

**Supplementary table S5.** Gene ontology analysis for biological processes associated with differentially upregulated genes between Pan02 tumors from mice that were treated with ARG2 vaccine compared to mice that received a control vaccine.

**GO BIOLOGICAL PROCESSES ASSOCIATED WITH THE DIFFERENTIALLY UPREGULATED GENES (FDR<0.05)**

Each process is classified as immune-related (1) or non-immune related (0) in column "Immune related (0/1)"

GO biological process complete	Mus musculus - REFLIST (21997)	upload_1 (50)	upload_1 (expected)	upload_1 (over/under)	upload_1 (fold Enrichment)	upload_1 (raw P-value)	upload_1 (FDR)	Immune related (0/1)
response to interferon-beta (GO:0035456)	64	14	0,72	+	19,47	1.64E-13	3,69E-10	1
cellular response to interferon-beta (GO:0035458)	56	13	0,63	+	20,67	6.37E-13	1,11E-09	1
cellular response to cytokine stimulus (GO:0071345)	690	30	7,75	+	3,87	5.39E-10	5,00E-07	1
response to cytokine (GO:0034097)	792	32	8,9	+	3,6	7.85E-10	6,51E-07	1
positive regulation of cytokine production (GO:0001819)	499	25	5,61	+	4,46	1.08E-09	8,53E-07	1
immune system process (GO:0002376)	2494	62	28,02	+	2,21	2.17E-09	1,56E-06	1
regulation of cytokine production (GO:0001817)	773	30	8,68	+	3,45	6.77E-09	4,45E-06	1
immune response (GO:0006955)	1614	45	18,13	+	2,48	2.42E-08	1,36E-05	1
regulation of immune system process (GO:0002682)	1637	41	18,39	+	2,23	2.24E-06	8,61E-04	1
positive regulation of interferon-beta production (GO:0032728)	48	7	0,54	+	12,98	2.47E-06	9,27E-04	1
response to type I interferon (GO:0034340)	34	6	0,38	+	15,71	4.95E-06	1,77E-03	1
positive regulation of interleukin-1 beta production (GO:0032731)	62	7	0,7	+	10,05	1.15E-05	3,36E-03	1
positive regulation of type I interferon production (GO:0032481)	68	7	0,76	+	9,16	2.00E-05	4,85E-03	1
cytokine-mediated signaling pathway (GO:0019221)	312	14	3,5	+	3,99	1.86E-05	4,88E-03	1
positive regulation of cytosolic calcium ion concentration (GO:0007204)	313	14	3,52	+	3,98	1.92E-05	4,88E-03	1
cellular response to type I interferon (GO:0071357)	25	5	0,28	+	17,8	1.84E-05	4,93E-03	1
type I interferon signaling pathway (GO:0060337)	25	5	0,28	+	17,8	1.84E-05	5,01E-03	1
regulation of interferon-beta production (GO:0032648)	67	7	0,75	+	9,3	1.83E-05	5,06E-03	1

regulation of innate immune response (GO:0045088)	237	12	2,66	+	4,51	2.41E-05	5,75E-03	1
positive regulation of immune system process (GO:0002684)	1094	29	12,29	+	2,36	2.45E-05	5,75E-03	1
innate immune response (GO:0045087)	875	25	9,83	+	2,54	2.57E-05	5,96E-03	1
regulation of immune response (GO:0050776)	1051	28	11,81	+	2,37	3.24E-05	7,30E-03	1
positive regulation of interleukin-1 production (GO:0032732)	74	7	0,83	+	8,42	3.31E-05	7,36E-03	1
response to interferon-alpha (GO:0035455)	31	5	0,35	+	14,36	4.62E-05	9,98E-03	1
positive regulation of tumor necrosis factor production (GO:0032760)	109	8	1,22	+	6,53	4.98E-05	1,06E-02	1
positive regulation of tumor necrosis factor superfamily cytokine production	111	8	1,25	+	6,42	5.62E-05	1,15E-02	1
regulation of tumor necrosis factor production (GO:0032680)	184	10	2,07	+	4,84	6.58E-05	1,31E-02	1
regulation of tumor necrosis factor superfamily cytokine production	187	10	2,1	+	4,76	7.48E-05	1,46E-02	1
regulation of vasoconstriction (GO:0019229)	86	7	0,97	+	7,25	8.06E-05	1,55E-02	1
cellular response to interferon-alpha (GO:0035457)	19	4	0,21	+	18,74	1.11E-04	2,00E-02	1
regulation of interleukin-1 beta production (GO:0032651)	96	7	1,08	+	6,49	1.54E-04	2,63E-02	1
lymphocyte chemotaxis (GO:0048247)	42	5	0,47	+	10,6	1.70E-04	2,86E-02	1
regulation of type I interferon-mediated signaling pathway (GO:0060338)	42	5	0,47	+	10,6	1.70E-04	2,89E-02	1
regulation of angiogenesis (GO:0045765)	299	12	3,36	+	3,57	2.00E-04	3,22E-02	1
regulation of vasculature development (GO:1901342)	303	12	3,4	+	3,53	2.25E-04	3,52E-02	1
regulation of type I interferon production (GO:0032479)	103	7	1,16	+	6,05	2.31E-04	3,53E-02	1
T cell chemotaxis (GO:0010818)	9	3	0,1	+	29,67	2.77E-04	3,96E-02	1
negative regulation of chemokine (C-X-C motif) ligand 2 production (GO:2000342)	10	3	0,11	+	26,71	3.57E-04	4,85E-02	1
negative regulation of IP-10 production (GO:0071659)	10	3	0,11	+	26,71	3.57E-04	4,89E-02	1
negative regulation of innate immune response (GO:0045824)	84	9	0,94	+	9,54	9.51E-07	4,05E-04	1
negative regulation of immune response (GO:0050777)	188	12	2,11	+	5,68	2.62E-06	9,60E-04	1

negative regulation of defense response (GO:0031348)	238	11	2,67	+	4,11	1.14E-04	2,02E-02	1
negative regulation of immune system process (GO:0002683)	448	15	5,03	+	2,98	2.26E-04	3,49E-02	1
negative regulation of type I interferon-mediated signaling pathway (GO:0060339)	24	4	0,27	+	14,84	2.47E-04	3,70E-02	1
defense response to virus (GO:0051607)	226	21	2,54	+	8,27	6.04E-13	1,19E-09	1
response to virus (GO:0009615)	287	22	3,22	+	6,82	5.87E-12	7,71E-09	1
response to bacterium (GO:0009617)	896	36	10,07	+	3,58	7.04E-11	7,93E-08	1
negative regulation of viral process (GO:0048525)	102	13	1,15	+	11,35	5.12E-10	5,05E-07	1
regulation of viral life cycle (GO:1903900)	143	14	1,61	+	8,72	2.57E-09	1,76E-06	1
regulation of viral genome replication (GO:0045069)	87	11	0,98	+	11,26	1.22E-08	7,68E-06	1
regulation of viral process (GO:0050792)	166	14	1,86	+	7,51	1.50E-08	9,12E-06	1
response to external biotic stimulus (GO:0043207)	1490	59	16,74	+	3,52	2.76E-17	1,45E-13	0
response to other organism (GO:0051707)	1488	59	16,72	+	3,53	2.60E-17	2,05E-13	0
biological process involved in interspecies interaction between organisms	1624	61	18,24	+	3,34	7.75E-17	3,06E-13	0
response to biotic stimulus (GO:0009607)	1529	60	17,18	+	3,49	2.08E-17	3,28E-13	0
response to external stimulus (GO:0009605)	2452	76	27,54	+	2,76	1.40E-16	4,40E-13	0
defense response (GO:0006952)	1493	57	16,77	+	3,4	5.19E-16	1,36E-12	0
defense response to symbiont (GO:0140546)	227	21	2,55	+	8,24	6.54E-13	1,03E-09	0
response to stimulus (GO:0050896)	8671	153	97,4	+	1,57	1.78E-12	2,54E-09	0
defense response to other organism (GO:0098542)	1119	42	12,57	+	3,34	1.19E-11	1,44E-08	0
negative regulation of viral genome replication (GO:0045071)	59	11	0,66	+	16,6	3.09E-10	3,25E-07	0
response to stress (GO:0006950)	3303	76	37,1	+	2,05	5.51E-10	4,82E-07	0
regulation of multicellular organismal process (GO:0051239)	2900	69	32,58	+	2,12	1.22E-09	9,16E-07	0
response to organic substance (GO:0010033)	2608	62	29,3	+	2,12	1.63E-08	9,51E-06	0

cellular response to chemical stimulus (GO:0070887)	2473	59	27,78	+	2,12	2.60E-08	1,41E-05	0
positive regulation of gene expression (GO:0010628)	1203	37	13,51	+	2,74	4.07E-08	2,14E-05	0
response to chemical (GO:0042221)	3577	75	40,18	+	1,87	5.13E-08	2,61E-05	0
cellular response to organic substance (GO:0071310)	1866	48	20,96	+	2,29	7.46E-08	3,67E-05	0
positive regulation of multicellular organismal process (GO:0051240)	1639	44	18,41	+	2,39	8.82E-08	4,21E-05	0
positive regulation of biological process (GO:0048518)	6454	110	72,5	+	1,52	5.19E-07	2,34E-04	0
positive regulation of response to stimulus (GO:0048584)	2367	54	26,59	+	2,03	5.08E-07	2,35E-04	0
regulation of response to external stimulus (GO:0032101)	967	30	10,86	+	2,76	7.50E-07	3,28E-04	0
regulation of nuclease activity (GO:0032069)	27	6	0,3	+	19,78	1.52E-06	6,16E-04	0
positive regulation of response to external stimulus (GO:0032103)	452	19	5,08	+	3,74	1.50E-06	6,21E-04	0
regulation of ribonuclease activity (GO:0060700)	15	5	0,17	+	29,67	2.20E-06	8,66E-04	0
positive regulation of cell communication (GO:0010647)	1764	42	19,82	+	2,12	5.21E-06	1,83E-03	0
sensory perception of smell (GO:0007608)	1124	0	12,63	-	< 0,01	5.51E-06	1,85E-03	0
positive regulation of signaling (GO:0023056)	1771	42	19,89	+	2,11	5.49E-06	1,88E-03	0
ion homeostasis (GO:0050801)	809	25	9,09	+	2,75	7.15E-06	2,35E-03	0
chemical homeostasis (GO:0048878)	1201	32	13,49	+	2,37	7.87E-06	2,48E-03	0
inorganic ion homeostasis (GO:0098771)	760	24	8,54	+	2,81	7.77E-06	2,50E-03	0
positive regulation of cellular process (GO:0048522)	5933	99	66,65	+	1,49	9.84E-06	3,04E-03	0
cellular macromolecule metabolic process (GO:0044260)	4105	21	46,11	-	0,46	1.12E-05	3,33E-03	0
metal ion homeostasis (GO:0055065)	672	22	7,55	+	2,91	1.10E-05	3,34E-03	0
negative regulation of response to biotic stimulus (GO:0002832)	117	9	1,31	+	6,85	1.19E-05	3,40E-03	0
regulation of response to stimulus (GO:0048583)	4055	74	45,55	+	1,62	1.56E-05	4,38E-03	0
regulation of cytosolic calcium ion concentration (GO:0051480)	357	15	4,01	+	3,74	1.96E-05	4,82E-03	0

cation homeostasis (GO:0055080)	751	23	8,44	+	2,73	1.94E-05	4,85E-03	0
homeostatic process (GO:0042592)	1680	39	18,87	+	2,07	1.91E-05	4,94E-03	0
sensory perception of chemical stimulus (GO:0007606)	1224	1	13,75	-	0,07	2.85E-05	6,51E-03	0
regulation of defense response (GO:0031347)	627	20	7,04	+	2,84	3.99E-05	8,74E-03	0
regulation of cellular response to growth factor stimulus (GO:0090287)	299	13	3,36	+	3,87	5.04E-05	1,06E-02	0
regulation of biological quality (GO:0065008)	3901	70	43,82	+	1,6	5.22E-05	1,08E-02	0
regulation of cold-induced thermogenesis (GO:0120161)	146	9	1,64	+	5,49	6.12E-05	1,24E-02	0
cell surface receptor signaling pathway (GO:0007166)	1967	42	22,1	+	1,9	7.21E-05	1,42E-02	0
positive regulation of metabolic process (GO:0009893)	3772	67	42,37	+	1,58	9.07E-05	1,72E-02	0
regulation of response to biotic stimulus (GO:0002831)	364	14	4,09	+	3,42	9.22E-05	1,73E-02	0
positive regulation of signal transduction (GO:0009967)	1555	35	17,47	+	2	9.54E-05	1,77E-02	0
defense response to bacterium (GO:0042742)	513	17	5,76	+	2,95	9.80E-05	1,80E-02	0
cellular protein metabolic process (GO:0044267)	2999	14	33,69	-	0,42	1.08E-04	1,95E-02	0
cellular calcium ion homeostasis (GO:0006874)	470	16	5,28	+	3,03	1.17E-04	2,04E-02	0
divalent inorganic cation homeostasis (GO:0072507)	531	17	5,96	+	2,85	1.46E-04	2,53E-02	0
positive regulation of cold-induced thermogenesis (GO:0120162)	98	7	1,1	+	6,36	1.73E-04	2,87E-02	0
cellular metal ion homeostasis (GO:0006875)	596	18	6,7	+	2,69	1.88E-04	3,09E-02	0
regulation of transmembrane receptor protein serine/threonine kinase signaling	254	11	2,85	+	3,86	1.97E-04	3,20E-02	0
cellular divalent inorganic cation homeostasis (GO:0072503)	495	16	5,56	+	2,88	2.06E-04	3,28E-02	0
calcium ion homeostasis (GO:0055074)	498	16	5,59	+	2,86	2.20E-04	3,47E-02	0
triglyceride metabolic process (GO:0006641)	72	6	0,81	+	7,42	2.33E-04	3,53E-02	0
regulation of morphogenesis of an epithelium (GO:1905330)	73	6	0,82	+	7,32	2.50E-04	3,61E-02	0
nucleic acid metabolic process (GO:0090304)	1804	6	20,27	-	0,3	2.49E-04	3,64E-02	0

cellular cation homeostasis (GO:0030003)	665	19	7,47	+	2,54	2.47E-04	3,64E-02	0
regulation of anatomical structure size (GO:0090066)	556	17	6,25	+	2,72	2.47E-04	3,67E-02	0
macromolecule metabolic process (GO:0043170)	5553	38	62,38	-	0,61	2.80E-04	3,97E-02	0
positive regulation of cell population proliferation (GO:0008284)	1005	25	11,29	+	2,21	3.18E-04	4,47E-02	0
cellular ion homeostasis (GO:0006873)	681	19	7,65	+	2,48	3.30E-04	4,60E-02	0
fatty acid metabolic process (GO:0006631)	366	13	4,11	+	3,16	3.44E-04	4,76E-02	0
regulation of chemokine (C-X-C motif) ligand 2 production (GO:2000341)	27	4	0,3	+	13,19	3.69E-04	4,98E-02	0

#### IMMUNE-RELATED GO BIOLOGICAL PROCESSES ASSOCIATED WITH THE DIFFERENTIALLY UPREGULATED GENES (FDR<0.05)

Immune-related processes are classified into categories.

GO biological process complete	Category	Selected for representation (figure 6)	upload_1 (FDR)
positive regulation of cytosolic calcium ion concentration (GO:0007204)	Ca2+ immune activation	X	4,88E-03
lymphocyte chemotaxis (GO:0048247)	T cells/lymphocytes	X	2,86E-02
T cell chemotaxis (GO:0010818)	T cells/lymphocytes	X	3,96E-02
cellular response to cytokine stimulus (GO:0071345)	Cytokines	X	5,00E-07
response to cytokine (GO:0034097)	Cytokines		6,51E-07
positive regulation of cytokine production (GO:0001819)	Cytokines	X	8,53E-07
regulation of cytokine production (GO:0001817)	Cytokines		4,45E-06
cytokine-mediated signaling pathway (GO:0019221)	Cytokines		4,88E-03

negative regulation of chemokine (C-X-C motif) ligand 2 production (GO:2000342)	Cytokines	X	4,85E-02
negative regulation of CXCL10 (IP-10) production (GO:0071659)	Cytokines	X	4,89E-02
positive regulation of tumor necrosis factor production (GO:0032760)	Cytokines		1,06E-02
positive regulation of tumor necrosis factor superfamily cytokine production (GO:1903557)	Cytokines	X	1,15E-02
regulation of tumor necrosis factor production (GO:0032680)	Cytokines		1,31E-02
regulation of tumor necrosis factor superfamily cytokine production (GO:1903555)	Cytokines		1,46E-02
response to interferon-beta (GO:0035456)	Type I interferons	X	3,69E-10
cellular response to interferon-beta (GO:0035458)	Type I interferons		1,11E-09
positive regulation of interferon-beta production (GO:0032728)	Type I interferons		9,27E-04
response to type I interferon (GO:0034340)	Type I interferons		1,77E-03
positive regulation of type I interferon production (GO:0032481)	Type I interferons	X	4,85E-03
cellular response to type I interferon (GO:0071357)	Type I interferons	X	4,93E-03
type I interferon signaling pathway (GO:0060337)	Type I interferons		5,01E-03
regulation of interferon-beta production (GO:0032648)	Type I interferons		5,06E-03
response to interferon-alpha (GO:0035455)	Type I interferons	X	9,98E-03
cellular response to interferon-alpha (GO:0035457)	Type I interferons		2,00E-02
regulation of type I interferon-mediated signaling pathway (GO:0060338)	Type I interferons		2,89E-02
regulation of type I interferon production (GO:0032479)	Type I interferons		3,53E-02
positive regulation of interleukin-1 beta production (GO:0032731)	IL-1		3,36E-03

positive regulation of interleukin-1 production (GO:0032732)	IL-1	X	7,36E-03
regulation of interleukin-1 beta production (GO:0032651)	IL-1		2,63E-02
immune system process (GO:0002376)	General immune response	X	1,56E-06
immune response (GO:0006955)	General immune response		1,36E-05
regulation of immune system process (GO:0002682)	General immune response		8,61E-04
regulation of innate immune response (GO:0045088)	General immune response		5,75E-03
positive regulation of immune system process (GO:0002684)	General immune response		5,75E-03
innate immune response (GO:0045087)	General immune response		5,96E-03
regulation of immune response (GO:0050776)	General immune response		7,30E-03
regulation of vasoconstriction (GO:0019229)	Angiogenesis		1,55E-02
regulation of angiogenesis (GO:0045765)	Angiogenesis	X	3,22E-02
regulation of vasculature development (GO:1901342)	Angiogenesis	X	3,52E-02