995
443	Prostaglandin E2		negative	Human			Katamura et al. J Immunol 1995
444	17β-oestradiol		negative	Human			Evagelatou et al. Endocrine 1995
445	Thalidomide		positive	human	PBMC		Shannon et al. Immunopharmacology 1995
446	CD44		positive	mice			Sommer et al. Int Immunol 1995
447	Chloroquine		negative	Human			Landewe et al. Clin Exp Immunol 1995
448	syphilis		positive(primary)	human	PBMC		Podwinska et al. FEMS Immunol Med Microbiol 1995
449	reactiveoxygen productionby 5-lipoxygenase		positive	human	PBMC		Los et al. EMBO J 1995
450	Prothymosin alpha 1		positive	human	PBMC		Eckert et al. Int J Immunopharmacol 1995
451	vomitoxin (deoxynivalenol) and cycloheximide		positive	mice			Azcona-Olivera et al. Food Chem Toxicol 1995
452	cationic staphylococcal proteins		positive	human	PBMC		Jahreis et al. Clin Exp Immunol 1995
453	wortmannin (PI3K inhibitor)		positive / negative	human	cell line		Ueda et al. Int Immunol 1995
454	cAMP	NF-AT ↓	negative	mice	cell line		Tsuruta et al. J Immunol 1995
455	Indomethacin		positive	human	PBMC		Tsuboi et al. Cytokine 1995
456	Herpesvirus Saimiri		positive	human	cell line		Chou et al. Virology 1995
457	WIN 61058 and WIN 53071	NF-AT ↓	negative	human	cell line		Baine et al. J Immunol 1995
458	glycyrrhizin		positive	mice			Zhang et al. Cell Immunol 1995
459	ETS1		negative	human	cell line		Romano-Spica et al. J Immunol 1995
460	dehydroepiandrosterone		positive	human	PBMC		Suzuki et al. Clin Exp Immunol 1995
461	Helicobacter pylori		positive	human	PBMC		Fan et al. Mediators Inflamm 1995
462	IL-1		positive	mice			Brigelius-Flohe et al. Biofactors 1995
463	gold salts		negative	human	serum		Lewandowicz et al. Arch Immunol Ther Exp 1995
464	Morphine		negative				Roy et al. Adv Exp Med Biol 1995
465	Octamer factors		positive	human, mice	cell line		Pfeuffer et al. J Immunol 1994
466	thymic shared antigen-1(TSA-1)		negative	mice			Kosugi et al. Int Immunol 1994
467	SK&F 96365		negative	human	cell line		Chung et al. Br J Pharmacol 1994
468	c-fos		positive	mice			Ochi et al. J Immunol 1994
469	vasoactive intestinal peptide (VIP)		negative	mice	thymocyte		Xin et al. J Neuroimmunol 1994
470	IL-1, IFNα		positive	human	cell line		Holan et al. Cell Immunol 1994
471	c-Jun		positive	human	cell line		Petrak et al. J Immunol 1994
472	Multiple glycosylphosphatidylinositol-anchored Ly-6 molecules and transmembrane Ly-6E		negative	mice	cell line		Fleming et al. J Immunol 1994
473	Immunization with irradiated Plasmodium berghei sporozoites		positive	mice			White et al. Parasite Immunol 1994
474	cAMP		negative	mice			Lacour et al. Int Immunol 1994
475	inositol phosphate release		positive	human	PBMC		Bryan et al. Cell Immunol 1994
476	TRANSFORMING GROWTH FACTOR-β1 (TGF-β1)		negative	human	PBMC		Reinhold et al. Cytokine 1994
477	nymphal Ixodes ricinus ticks		positive	mice			Mbow et al. Cell Immunol 1994
478	glycosphingolipids						Montero et al. Transplant Proc 1994
479	okadaic acid		positive	mice	cell line		Falk et al. Lymphokine Cytokine Res 1994
480	eukaryotic initiation factor 4E (eIF-4E)		positive	mice	spleen cell		Barve et al. J Immunol 1994

No	Chemical	Biochemical pathway	Action to IL-2 production	Animal	in vitro/ in vivo	in vivo effects	Reference
481	human beta 2-microglobulin		negative	mice	cell line		Claesson et al. Immunol Lett 1994
482	cimetidine		positive	Rat	spleen cell		Ding et al. J Tongji Med Univ 1994
483	outer membrane proteins (OMP) from Shigella		positive	mice	spleen cell		Czarny et al. Arch Immunol Ther Exp 1994
484	cyclosporine		negative	human			Salom et al. Transplantation 1993
485	Ly-6A/E		negative	mice			Codias et al. J Immunol 1993
486	thyrotropin (TSH)		positive	human	PBMC		Komorowski et al. Horm Metab Res 1993
487	IL-4		negative	human	PBMC etc.		Colquhoun et al. J Surg Res 1993
488	Trichinella spiralis infection		positive	rat	milk cell		Na et al. J Reprod Immunol 1993
489	prostaglandin E2 (PGE2)		negative	mice	thymocyte		Daculsi et al. Immunol Lett 1993
490	5-lipoxygenase (5-LO) inhibitor, A-63162		negative	human	PBMC		Alfuru et al. J Leukoc Biol 1993
491	Treponema pallidum		negative	rabbit	PBMC		Podwinska et al. FEMS Immunol Med Microbiol 1993
492	42,000MW ERK and a 100,000MW protein		positive	human	cell line		Song et al. Immunology 1993
493	vasoactive intestinal peptide (VIP)		negative	mice			Sun et al. J Neuroimmunol 1993
494	Pentoxifylline		negative	human	PBMC		Thanhauser et al. Immunology 1993
495	vasoactive intestinal peptide (VIP)		negative	mice			Ganea et al. J Neuroimmunol 1993
496	substance P and related tachykinins		positive	mice			Rameshwar et al. J Immunol 1993
497	Schistosoma mansoni		positive	mice			Keisari et al. Immunobiology 1993
498	Dipeptidyl peptidase IV (CD26)		positive	human	PBMC		Reinhold et al. Immunobiology 1993
499	IL-10		negative	human	PBMC		de Waal Malefyt et al. J Immunol 1993
500	c-fos synthesis and increased Fos content of AP-1		positive	human	PBMC		Hughes et al. J Immunol 1993
501	glucocorticoid	AP-1 ↓, NF-AT ↓	negative	human	PBMC		Paliogianni et al. J Clin Invest 1993
502	antigens extracted from Dermatophagoides pteronyssinus (Dp)		positive	human	PBMC		Kubota et al. J Dermatol 1993
503	D. pteronyssinus		positive	human	PBMC		McHugh et al. Clin Exp Allergy 1993
504	IL-1a, IL-1b, IFN-a, TNF-a, IFN-b, TNF-b		positive, negative	human	cell line		Holan et al. Folia Biol 1993
505	rolipram, a PDE-IV inhibitor, and CI-930, a PDE-III inhibitor		no change	human	cell line		Lewis et al. Agents Actions 1993
506	the K+ channel blocker, charybdotoxin (ChTX)		negative	human	PBMC		Freedman et al. J Immunol 1992
507	IL-4 in schistosomiasis mansoni		positive	mice			Yamashita et al. J Immunol 1992
508	p21 ras		positive	mice	cell line		Rayler et al. EMBO J 1992
509	interactions between LFA-1/ICAM-1		positive	mice			Reginald et al. Immunol Lett 1992
510	factor VIII concentrates		negative				Wadhwa et al. Br J Haematol 1992
511	trypanosomiasis		negative	mice	spleen cell	restored by N-a	Calabresi et al. Int J Immunopharmacol 1992
512	benzene via drinking water		negative	mice	spleen cell num		Fan et al. Nihon Ika Daigaku Zasshi 1992
513	FK506 and rapamycin		negative				Hanke et al. Lymphokine Cytokine Res 1992
514	Trypanosoma cruzi		negative	mice			Soong et al. J Immunol 1992
515	Ly-6A/E		positive	mice	cell line		Codias et al. J Immunol 1992
516	B7		positive	human	cell line		Norton et al. J Immunol 1992
517	streptozotocin		negative	mice		diabetes	Burkart et al. Int J Immunopharmacol 1992
518	thymopentin (TP5)		positive	mice			Cillari et al. Int J Immunopharmacol 1992
519	Theileria parva		positive		cell line		Heussler et al. J Immunol 1992
520	Substance P		positive	human	cell line, PBMC		Calvo et al. J Immunol 1992
521	Prostaglandin E2 and other cyclic AMP-elevating agents		negative	human	PBMC		Anastassiou et al. J Immunol 1992
522	cyclosporine-A		negative	human	cell line		Williams et al. J Immunol 1992
523	surface sulphhydryl groups		no change	human	PBMC		Smith et al. Clin Exp Immunol 1992
524	Schistosoma mansoni infection		positive	mice			Henderson et al. J Immunol 1992
525	Cyclosporin A, FK506		negative	mice			Mouzaki et al. Cytokine 1992
526	IL-10		negative	human	PBMC		Taga et al. J Immunol 1992
527	The binding subunit of pertussis toxin		negative	mice	cell line		O'Neill et al. J Immunol 1992
528	Human chorionadotropin (hCG) and placental lactogen (hPL)		negative	human	PBMC		Schafer et al. J Perinat Med 1992
529	Prostaglandin E2 (PGE2)		negative	mice			Marcinkiewicz et al. Folia Histochem Cytobiochem 1991
530	Zinc Finger Protein		negative				Williams et al. Science 1991
531	NF-kappa B, AP-1, AP-3, OCT-1, and NF-AT			human			Graneli-Piperno et al. J Immunol 1991
532	Diltiazem		positive	mice		Decreases Host	Meldrum et al. J Surg Res 1991
533	Schistosoma mansoni infection		no change	mice			Henderson et al. J Immunol 1992
534	Dihydrotestosterone		no change	mice			Araneo et al. Blood 1991
535	Onchocerca volvulus infection		negative	chimpanzee			Soboslay et al. J Immunol 1991
536	FK-506, cyclosporin A, rapamycin		negative	Human, Mice			Henderson et al. Immunology 1991
537	Cycloheximide		positive	mice	cell line		Zubiaga et al. J Immunol 1991
538	IL-4		positive	mice			Tanaka et al. J Immunol 1991
539	Trypanosoma cruzi infection		negative	mice			Nabors et al. J Immunol 1991
540	calcitonin gene-related peptide (CGRP) and vasoactive intestinal peptide (VIP)		negative (VIP), no	mice	spleen cell		Boudard et al. J Neurosci Res 1991
541	Schistosomiasis		negative	mice			Fidel et al. J Immunol 1991
542	alpha 2-HS-glycoprotein		negative	human	PBMC		Jakab et al. Acta Physiol Hung 1991
543	Schistosomiasis japonica		negative	human	PBMC		Li et al. J Tongji Med Univ 1991
544	Intravesical BCG therapy		no change	human	PBMC		Hermann et al. Scand J Urol Nephrol 1991
545	isoprostins		positive	mice	spleen cell		Milano et al. Int J Immunopharmacol 1991
546	IL-1		positive	human	cell line		Yagisawa et al. Immunology 1990
547	Ly-6A/E		negative	mice			Codias et al. J Immunol 1990
548	Schistosomiasis		negative	mice			Fidel et al. J Immunol 1990
549	N-alpha-p-tosyl-L-phenylalanine chloromethylketone (TPCK, chymotrypsin-type protease inhibitor)		negative	human	cell line		Auberger et al. Immunology 1990
550	platelet-activating factor (PAF)		positive	rat	spleen cell		Pignol et al. J Immunol 1990
551	Cyclosporin A		negative	mice			Randok et al. Embo j 1990
552	CD4/L3T4		negative	mice			Tamura et al. J Immunol 1990
553	Monoclonal antibody specific for bovine CD 8 antigen		positive	bovine			Letesson et al. Vet Immunol Immunopathol 1990
554	IL-1	Protein kinase C	positive	mice	cell line		Macchia et al. Mol Cell Biol 1990
555	local BCG immunotherapy		positive	human	urine		Bohle et al. Cytokine 1990
556	CD1		positive	human	cell line		Theodorou et al. J Immunol 1990
557	thymic humoral factor (THF-gamma 2)		positive	human	UCBL		Ben-Hur et al. Immunopharmacol Immunotoxicol 1990
558	trauma-induced glycopeptide		negative	human	PBMC		Tompkins et al. Immunol Lett 1990
559	Cyclosporin A		negative	mice			Kasaian et al. J Immunol 1990
560	protein kinase C		negative	human	tonsillar lymphocytes		Ohmura et al. Int Immunol 1990
561	alpha-thioglycerol		positive	mice	cell line		Kubbies et al. Lymphokine Res 1990
562	Beta-endorphin		positive	mice	cell line		Bessier et al. Immunopharmacology 1990
563	cis-urocanic acid (cis-UCA)		negative	human	PBMC		Rasanen et al. Photodermatol 1989
564	NF-kB, tax-1		positive	human, m	cell line		Shibuya et al. Nucleic Acids Res 1989
565	polyunsaturated fatty acids (palmitic acid (16:0), oleic acid (18:1), linoleic acid (cis-18:2), linoleic acid (trans-18:2), and arachidonic acid (20:4))	protein kinase C	positive	human	PBMC		Szamel et al. J Immunol 1989
566	IL-6 IL-1		positive	mice			Holsti et al. J Immunol 1989
567	CD45R		positive	human	thymocyte		Deans et al. J Immunol 1989
568	Unsaturated fatty acid (oleic acid)		negative	mice			Yang et al. Immunology 1989
569	Ultraviolet radiation		negative	mice			Araneo et al. J Immunol 1989
570	IL-2		negative	human	PBMC		Kradin et al. J Clin Immunol 1989