

Appendix 1 – Taxonomy of the Immune Tolerance Literature

Table A1-1 – Eight Aggregate Category Taxonomy of the Immune Tolerance Literature

(Note: CL# is cluster number (assigned by computer algorithm), CLUSTER THEME is assigned by visual inspection, #REC is the number of records in the cluster)

CL#	CLUSTER THEME	#REC
101	Immune Tolerance Enhancement for Improved Organ Transplantation	1307
28	liver transplantation, emphasizing the mechanisms of immune tolerance induction	372
39	biomarkers of operational tolerance following kidney transplantation	316
50	regulatory T cell therapy in solid organ transplantation	619
104	Immune Tolerance Enhancement for Improved Tissue Allografts	1794
19	induction of immune tolerance through mixed chimerism, emphasizing transplantation tolerance	364
36	induction of donor-specific immunological tolerance to tissue allografts using bone marrow transplantation	333
52	mechanisms of allograft tolerance induction	695
54	allograft immune tolerance induction in rats	402
86	Immune Tolerance Augmentation in the Treatment of Autoimmune Diabetes	525
15	immune tolerance towards transplanted allogeneic pancreatic islets, especially for treatment of autoimmune diabetes	195
26	autoimmune diabetes, and the role of immune tolerance induction in its treatment	330
91	Immune Tolerance Augmentation Through Transplantation of Donor Stem Cells	632
7	immunomodulatory (especially immunosuppressive) properties of mesenchymal stem cells and their therapeutic applications	182
41	mechanisms of tolerance induction through the transplantation of donor hematopoietic stem cells	450
103	Role of Regulatory T Cells in Immune Response	1669
18	role of CD25+ CD4+ regulatory T cells in immune suppression/immune tolerance	334
25	regulatory T cell development, mechanisms of their suppressive function, and applications to treating autoimmunity	458
45	enhancing regulatory T cells for tolerance inducing immunotherapy, with some emphasis on FOXP3+ regulatory T cells	877
118	Role of Dendritic Cells in T Cell Response	4193
6	modulation of V beta 8+ TcR-associated T-cell memory against conventional antigens by Staphylococcal enterotoxin B	105

8	role of the autoimmune regulator (AIRE) in central and peripheral tolerance, physiology, and disease	212
22	induction of tolerance by tolerogenic dendritic cells	289
31	induction and maintenance of T cell anergy	320
34	T cell negative selection in the thymus	352
40	induction of tolerance in dendritic cells, and the application of these tolerogenic dendritic cells to autoimmunity	741
43	T cell tolerance, emphasizing peripheral tolerance in CD8+ T cells	470
53	regulatory T cells, emphasizing the role of FOXP3 in their development and function	338
55	mechanisms underlying immune self-tolerance	507
60	regulation of CD4 T cell tolerance and reactivity to self and non-self	859
121	Immune Tolerance Induction to Induce FVIII Antigen-Specific Tolerance in Patients with Hemophilia A and Inhibitors	2172
0	Immune tolerance induction in patients with hemophilia a and inhibitors	147
2	immune tolerance induction by FVIII in hemophilia A patients with inhibitor	211
10	natural history of chronic hepatitis B virus infection in adults and children, emphasizing immunological mechanisms	418
20	factor VIII inhibitors in mild and moderate-severity hemophilia A	382
33	role of B cells in immunological tolerance and autoimmunity	1014
123	Mechanisms of Immune Response Regulation	10757
1	immunosuppressive mechanisms of regulatory T cells	220
3	biology of the immunomodulatory molecule HLA-G in transplantation, disease, and pregnancy	266
4	mechanisms and dynamics of natural killer cell tolerance	159
5	food allergies, especially the role of oral tolerance and immunotherapy	177
9	Myeloid-derived suppressor cells as regulators of the immune system, especially their role in tolerance induction in cancer	216
11	immunosuppressive networks in the tumor environment and their role in immunotherapy	76
12	role of the innate and adaptive immune responses (especially the role of immune tolerance on induction of autoimmunity) in the pathogenesis of systemic lupus erythematosus	184
13	tolerance induction to allergens, especially cow's milk, peanuts, and eggs	136
14	immunoregulatory effects of indoleamine 2, 3-dioxygenase, especially in cancer therapy, transplantation, and immune related diseases	219
16	allergen-specific Immunotherapy for inhalant allergens	136
17	molecular and cellular aspects of sepsis-induced immunosuppression	124
21	association between Helicobacter pylori infection-mediated immune tolerance and inflammatory bowel disease	127
23	enhanced response to enzyme replacement therapy in Pompe disease after the induction of immune tolerance	125
24	tachyphylaxis and tolerance to medications, especially antidepressants	96
27	experimental autoimmune encephalomyelitis, emphasizing administration of myelin basic protein-derived peptide to induce immune tolerance	227

29	oral tolerance induction, especially in the treatment of food allergies	488
30	mechanisms of immune tolerance induction to allergens, emphasizing mechanisms of allergen-specific immunotherapy	161
32	induction of endotoxin tolerance in cells, especially to lipopolysaccharides	330
35	therapeutic vaccines for cancer	429
37	pregnancy immune tolerance at the maternal-fetal interface	535
38	mechanisms of UV-induced immunosuppression	259
42	adverse reactions related to immune checkpoint inhibitor therapy for cancer, emphasizing impacts of the PD-1/PD-L1 blockade	296
44	mechanisms of immune privilege, especially ocular immune privilege	175
46	immunological basis for recurrent fetal loss and pregnancy complications	484
47	role of gut microbiota in the regulation of the immune response	412
48	mechanisms of tumor escape from the immune system, especially tumor-induced immunosuppression	886
49	induction of immunological tolerance by oral administration of albumin	289
51	mechanisms of cancer immunoescape, emphasizing breast cancer	384
56	autoimmunity, autoimmune diseases, and the role of genetic and epigenetic influences on defective immune tolerance underlying autoimmunity	420
57	mechanisms of virus-induced immunosuppression and subsequent impact on autoimmune diseases	330
58	focuses on immunogenic collagen type II peptides in the induction of tolerance to collagen-induced arthritis	189
59	infection, emphasizing parasite-induced immune tolerance	348
61	immunosuppression in patients with HIV	452
62	TNF tolerance in monocytes and macrophages	473
63	enhancing versus suppressive effects of stress on immune function, as well as the influence of innate immunity on immune tolerance	929

Appendix 2 – Selected Titles of Papers from Each Leaf Cluster

(Note: the first row of each table contains the leaf cluster number, the leaf theme, and the number of records in the leaf cluster (in parentheses). All other rows in the table contain selected titles of papers in the cluster.)

Table A2-1, Cluster 0

Cluster 0 focuses on Immune tolerance induction in patients with hemophilia a and inhibitors (147)
Low-dose Immune Tolerance Induction in Hemophilia: A Single-Center Experience.
Immune tolerance induction in patients with severe hemophilia A with inhibitors.
Low-dose immune tolerance induction alone or with immunosuppressants according to prognostic risk factors in Chinese children with hemophilia A inhibitors.
The Japanese Immune Tolerance Induction (J-ITI) study in haemophilia patients with inhibitor: Outcomes and successful predictors of ITI treatment.

Immune tolerance induction in patients with haemophilia a and inhibitors: effectiveness and cost analysis in an European Cohort (The ITER Study).
Immune tolerance induction in haemophilia A patients with inhibitors by treatment with recombinant factor VIII: a retrospective non-interventional study.
Late immune tolerance induction in haemophilia A patients.
Low-dose immune tolerance induction for paediatric haemophilia patients with factor VIII inhibitors.
Immune Tolerance Induction (ITI) with a pdFVIII/VWF Concentrate (octanate) in 100 Patients in the Observational ITI (ObsITI) Study.
The use of factor VIII/von Willebrand factor concentrate for immune tolerance induction in haemophilia A patients with high-titre inhibitors: association of clinical outcome with inhibitor epitope profile.
Long-term outcome of haemophilia A patients after successful immune tolerance induction therapy using a single plasma-derived FVIII/VWF product: the long-term ITI study.
Prompt immune tolerance induction at inhibitor diagnosis regardless of titre may increase overall success in haemophilia A complicated by inhibitors: experience of two U.S. centres.
Early eradication of factor VIII inhibitor in patients with congenital hemophilia A by immune tolerance induction with a high dose of immunoglobulin.
Immunotolerance induction effectivity in hemophilia A children and neutralizing alloantibodies.
Immune tolerance induction with a high purity von Willebrand factor/VIII complex concentrate in haemophilia A patients with inhibitors at high risk of a poor response.

Table A2-2, Cluster 1

Cluster 1 focuses on immunosuppressive mechanisms of regulatory T cells (220)
Lymphopenia and interleukin-2 therapy alter homeostasis of CD4+CD25+ regulatory T cells.
Using an ancient tool for igniting and propagating immune tolerance: IDO as an inducer and amplifier of regulatory T cell functions.
Continuous requirement for the TCR in regulatory T cell function.
In vitro Differentiation of Thymic T(reg) Cell Progenitors to Mature Thymic T(reg) Cells.
Mitochondrial complex III is essential for suppressive function of regulatory T cells.
Function of the IL-2R for thymic and peripheral CD4+CD25+ Foxp3+ T regulatory cells.
Activated but not resting regulatory T cells accumulated in tumor microenvironment and correlated with tumor progression in patients with colorectal cancer.
ZFP91 is required for the maintenance of regulatory T cell homeostasis and function.
Signaling through TLR7 enhances the immunosuppressive activity of murine CD4+CD25+ T regulatory cells.
Acsbg1-dependent mitochondrial fitness is a metabolic checkpoint for tissue T(reg) cell homeostasis.
Regulatory T cells exert checks and balances on self tolerance and autoimmunity.
Oxidative stress controls regulatory T cell apoptosis and suppressor activity and PD-L1-blockade resistance in tumor.
Functional crosstalk between dendritic cells and Foxp3(+) regulatory T cells in the maintenance of immune tolerance.
A20 Restrains Thymic Regulatory T Cell Development.
Nemo-like Kinase Drives Foxp3 Stability and Is Critical for Maintenance of Immune Tolerance by Regulatory T Cells.

Table A2-3, Cluster 2

Cluster 2 focuses on immune tolerance induction by FVIII in hemophilia A patients with inhibitor (211)
Inhibitors in hemophilia A: mechanisms of inhibition, management and perspectives.
T cell response to FVIII.
Mechanisms of action of immune tolerance induction against factor VIII in patients with congenital haemophilia A and factor VIII inhibitors.
Successful immune tolerance induction by FVIII in hemophilia A patients with inhibitor may occur without deletion of FVIII-specific T cells.
Successful immune tolerance induction with high-dose coagulation factor VIII and intravenous immunoglobulins in a patient with congenital hemophilia and high-titer inhibitor of coagulation factor VIII despite unfavorable prognosis for the therapy.
Antigen-specific immunotherapy with apitopes suppresses generation of FVIII inhibitor antibodies in HLA-transgenic mice.
Epitope specificity of anti-FVIII antibodies during immune tolerance therapy with factor VIII preparation containing von Willebrand factor.
Progress toward inducing immunologic tolerance to factor VIII.
High-dose factor VIII inhibits factor VIII-specific memory B cells in hemophilia A with factor VIII inhibitors.
Development of inhibitors in hemophilia A: An illustrated review.
Immune tolerance against infused FVIII in hemophilia A is mediated by PD-L1+ Tregs.
Factor VIII-specific B cell responses in haemophilia A patients with inhibitors.
Tolerating Factor VIII: Recent Progress.
Suppression of FVIII inhibitor formation in hemophilic mice by delivery of transgene modified apoptotic fibroblasts.
Inhibitory antibodies in hemophilia A.

Table A2-4, Cluster 3

Cluster 3 focuses on biology of the immunomodulatory molecule HLA-G in transplantation, disease, and pregnancy (266)
HLA-G as a tolerogenic molecule in transplantation and pregnancy.
Controlling the Immunological Crosstalk during Conception and Pregnancy: HLA-G in Reproduction.
Lung macrophages and dendritic cells express HLA-G molecules in pulmonary diseases.
Biology of the immunomodulatory molecule HLA-G in human liver diseases.
The Molecular and Functional Characteristics of HLA-G and the Interaction with Its Receptors: Where to Intervene for Cancer Immunotherapy?
Detection of HLA-G by a specific sandwich ELISA using monoclonal antibodies G233 and 56B.
HLA-G*0105N null allele encodes functional HLA-G isoforms.
The HLA-G 14bp gene polymorphism and decidual HLA-G 14bp gene expression in pre-eclamptic and normal pregnancies.
New insights into HLA-G mediated tolerance.
Nitric oxide produces HLA-G nitration and induces metalloprotease-dependent shedding creating a tolerogenic milieu.
HLA-G: A New Immune Checkpoint in Cancer?
[HLA-G: immune tolerance in normal and pathological physiology].

HLA-G polymorphisms: ethnic differences and implications for potential molecule function.
Expression of HLA-G in patients with hepatocellular carcinoma.
HLA-G mediated immune regulation is impaired by a single amino acid exchange in the alpha 2 domain.

Table A2-5, Cluster 4

Cluster 4 focuses on the mechanisms and dynamics of natural killer cell tolerance (159)
Regulation of NK cell responsiveness to achieve self-tolerance and maximal responses to diseased target cells.
Regulatory NK cells in autoimmune disease.
NK cell self tolerance, responsiveness and missing self recognition.
The dynamics of natural killer cell tolerance.
Confinement of activating receptors at the plasma membrane controls natural killer cell tolerance.
Missing self recognition and self tolerance of natural killer (NK) cells.
A new self: MHC-class-I-independent natural-killer-cell self-tolerance.
Genetic and antibody-mediated reprogramming of natural killer cell missing-self recognition in vivo.
Re-educating natural killer cells.
Natural killer cell education and tolerance.
Selection, tuning, and adaptation in mouse NK cell education.
A subset of natural killer cells achieves self-tolerance without expressing inhibitory receptors specific for self-MHC molecules.
Natural killer cell tolerance licensing and other mechanisms.
Retuning of Mouse NK Cells after Interference with MHC Class I Sensing Adjusts Self-Tolerance but Preserves Anticancer Response.
Target-induced anergy of natural killer cytotoxic function is restricted to the NK-target conjugate subset.

Table A2-6, Cluster 5

Cluster 5 focuses on food allergies, especially the role of oral tolerance and immunotherapy (177)
[Research advances in influencing factors for immune tolerance to food allergens in children].
Oral immunotherapy for food allergy.
Immune suppression of food allergy by maternal IgG in murine models.
Update on Early Nutrition and Food Allergy in Children.
Oral tolerance and allergy.
The Epigenetics of Food Allergy.
New Perspectives in Food Allergy.
The changing geoepidemiology of food allergies.
New developments in immunotherapies for food allergy.
Novel approaches to food allergy.
Prevention of Food Allergy: The Significance of Early Introduction.
Immunotherapy for food allergy.
[Neonatal food allergy].
The role of epigenetic mediation and the future of food allergy research.
Oral food desensitization.

Table A2-7, Cluster 6

Cluster 6 focuses on modulation of V beta 8+ TcR-associated T-cell memory against conventional antigens by Staphylococcal enterotoxin B (105)
Staphylococcal enterotoxin B modulates V beta 8+ TcR-associated T-cell memory against conventional antigen.
Superantigen-reactive T cells that display an anergic phenotype in vitro appear functional in vivo.
Staphylococcal enterotoxin B induces an early and transient state of immunosuppression characterized by V beta-unrestricted T cell unresponsiveness and defective antigen-presenting cell functions.
Clonal anergy to staphylococcal enterotoxin B in vivo: selective effects on T cell subsets and lymphokines.
Superantigen-induced anergy of V beta 8+ CD4+ T cells induces functional but non-proliferative T cells in vivo.
Differential effect of staphylococcal enterotoxin B upon the induction of tolerance on peripheral CD4+V beta 8+ and CD8+V beta 8+ T cells.
Selective expansion followed by profound deletion of mature V beta 8.3+ T cells in vivo after exposure to the superantigenic lectin Urtica dioica agglutinin.
The fate of anergic T cells in vivo.
Exogenous superantigens acutely trigger distinct levels of peripheral T cell tolerance/immunosuppression: dose-response relationship.
T cell dependent B cell activation occurs during the induction of T cell anergy by staphylococcal enterotoxin B in mice.
Induction of clonal anergy by oral administration of staphylococcal enterotoxin B.
ICAM-1 is required for T cell proliferation but not for anergy or apoptosis induced by Staphylococcus aureus enterotoxin B in vivo.
Selective anergy of V beta 8+ T cells in human immunodeficiency virus-infected individuals.
Active suppression induced by cutaneous exposure to bacterial superantigen is prevented by interleukin-12 treatment in vivo.
Prevention and reversal of superantigen-induced anergy by contact allergen exposure.

Table A2-8, Cluster 7

Cluster 7 focuses on immunomodulatory (especially immunosuppressive) properties of mesenchymal stem cells and their therapeutic applications (182)
Immunomodulatory properties of mesenchymal stem cells and their therapeutic applications.
Mesenchymal stem cells and their immunosuppressive role in transplantation tolerance.
Immunosuppressive Property of MSCs Mediated by Cell Surface Receptors.
Multipotent mesenchymal stem cells with immunosuppressive activity can be easily isolated from dental pulp.
New concepts on the immune modulation mediated by mesenchymal stem cells.
Immunosuppressive properties of mesenchymal stem cells.
Immunological properties of mesenchymal stem cells and clinical implications.
Indoleamine 2, 3-Dioxygenase Transfected Mesenchymal Stem Cells Induce Kidney Allograft Tolerance by Increasing the Production and Function of Regulatory T Cells.

Mesenchymal stem cells can affect solid organ allograft survival.
Immunosuppressive properties of cloned bone marrow mesenchymal stem cells.
Mesenchymal stromal cells; role in tissue repair, drug discovery and immune modulation.
Mesenchymal stem cells and their use as cell replacement therapy and disease modelling tool.
Mesenchymal stromal cells: current understanding and clinical status.
Mesenchymal stem cells: a double-edged sword in regulating immune responses.
Genetic mismatch affects the immunosuppressive properties of mesenchymal stem cells in vitro and their ability to influence the course of collagen-induced arthritis.

Table A2-9, Cluster 8

Cluster 8 focuses on the role of the autoimmune regulator (AIRE) in central and peripheral tolerance, physiology, and disease (212)
Paradoxical development of polymyositis-like autoimmunity through augmented expression of autoimmune regulator (AIRE).
Beyond APECED: An update on the role of the autoimmune regulator gene (AIRE) in physiology and disease.
Central tolerance to self revealed by the autoimmune regulator.
The Role of Autoimmune Regulator (AIRE) in Peripheral Tolerance.
Aire controls the differentiation program of thymic epithelial cells in the medulla for the establishment of self-tolerance.
AIRE is not essential for the induction of human tolerogenic dendritic cells.
A novel conditional Aire allele enables cell-specific ablation of the immune tolerance regulator Aire.
Disruption of immunological tolerance: role of AIRE gene in autoimmunity.
Ectopic Aire Expression in the Thymic Cortex Reveals Inherent Properties of Aire as a Tolerogenic Factor within the Medulla.
Control of central and peripheral tolerance by Aire.
Update on Aire and thymic negative selection.
AIRE in the thymus and beyond.
Transcriptional regulation by AIRE: molecular mechanisms of central tolerance.
Aire Disruption Influences the Medullary Thymic Epithelial Cell Transcriptome and Interaction With Thymocytes.
Intronic regulation of Aire expression by Jmjd6 for self-tolerance induction in the thymus.

Table A2-10, Cluster 9

Cluster 9 focuses on Myeloid-derived suppressor cells as regulators of the immune system, especially their role in tolerance induction in cancer (216)
Myeloid derived suppressor cells and their role in tolerance induction in cancer.
Myeloid-derived suppressor cells as effectors of immune suppression in cancer.
Myeloid-derived suppressor cells as regulators of the immune system.
Complexity and challenges in defining myeloid-derived suppressor cells.
Novel Characterization of Myeloid-Derived Suppressor Cells in Tumor Microenvironment.
Myeloid-Derived Suppressor Cells in Tumors: From Mechanisms to Antigen Specificity and Microenvironmental Regulation.

Swertianolin ameliorates immune dysfunction in sepsis via blocking the immunosuppressive function of myeloid- derived suppressor cells.
Diverse functions of myeloid-derived suppressor cells in autoimmune diseases.
Myeloid-derived suppressor cells as cellular immunotherapy in transplantation and autoimmune diseases.
Myeloid-derived suppressor cells participate in preventing graft rejection.
Activated T cells sustain myeloid-derived suppressor cell-mediated immune suppression.
Beyond immunosuppressive effects: dual roles of myeloid-derived suppressor cells in bone-related diseases.
Functional changes in myeloid-derived suppressor cells (MDSCs) during tumor growth: FKBP51 contributes to the regulation of the immunosuppressive function of MDSCs.
Role of myeloid-derived suppressor cells in tumor immunotherapy.
Myeloid derived suppressor cells and their role in diseases.

Table A2-11, Cluster 10

Cluster 10 focuses on natural history of chronic hepatitis B virus infection in adults and children, emphasizing immunological mechanisms (418)
Natural history of chronic hepatitis B virus infection: what we knew in 1981 and what we know in 2005.
Molecular characteristics and stages of chronic hepatitis B virus infection.
Natural history of hepatitis B virus infection: an update for clinicians.
Immunological mechanisms of hepatitis B virus persistence in newborns.
HBV DNA Integration and Clonal Hepatocyte Expansion in Chronic Hepatitis B Patients Considered Immune Tolerant.
[Natural history and clinical manifestations of chronic hepatitis B virus].
Hepatitis B: Who should be treated?-managing patients with chronic hepatitis B during the immune-tolerant and immunoactive phases.
Hepatitis B surface antigen (HBsAg) levels in the natural history of hepatitis B virus (HBV)-infection: a European perspective.
Natural history of chronic hepatitis B virus infection in adults with emphasis on the occurrence of cirrhosis and hepatocellular carcinoma.
Hepatitis B virus infection in children: epidemiology, natural course and prevention in Taiwan.
The lack of effect of therapeutic vaccination with a pre-S2/S HBV vaccine in the immune tolerant phase of chronic HBV infection.
Long-term and efficient inhibition of hepatitis B virus replication by AAV8-delivered artificial microRNAs.
[Natural history of hepatitis B infection].
Treatment of hepatitis B.
Natural history of chronic hepatitis B virus infection: new light on an old story.

Table A2-12, Cluster 11

Cluster 11 focuses on immunosuppressive networks in the tumor environment and their role in immunotherapy (76)
Surgical implications of tumour immunology.

Immunosuppressive networks in the tumour environment and their therapeutic relevance.
The role of the tumour microenvironment in immunotherapy.
Adaptive immunity in cancer immunology and therapeutics.
Anti-tumour effects of a xenogeneic fibroblast activation protein-based whole cell tumour vaccine in murine tumour models.
Interleukin-10 promotes B16-melanoma growth by inhibition of macrophage functions and induction of tumour and vascular cell proliferation.
Sporadic immunogenic tumours avoid destruction by inducing T-cell tolerance.
Tumour hypoxia promotes tolerance and angiogenesis via CCL28 and T(reg) cells.
Functional roles of immature dendritic cells in impaired immunity of solid tumour and their targeted strategies for provoking tumour immunity.
[Local immune tolerance mechanisms in kidney cancer].
Immunosuppressive networks in the tumour environment and their effect in dendritic cells.
Cancer vaccines: a step towards prevention and treatment of cancer.
Multifaceted inhibition of anti-tumour immune mechanisms by soluble tumour necrosis factor receptor type I.
Does our current understanding of immune tolerance, autoimmunity, and immunosuppressive mechanisms facilitate the design of efficient cancer vaccines?
Consideration of dual characters of exosomes in the tumour immune response.

Table A2-13, Cluster 12

Cluster 12 focuses on the role of the innate and adaptive immune responses (especially the role of immune tolerance on induction of autoimmunity) in the pathogenesis of systemic lupus erythematosus (184)
Role of the innate and adaptive immune responses in the pathogenesis of systemic lupus erythematosus.
Lupus genes at the interface of tolerance and autoimmunity.
The role of cytokines in the pathogenesis and treatment of systemic lupus erythematosus.
Balancing diversity and tolerance: lessons from patients with systemic lupus erythematosus.
Genetics and pathogenesis of systemic lupus erythematosus and lupus nephritis.
Suppression of systemic lupus erythematosus by the human immunodeficiency virus.
Update on the Genetics of Systemic Lupus Erythematosus: Genome-Wide Association Studies and Beyond.
Immunological Involvement of MicroRNAs in the Key Events of Systemic Lupus Erythematosus.
T cells in the pathogenesis of systemic lupus erythematosus.
Evaluation of polymorphic variants in apoptotic genes and their role in susceptibility and clinical progression to systemic lupus erythematosus.
Drugs in early clinical development for Systemic Lupus Erythematosus.
DNase1 in pathogenesis of systemic lupus erythematosus.
T Helper 2-Associated Immunity in the Pathogenesis of Systemic Lupus Erythematosus.
The star target in SLE: IL-17.
Contribution of dendritic cells to the autoimmune pathology of systemic lupus erythematosus.

Table A2-14, Cluster 13

Cluster 13 focuses on tolerance induction to allergens, especially cow's milk, peanuts, and eggs (136)
Severe anaphylaxis to sheep's milk cheese in a child desensitized to cow's milk through specific oral tolerance induction.
Single low-dose exposure to cow's milk at diagnosis accelerates cow's milk allergic infants' progress on a milk ladder programme.
Basophil reactivity, wheal size, and immunoglobulin levels distinguish degrees of cow's milk tolerance.
Cow's milk allergy related pediatric constipation: appropriate time of milk tolerance.
Reintroduction of cow's milk in milk-allergic children.
Cow's milk allergy in children, from avoidance to tolerance.
Incremental prognostic factors associated with cow's milk allergy outcomes in infant and child referrals: the Milan Cow's Milk Allergy Cohort study.
Determination of food specific IgE levels over time can predict the development of tolerance in cow's milk and hen's egg allergy.
Practical interest of both skin prick test and specific IgE in the evaluation of tolerance acquisition in IgE mediated cow's milk allergy (CMA). A clinical retrospective study in a cohort of 184 children.
Acquisition of tolerance to egg and peanut in African food-allergic children with atopic dermatitis.
Modified proteins in allergy prevention.
The natural history of milk allergy in an observational cohort.
Prediction of tolerance in children with IgE mediated cow's milk allergy by microarray profiling and chemometric approach.
Baked Tolerance in Cow's Milk Allergy: Quite Frequent, Hard to Predict!
Allergy or tolerance in children sensitized to peanut: prevalence and differentiation using component-resolved diagnostics.

Table A2-15, Cluster 14

Cluster 14 focuses on immunoregulatory effects of indoleamine 2, 3-dioxygenase, especially in cancer therapy, transplantation, and immune related diseases (219)
Indoleamine 2, 3-Dioxygenase: A Professional Immunomodulator and Its Potential Functions in Immune Related Diseases.
The rationale of indoleamine 2,3-dioxygenase inhibition for cancer therapy.
Immunosuppressive IDO in Cancer: Mechanisms of Action, Animal Models, and Targeting Strategies.
Immunoregulatory effects of indoleamine 2, 3-dioxygenase in transplantation.
Indoleamine 2,3-dioxygenase in immune suppression and cancer.
Highlights at the gate of tryptophan catabolism: a review on the mechanisms of activation and regulation of indoleamine 2,3-dioxygenase (IDO), a novel target in cancer disease.
Indoleamine 2,3-dioxygenase in cancer: targeting pathological immune tolerance with small-molecule inhibitors.
Natural CD4+ T-cell responses against indoleamine 2,3-dioxygenase.
Indoleamine 2,3-dioxygenase in T-cell tolerance and tumoral immune escape.
IDO in the Tumor Microenvironment: Inflammation, Counter-Regulation, and Tolerance.
Inducing the tryptophan catabolic pathway, indoleamine 2,3-dioxygenase (IDO), for suppression of graft-versus-host disease (GVHD) lethality.
Indoleamine 2,3-dioxygenase, an emerging target for anti-cancer therapy.

Indoleamine 2,3-Dioxygenase (IDO) Activity: A Perspective Biomarker for Laboratory Determination in Tumor Immunotherapy.
Decreased indoleamine 2,3-dioxygenase expression in dendritic cells and role of indoleamine 2,3-dioxygenase-expressing dendritic cells in immune thrombocytopenia.
Kynurenine pathway enzymes in dendritic cells initiate tolerogenesis in the absence of functional IDO.

Table A2-16, Cluster 15

Cluster 15 focuses on immune tolerance towards transplanted allogeneic pancreatic islets, especially for treatment of autoimmune diabetes (195)
Operational immune tolerance towards transplanted allogeneic pancreatic islets in mice and a non-human primate.
Biological and biomaterial approaches for improved islet transplantation.
CCL22 Prevents Rejection of Mouse Islet Allografts and Induces Donor-Specific Tolerance.
The current status of islet transplantation and its perspectives.
Islet cell transplantation for the treatment of type 1 diabetes in the USA.
Pancreatic islet basement membrane loss and remodeling after mouse islet isolation and transplantation: impact for allograft rejection.
Culture on a native bone marrow-derived extracellular matrix restores the pancreatic islet basement membrane, preserves islet function, and attenuates islet immunogenicity.
Resolving the conundrum of islet transplantation by linking metabolic dysregulation, inflammation, and immune regulation.
Prevention of early loss of transplanted islets in the liver of mice by adenosine.
Clinical islet transplantation at the University of Alberta--the Edmonton experience.
The effect of bone marrow transplantation on survival of allogeneic pancreatic islets with short-term tacrolimus conditioning in rats.
Clinical islet transplant: current and future directions towards tolerance.
Resistance of spontaneously diabetic Ins2(akita) mice to allograft tolerance induced by anti-CD154 therapy.
PLG scaffold delivered antigen-specific regulatory T cells induce systemic tolerance in autoimmune diabetes.
Induction of Immune Tolerance in Islet Transplantation Using Apoptotic Donor Leukocytes.

Table A2-17, Cluster 16

Cluster 16 focuses on allergen-specific Immunotherapy for inhalant allergens (136)
Allergen-specific Immunotherapy for Inhalant Allergens in Children.
Update on allergy immunotherapy: American Academy of Allergy, Asthma & Immunology/European Academy of Allergy and Clinical Immunology/PRACTALL consensus report.
Immunotherapy and Asthma in Children.
Scientific foundations of allergen-specific immunotherapy for allergic disease.
International consensus on allergy immunotherapy.
Allergen Immunotherapy: Current and Future Trends.
Immunotherapy in the Treatment of Allergic Rhinitis in Children.
The practical role of serum allergen-specific IgE as potential biomarker for predicting responder to allergen immunotherapy.

Allergen immunotherapy in allergic rhinitis: current use and future trends.
Modified Allergens for Immunotherapy.
Allergen immunotherapy and asthma.
Recent Advances in Allergen-Specific Immunotherapy in Humans: A Systematic Review.
A review of clinical efficacy, safety, new developments and adherence to allergen-specific immunotherapy in patients with allergic rhinitis caused by allergy to ragweed pollen (<i>Ambrosia artemisiifolia</i>).
State of the Art: Development of a Sublingual Allergy Immunotherapy Tablet for Allergic Rhinitis in Japan.
SUBLINGUAL IMMUNOTHERAPY IN CHILDREN: STATE OF ART.

Table A2-18, Cluster 17

Cluster 17 focuses on molecular and cellular aspects of sepsis-induced immunosuppression (124)
Molecular and cellular aspects of sepsis-induced immunosuppression.
Advances in the understanding and treatment of sepsis-induced immunosuppression.
T-cell-mediated immunity and the role of TRAIL in sepsis-induced immunosuppression.
Potential Immunotherapeutics for Immunosuppression in Sepsis.
Immune Deregulation in Sepsis and Septic Shock: Reversing Immune Paralysis by Targeting PD-1/PD-L1 Pathway.
Sepsis: the need for tolerance not complacency.
Sepsis-induced immunosuppression: from cellular dysfunctions to immunotherapy.
Towards personalized medicine in sepsis: Quest for Shangri-La?
Sepsis-induced immunosuppression: from bad to worse.
Ketoprofen impairs immunosuppression induced by severe sepsis and reveals an important role for prostaglandin E2.
Immunosuppression in patients who die of sepsis and multiple organ failure.
What is the pathophysiology of the septic host upon admission?
Long Noncoding RNA HOTAIRM1 Promotes Immunosuppression in Sepsis by Inducing T Cell Exhaustion.
Sepsis, immunosuppression and the role of epigenetic mechanisms.
Park 7: A Novel Therapeutic Target for Macrophages in Sepsis-Induced Immunosuppression.

Table A2-19, Cluster 18

Cluster 18 focuses on role of CD25+ CD4+ regulatory T cells in immune suppression/immune tolerance (334)
Human CD4+CD25+ regulatory T cells share equally complex and comparable repertoires with CD4+CD25- counterparts.
Human CD4(+)CD25(+) thymocytes and peripheral T cells have immune suppressive activity in vitro.
Activated CD4+ CD25+ T cells suppress antigen-specific CD4+ and CD8+ T cells but induce a suppressive phenotype only in CD4+ T cells.
Bone marrow-derived dendritic cells reverse the anergic state of CD4+CD25+ T cells without reversing their suppressive function.
Functional assay for human CD4+CD25+ Treg cells reveals an age-dependent loss of suppressive activity.

Deficient CD4+CD25+ T regulatory cell function in patients with abdominal aortic aneurysms.
Unique roles of Schistosoma japonicum protein Sj16 to induce IFN- γ and IL-10 producing CD4(+)CD25(+) regulatory T cells in vitro and in vivo.
Studies on naïve CD4+CD25+T cells inhibition of naïve CD4+CD25- T cells in mixed lymphocyte cultures.
Differential response of murine CD4+CD25+ and CD4+CD25- T cells to dexamethasone-induced cell death.
Depleting anti-CD4 monoclonal antibody (GK1.5) treatment: influence on regulatory CD4+CD25+Foxp3+ T cells in mice.
CD4+CD25- T cells in aged mice are hyporesponsive and exhibit suppressive activity.
CD4(+)CD25(+) T cells facilitate the induction of T cell anergy.
The cellular basis of cardiac allograft rejection. IX. Ratio of naïve CD4+CD25+ T cells/CD4+CD25- T cells determines rejection or tolerance.
CD4+CD25+ regulatory T cells in patients with gastrointestinal malignancies: possible involvement of regulatory T cells in disease progression.
BALB/c mice have more CD4+CD25+ T regulatory cells and show greater susceptibility to suppression of their CD4+CD25- responder T cells than C57BL/6 mice.

Table A2-20, Cluster 19

Cluster 19 focuses on induction of immune tolerance through mixed chimerism, emphasizing transplantation tolerance (364)
Simultaneous donor bone marrow and cardiac transplantation: can tolerance be induced with the development of chimerism?
Mixed chimerism in SCT: conflict or peaceful coexistence?
Induction of tolerance through mixed chimerism.
Mechanistic and therapeutic role of regulatory T cells in tolerance through mixed chimerism.
Deletional and regulatory mechanisms coalesce to drive transplantation tolerance through mixed chimerism.
Establishment of Chimerism and Organ Transplant Tolerance in Laboratory Animals: Safety and Efficacy of Adaptation to Humans.
Facilitating cells as a venue to establish mixed chimerism and tolerance.
Transient mixed chimerism for allograft tolerance.
Mixed chimerism to induce tolerance: lessons learned from nonhuman primates.
Transplantation tolerance through mixed chimerism.
Mixed chimerism.
Recent progress in tolerance induction through mixed chimerism.
High-level allogeneic chimerism achieved by prenatal tolerance induction and postnatal nonmyeloablative bone marrow transplantation.
[Transplant tolerance through mixed chimerism].
Preclinical and clinical studies on the induction of renal allograft tolerance through transient mixed chimerism.

Table A2-21, Cluster 20

Cluster 20 focuses on factor VIII inhibitors in mild and moderate-severity hemophilia A (382)
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Inhibitor antibodies to factor VIII and factor IX: management.
[Revision consensus hemophilia: treatment and responsibility. Nederlandse Vereniging van Hemophilia Patients].
[Prophylaxis in patients with haemophilia complicated by inhibitors].
How I manage patients with inherited haemophilia A and B and factor inhibitors.
Antibodies to factor VIII in hemophilia A patients.
Factor VIII inhibitors in mild and moderate-severity haemophilia A.
Inhibitors in young boys with haemophilia.
A new era of treatment for patients with haemophilia A?
Recommendations for the treatment of factor VIII inhibitors: from the UK Haemophilia Centre Directors' Organisation Inhibitor Working Party.
Inhibitors in Hemophilia: Treatment Challenges and Novel Options.
Factor VIII inhibitors in mild and moderate-severity haemophilia A. UK Haemophilia Centre Directors Organisation.
Paediatric haemophilia with inhibitors: existing management options, treatment gaps and unmet needs.
Experience of Immune Tolerance Induction Therapy for Hemophilia A Patients with Inhibitors from a Single Center in India.
Toward optimal therapy for inhibitors in hemophilia.
Prophylaxis in haemophilia with inhibitors: update from international experience.

Table A2-22, Cluster 21

Cluster 21 focuses on association between <i>Helicobacter pylori</i> infection-mediated immune tolerance and inflammatory bowel disease (127)
Association between <i>Helicobacter pylori</i> infection and inflammatory bowel disease: a meta-analysis and systematic review of the literature.
<i>Helicobacter pylori</i> infection and inflammatory bowel disease: a crosstalk between upper and lower digestive tract.
The loss of tolerance to CHI3L1 - A putative role in inflammatory bowel disease?
<i>Helicobacter pylori</i> DNA's anti-inflammatory effect on experimental colitis.
The association between <i>Helicobacter pylori</i> infection and inflammatory bowel disease based on meta-analysis.
The role of bacteria in the inflammatory bowel disease development: a narrative review.
Gastrointestinal microbiome and <i>Helicobacter pylori</i> : Eradicate, leave it as it is, or take a personalized benefit-risk approach?
The role of toll-like receptors in immune tolerance induced by <i>Helicobacter pylori</i> infection.
The role of infection in inflammatory bowel disease: initiation, exacerbation and protection.
Crosstalk between the intestinal microbiota and the innate immune system in intestinal homeostasis and inflammatory bowel disease.
Cytokines in inflammatory bowel disease.
Probiotics in Pediatric Gastroenterology: Emerging Indications: Inflammatory Bowel Diseases.
TLR2 mediates <i>Helicobacter pylori</i> -induced tolerogenic immune response in mice.
Unraveling the factors and mechanism involved in persistence: Host-pathogen interactions in <i>Helicobacter pylori</i> .
Human Intestinal Dendritic Cells in Inflammatory Bowel Diseases.

Table A2-23, Cluster 22

Cluster 22 focuses on induction of tolerance by tolerogenic dendritic cells (289)
Dendritic cell vaccine design: strategies for eliciting peripheral tolerance as therapy of autoimmune diseases.
Type 1 regulatory T cells and regulatory B cells induced by tolerogenic dendritic cells.
Uptake of apoptotic DC converts immature DC into tolerogenic DC that induce differentiation of Foxp3+ Treg.
Adrenomedullin, a neuropeptide with immunoregulatory properties induces semi-mature tolerogenic dendritic cells.
The Dendritic Cell Dilemma in the Skin: Between Tolerance and Immunity.
Dendritic cells, antigen distribution and the initiation of primary immune responses to self and non-self antigens.
Dendritic cells as gatekeepers of tolerance.
Killing of naive T cells by CD95L-transfected dendritic cells (DC): in vivo study using killer DC-DC hybrids and CD4(+) T cells from DO11.10 mice.
Modulation of tolerogenic dendritic cells and autoimmunity.
Prevention of allograft rejection by in vitro generated tolerogenic dendritic cells.
Induction of tolerance by IL-10-treated dendritic cells.
[Progress in biology of dendritic cells].
TNF-alpha-treated DC exacerbates disease in a murine tumor metastasis model.
Dendritic cells in networks of immunological tolerance.
[Dendritic cells and transplantation immune tolerance--review].

Table A2-24, Cluster 23

Cluster 23 focuses on enhanced response to enzyme replacement therapy in Pompe disease after the induction of immune tolerance (125)
Enhanced response to enzyme replacement therapy in Pompe disease after the induction of immune tolerance.
Liver depot gene therapy for Pompe disease.
Advancements in AAV-mediated Gene Therapy for Pompe Disease.
Lentiviral gene therapy prevents anti-human acid α -glucosidase antibody formation in murine Pompe disease.
Teaching tolerance: New approaches to enzyme replacement therapy for Pompe disease.
Immunomodulatory, liver depot gene therapy for Pompe disease.
Low-Dose Liver-Targeted Gene Therapy for Pompe Disease Enhances Therapeutic Efficacy of ERT via Immune Tolerance Induction.
Immunological challenges and approaches to immunomodulation in Pompe disease: a literature review.
Targeted approaches to induce immune tolerance for Pompe disease therapy.
Successful immune tolerance induction to enzyme replacement therapy in CRIM-negative infantile Pompe disease.
Copackaged AAV9 Vectors Promote Simultaneous Immune Tolerance and Phenotypic Correction of Pompe Disease.

Sustained immune tolerance induction in enzyme replacement therapy-treated CRIM-negative patients with infantile Pompe disease.
A Race Against Time-Changing the Natural History of CRIM Negative Infantile Pompe Disease.
CRIM-negative infantile Pompe disease: characterization of immune responses in patients treated with ERT monotherapy.
Providing the conduit for treatment: The impact of vascular access and vein preservation in a 5-year-old child with prenatally diagnosed CRIM-negative Infantile Pompe disease.

Table A2-25, Cluster 24

Cluster 24 focuses on tachyphylaxis and tolerance to medications, especially antidepressants (96)
Aripiprazole may be free from tachyphylaxis: preliminary findings.
Failure to demonstrate therapeutic tachyphylaxis to topically applied steroids in patients with psoriasis.
Tachyphylaxis in major depressive disorder: A review of the current state of research.
Assessing rates and predictors of tachyphylaxis during the prevention of recurrent episodes of depression with venlafaxine ER for two years (PREVENT) study.
Challenge interval determines tachyphylaxis to aerosolized LTD4.
Tachyphylaxis during treatment of exudative age-related macular degeneration with ranibizumab.
Tachyphylaxis during treatment of exudative age-related macular degeneration with aflibercept.
Tachyphylaxis/tolerance to antidepressants in treatment of dysthymia: results of a retrospective naturalistic chart review study.
Tachyphylaxis to cisatracurium--case reports and literature review.
Does tachyphylaxis occur in long-term management of scalp seborrheic dermatitis with pyrithione zinc-based treatments?
NG-nitro-L-arginine methyl ester (L-NAME) prevents tachyphylaxis to local anesthetics in a dose-dependent manner.
Tachyphylaxis and Dependence in Pharmacotherapy for Unexplained Chronic Cough.
Evidence that spinal segmental nitric oxide mediates tachyphylaxis to peripheral local anesthetic nerve block.
Nitric oxide generation, tachyphylaxis and cross-tachyphylaxis from nitrovasodilators in vivo.
Tachyphylaxis after intravitreal bevacizumab for exudative age-related macular degeneration.

Table A2-26, Cluster 25

Cluster 25 focuses on regulatory T cell development, mechanisms of their suppressive function, and applications to treating autoimmunity (458)
Manipulating regulatory T cells: a promising strategy to treat autoimmunity.
Transcriptional regulation and development of regulatory T cells.
Treg cells in autoimmunity: from identification to Treg-based therapies.
Flt3 ligand expands CD4+ FoxP3+ regulatory T cells in human subjects.
Molecular mechanisms of regulatory T cell development and suppressive function.
Antigen-Specific Regulatory T Cell Therapy in Autoimmune Diseases and Transplantation.
Molecular determinants of regulatory T cell development: the essential roles of epigenetic changes.
Current status and perspectives of regulatory T cell-based therapy.
CPHEN-016: Comprehensive phenotyping of human regulatory T cells.

Requirement for POH1 in differentiation and maintenance of regulatory T cells.
Regulatory T cells and Toll-like receptors in tumor immunity.
Thymic and peripheral differentiation of regulatory T cells.
Isolation of human antigen-specific regulatory T cells with high suppressive function.
Immunotherapy of Cancer by Targeting Regulatory T cells.
Epigenetic enzymes are the therapeutic targets for CD4(+)CD25(+/-high)Foxp3(+) regulatory T cells.

Table A2-27, Cluster 26

Cluster 26 focuses on autoimmune diabetes, and the role of immune tolerance induction in its treatment (330)
Antigen-based vaccination and prevention of type 1 diabetes.
The dark side of insulin: A primary autoantigen and instrument of self-destruction in type 1 diabetes.
Tolerance to Proinsulin-1 Reduces Autoimmune Diabetes in NOD Mice.
Immunotherapy with Tolerogenic Dendritic Cells Alone or in Combination with Rapamycin Does Not Reverse Diabetes in NOD Mice.
Insulin dependent diabetes mellitus in the non-obese diabetic mouse: a disease mediated by T cell anergy?
Modulating the autoimmune response in type 1 diabetes: a report on the 64th scientific sessions of the ADA, June 2004, Orlando, FL, USA.
Type 1 diabetes: lessons for other autoimmune diseases?
Dendritic cell mediated therapy for immunoregulation of type 1 diabetes mellitus.
Insulin's other life: an autoantigen in type 1 diabetes.
Curative and beta cell regenerative effects of alpha1-antitrypsin treatment in autoimmune diabetic NOD mice.
The targeting of β -cells by T lymphocytes in human type 1 diabetes: clinical perspectives.
Molecular mechanisms in autoimmune type 1 diabetes: a critical review.
Bioengineering strategies for inducing tolerance in autoimmune diabetes.
A Swedish approach to the prevention of type 1 diabetes.
Prevention of autoimmune diabetes by immunogene therapy using recombinant vaccinia virus expressing glutamic acid decarboxylase.

Table A2-28, Cluster 27

Cluster 27 focuses on experimental autoimmune encephalomyelitis, emphasizing administration of myelin basic protein-derived peptide to induce immune tolerance (227)
Development of PLGA Nanoparticles with a Glycosylated Myelin Oligodendrocyte Glycoprotein Epitope (MOG(35-55)) against Experimental Autoimmune Encephalomyelitis (EAE).
Treatment of autoimmune disease by oral tolerance to autoantigens.
Cytokine shifts and tolerance in experimental autoimmune encephalomyelitis.
Mechanisms of recovery from experimental autoimmune encephalomyelitis: T cell deletion and immune deviation in myelin basic protein T cell receptor transgenic mice.
The experimental autoimmune encephalomyelitis (EAE) model of MS: utility for understanding disease pathophysiology and treatment.
Age-dependent T cell tolerance and autoimmunity to myelin basic protein.
Lewis Rat Model of Experimental Autoimmune Encephalomyelitis.

Orally administered myelin basic protein in neonates primes for immune responses and enhances experimental autoimmune encephalomyelitis in adult animals.
Tolerance induction and autoimmune encephalomyelitis amelioration after administration of myelin basic protein-derived peptide.
Acquired thymic tolerance to autoimmune encephalomyelitis is associated with activation of peripheral IL-10-producing macrophages/dendritic cells.
Acquired tolerance to experimental autoimmune encephalomyelitis by intrathymic injection of myelin basic protein or its major encephalitogenic peptide.
[Mechanism of immune tolerance induced by soluble myelin oligodendrocyte glycoprotein in mice with experimental autoimmune encephalomyelitis].
Effect of timing of intravenous administration of myelin basic protein on the induction of tolerance in experimental allergic encephalomyelitis.
Antigen-oriented T cell migration contributes to myelin peptide induced-EAE and immune tolerance.
Oral Administration of Lactococcus lactis Expressing Synthetic Genes of Myelin Antigens in Decreasing Experimental Autoimmune Encephalomyelitis in Rats.

Table A2-29, Cluster 28

Cluster 28 focuses on liver transplantation, emphasizing the mechanisms of immune tolerance induction (372)
Immunological Determinants of Liver Transplant Outcomes Uncovered by the Rat Model.
Liver transplantation in the mouse: Insights into liver immunobiology, tissue injury, and allograft tolerance.
Progress in Liver Transplant Tolerance and Tolerance-Inducing Cellular Therapies.
[Development of immune tolerance in liver transplantation].
Understanding, predicting and achieving liver transplant tolerance: from bench to bedside.
Unique aspects of rejection and tolerance in liver transplantation.
Identification of tolerant recipients following liver transplantation.
[Liver transplantation in swine: a model for tolerance induction].
Revisiting the liver's role in transplant alloimmunity.
Clinical operational tolerance in liver transplantation: state-of-the-art perspective and future prospects.
Spontaneous and induced tolerance for liver transplant recipients.
Immune microenvironment and therapeutic progress of recurrent hepatocellular carcinoma after liver transplantation.
Strategies for Deliberate Induction of Immune Tolerance in Liver Transplantation: From Preclinical Models to Clinical Application.
Biomarkers of immune tolerance in liver transplantation.
Induction Phase of Spontaneous Liver Transplant Tolerance.

Table A2-30, Cluster 29

Cluster 29 focuses on oral tolerance induction, especially in the treatment of food allergies (488)
Oral administration of IL-12 abrogates the induction but not the maintenance of oral tolerance.
Oral tolerance:Recent advances on mechanisms and potential applications.
[Oral tolerance in the treatment of rheumatoid arthritis and other autoimmune diseases].

Oral tolerance: lessons on treatment of food allergy.
Oral tolerance.
A review of the mechanisms of oral tolerance and immunotherapy.
$\gamma\delta$ T Cell-Secreted XCL1 Mediates Anti-CD3-Induced Oral Tolerance.
[Gut mucosal immunity and oral tolerance].
Oral tolerance induction in humans.
Oral tolerance and inflammatory bowel disease.
Oral Tolerance Development and Maintenance.
History and mechanisms of oral tolerance.
Oral tolerance in neonates: from basics to potential prevention of allergic disease.
Decrease in susceptibility to oral tolerance induction and occurrence of oral immunization to ovalbumin in 20-38-week-old mice. The effect of interval between oral exposures and rate of antigen intake in the oral immunization.
Blockade of oral tolerance to ovalbumin in mice by silver nanoparticles.

Table A2-31, Cluster 30

Cluster 30 focuses on mechanisms of immune tolerance induction to allergens, emphasizing mechanisms of allergen-specific immunotherapy (161)
Mechanisms of immune tolerance to allergens in children.
Update in the mechanisms of allergen-specific immunotherapy.
Novel developments in the mechanisms of immune tolerance to allergens.
Synchronous immune alterations mirror clinical response during allergen immunotherapy.
Allergens and their role in the allergic immune response.
Peptide-based vaccines in the treatment of specific allergy.
Mechanisms of allergen-specific immunotherapy and novel ways for vaccine development.
Allergen immunotherapy, routes of administration and cytokine networks: an update.
Allergen immunotherapy and tolerance.
Intranasal tolerance induction with polypeptides derived from 3 noncross-reactive major aeroallergens prevents allergic polysensitization in mice.
T-cell tolerance to inhaled allergens: mechanisms and therapeutic approaches.
Mechanisms of allergen-specific immunotherapy: multiple suppressor factors at work in immune tolerance to allergens.
Induction of bystander tolerance and immune deviation after Fel d 1 peptide immunotherapy.
T-cell response to allergens.
Combined sensitization of mice to extracts of dust mite, ragweed, and Aspergillus species breaks through tolerance and establishes chronic features of asthma.

Table A2-32, Cluster 31

Cluster 31 focuses on induction and maintenance of T cell anergy (320)
Dose-dependent induction of distinct anergic phenotypes: multiple levels of T cell anergy.
T cell anergy and costimulation.
T-cell anergy and peripheral T-cell tolerance.
Induction of T-cell activation or anergy determined by the combination of intensity and duration of T-cell receptor stimulation, and sequential induction in an individual cell.

The induction and maintenance of T cell anergy.
Interleukin-2, but not interleukin-15, is required to terminate experimentally induced clonal T-cell anergy.
Involvement of CTLA-4 in T-cell anergy induced by staphylococcal enterotoxin A in vitro.
Differential induction of the NF-AT complex during restimulation and the induction of T-cell anergy.
Induction of T cell anergy in the absence of CTLA-4/B7 interaction.
Ndrp1 is a T-cell clonal anergy factor negatively regulated by CD28 costimulation and interleukin-2.
A population of in vivo anergized T cells with a lower activation threshold for the induction of CD25 exhibit differential requirements in mobilization of intracellular calcium and mitogen-activated protein kinase activation.
T-cell anergy induced by clonotype-specific antibodies: modulation of an autoreactive human T-cell clone in vitro.
Differential susceptibility of naïve versus cloned CD4+ T cells to antigen-specific and MHC-restricted anergy induction.
Induction of responsiveness in superantigen-induced anergic T cells. Role of ligand density and costimulatory signals.
Role of interleukin-2 in superantigen-induced T-cell anergy.

Table A2-33, Cluster 32

Cluster 32 focuses on induction of endotoxin tolerance in cells, especially to lipopolysaccharides (330)
Dysregulation of LPS-induced Toll-like receptor 4-MyD88 complex formation and IL-1 receptor-associated kinase 1 activation in endotoxin-tolerant cells.
Inhibition of lipopolysaccharide-induced signal transduction in endotoxin-tolerized mouse macrophages: dysregulation of cytokine, chemokine, and toll-like receptor 2 and 4 gene expression.
Synergy and cross-tolerance between toll-like receptor (TLR) 2- and TLR4-mediated signaling pathways.
Overexpression of CD14, TLR4, and MD-2 in HEK 293T cells does not prevent induction of in vitro endotoxin tolerance.
Interleukin-1 β induces in vivo tolerance to lipopolysaccharide in mice.
Endotoxin tolerance: is there a clinical relevance?
Cutting edge: endotoxin tolerance in mouse peritoneal macrophages correlates with down-regulation of surface toll-like receptor 4 expression.
Induction of endotoxin tolerance in vivo inhibits activation of IRAK4 and increases negative regulators IRAK-M, SHIP-1, and A20.
In vitro down regulation of proinflammatory cytokines induced by LPS tolerance in pig CD14+ cells.
miR-146a is critical for endotoxin-induced tolerance: IMPLICATION IN INNATE IMMUNITY.
Duration of in vivo endotoxin tolerance in horses.
Molecular mechanisms of innate memory and tolerance to LPS.
Changes in endotoxin-induced cytokine production by whole blood after in vivo exposure of normal humans to endotoxin.
Endotoxin tolerance: new mechanisms, molecules and clinical significance.
Compartmentalization of tolerance to endotoxin.

Table A2-34, Cluster 33

Cluster 33 focuses on the role of B cells in immunological tolerance and autoimmunity (1014)
B cells and immunological tolerance.
B cells participate in tolerance and autoimmunity through cytokine production.
Endogenous antigen tunes the responsiveness of naive B cells but not T cells.
B cell tolerance--how to make it and how to break it.
Impaired early B cell tolerance in patients with rheumatoid arthritis.
Activation of human B cells negatively regulates TGF- β 1 production.
Autoreactivity and the positive selection of B cells.
Germinal center exclusion of autoreactive B cells is defective in human systemic lupus erythematosus.
The double-edge role of B cells in mediating antitumor T-cell immunity: Pharmacological strategies for cancer immunotherapy.
The role of T cells in the regulation of B cell tolerance.
Suppressive functions of activated B cells in autoimmune diseases reveal the dual roles of Toll-like receptors in immunity.
G alpha q-containing G proteins regulate B cell selection and survival and are required to prevent B cell-dependent autoimmunity.
Innate pathways to B-cell activation and tolerance.
Targeting of B cells in SLE: rationale and therapeutic opportunities.
Requirement for Transcription Factor Ets1 in B Cell Tolerance to Self-Antigens.

Table A2-35, Cluster 34

Cluster 34 focuses on T cell negative selection in the thymus (352)
Thymic epithelial cell lines that mediate positive selection can also induce thymocyte clonal deletion.
Induction of thymocyte positive selection does not convey immediate resistance to negative selection.
Quantitative impact of thymic clonal deletion on the T cell repertoire.
Dysregulation of thymic clonal deletion and the escape of autoreactive T cells.
Influence of correlated antigen presentation on T-cell negative selection in the thymus.
[Development of the thymus and immune system].
CD28 expression is not essential for positive and negative selection of thymocytes or peripheral T cell tolerance.
Stable interactions and sustained TCR signaling characterize thymocyte-thymocyte interactions that support negative selection.
Thymic microenvironments for T-cell repertoire formation.
Negative selection by endogenous antigen and superantigen occurs at multiple thymic sites.
T cell receptor (TCR)-induced death of immature CD4+CD8+ thymocytes by two distinct mechanisms differing in their requirement for CD28 costimulation: implications for negative selection in the thymus.
EBI2 contributes to the induction of thymic central tolerance in mice by promoting rapid motility of medullary thymocytes.
Thymic selection of immunoglobulin idiotype specific T-cells.
Negative selection--clearing out the bad apples from the T-cell repertoire.
A role for accessibility to self-peptide-self-MHC complexes in intrathymic negative selection.

Table A2-36, Cluster 35

Cluster 35 focuses on therapeutic vaccines for cancer (429)
Antigen-specific vaccines for cancer treatment.
Therapeutic vaccines for colorectal cancer: The progress and future prospect.
DNA vaccines for cancer.
Overview of therapeutic vaccination approaches for cancer.
Developing recombinant and synthetic vaccines for the treatment of melanoma.
DNA vaccination against multiple myeloma.
Therapeutic cancer vaccines.
Generation of multiepitope cancer vaccines based on large combinatorial libraries of survivin-derived mutant epitopes.
Inefficacy of therapeutic cancer vaccines and proposed improvements. Casus of prostate cancer.
Enhancing tumor specific immune responses by transcutaneous vaccination.
Cancer vaccines: challenges and outlook in the field.
Multiple-purpose immunotherapy for cancer.
Development of novel immune interventions for prostate cancer.
Altering Landscape of Cancer Vaccines: Unique Platforms, Research on Therapeutic Applications and Recent Patents.
Cellular vaccine approaches.

Table A2-37, Cluster 36

Cluster 36 focuses on induction of donor-specific immunological tolerance to tissue allografts using bone marrow transplantation (333)
Long-term immunologic induction of donor-specific tolerance to skin allografts by bone marrow transplant in rabbits.
Discontinuation of immunosuppression for prevention of kidney graft rejection after receiving a bone marrow transplant from the same HLA identical sibling donor.
Recipient bone marrow engraftment in donor tissue after long-term tolerance to a composite tissue allograft.
Allogeneic bone marrow transplantation with co-stimulatory blockade induces macrochimerism and tolerance without cytoreductive host treatment.
The importance of MHC class II in allogeneic bone marrow transplantation and chimerism-based solid organ tolerance in a rat model.
Mixed hematopoietic chimerism for preventing graft-versus-host disease in mice receiving rat bone marrow transplantation.
A nonlethal conditioning approach to achieve engraftment of xenogeneic rat bone marrow in mice and to induce donor-specific tolerance.
[Studies on the induction of transplantation tolerance and immune reconstitution through combined strategies].
The mystique of hepatic tolerogenicity.
Induction of immunological tolerance in full major and multiminor histocompatibility-disparate mice using a mixed bone marrow transplantation model.
Chimerism induction in vascularized bone marrow transplants augmented with bone marrow cells.
Dissociation of hemopoietic chimerism and allograft tolerance after allogeneic bone marrow transplantation.

Long-term survival of cardiac xenografts in fully xenogeneic (mouse --> rat) bone marrow chimeras.
Chimerism and tolerance: from freemartin cattle and neonatal mice to humans.
Tolerance induction following allogeneic vascularized bone marrow transplantation--the possible role of microchimerism.

Table A2-38, Cluster 37

Cluster 37 focuses on pregnancy immune tolerance at the maternal-fetal interface (535)
Crosstalk Between Trophoblast and Macrophage at the Maternal-Fetal Interface: Current Status and Future Perspectives.
[Research advances in the function of T cells at the maternal-fetal interface].
[Research advances of natural killer cells at the maternal-fetal interface].
Trophoblast immune receptors in maternal-fetal tolerance.
Pregnancy and Tumour: The Parallels and Differences in Regulatory T Cells.
Visualizing Dynamic Changes at the Maternal-Fetal Interface Throughout Human Pregnancy by Mass Cytometry.
Pregnancy immune tolerance at the maternal-fetal interface.
The mystery of the life tree: the placenta [†] .
Isolation of Leukocytes from the Murine Tissues at the Maternal-Fetal Interface.
Regulation of costimulatory signal in maternal-fetal immune tolerance.
Crosstalk Between Trophoblasts and Decidual Immune Cells: The Cornerstone of Maternal-Fetal Immunotolerance.
Functional regulation of decidual macrophages during pregnancy.
Corrigendum to: Paternal priming of maternal tissues to optimise pregnancy success.
[The involvement of galectin-1 in implantation and pregnancy maintenance at the maternal-fetal interface].
MicroRNA-Mediated Control of Inflammation and Tolerance in Pregnancy.

Table A2-39, Cluster 38

Cluster 38 focuses on mechanisms of UV-induced immunosuppression (259)
Effects of low-dose ultraviolet radiation on in vivo human cutaneous recall responses.
Mechanisms underlying UV-induced immune suppression: implications for sunscreen design.
[Ultraviolet radiation--immune response].
Mechanisms of UV-induced immunosuppression.
Ultraviolet radiation and immunology: something new under the sun--presidential address.
UVA-induced immunosuppression.
Ultraviolet Radiation-Induced Immunosuppression: Induction of Regulatory T Cells.
Evidence that ultraviolet B radiation induces tolerance and impairs induction of contact hypersensitivity by different mechanisms.
Immunosuppression induced by acute solar-simulated ultraviolet exposure in humans: prevention by a sunscreen with a sun protection factor of 15 and high UVA protection.
Ultraviolet irradiation, systemic immunosuppression and skin cancer: role of urocanic acid.
Molecular determinants of UV-induced immunosuppression.
Ultraviolet radiation-induced immunosuppression of delayed-type hypersensitivity in mice.

Commercial sunscreen lotions prevent ultraviolet-radiation-induced immune suppression of contact hypersensitivity.
Interleukin-12 prevents ultraviolet B-induced local immunosuppression and overcomes UVB-induced tolerance.
Ultraviolet spectral energy differences affect the ability of sunscreen lotions to prevent ultraviolet-radiation-induced immunosuppression.

Table A2-40, Cluster 39

Cluster 39 focuses on biomarkers of operational tolerance following kidney transplantation (316)
Biomarkers of operational tolerance following kidney transplantation - The immune tolerance network studies of spontaneously tolerant kidney transplant recipients.
Current status of tolerance in kidney transplantation.
The natural history of clinical operational tolerance after kidney transplantation through twenty-seven cases.
Biomarkers of immune tolerance in kidney transplantation: an overview.
Identification of a gene expression profile associated with operational tolerance among a selected group of stable kidney transplant patients.
Gene expression signature in transplantation tolerance.
Immunological biomarkers of tolerance in human kidney transplantation: An updated literature review.
Perforin: An intriguing protein in allograft rejection immunology (Review).
Tolerance in Solid-Organ Transplant.
Biomarkers of tolerance.
Tregs and kidney: From diabetic nephropathy to renal transplantation.
Fingerprints of transplant tolerance suggest opportunities for immunosuppression minimization.
Biomarkers and Pharmacogenomics in Kidney Transplantation.
Defining a Methylation Signature Associated With Operational Tolerance in Kidney Transplant Recipients.
Tolerance signatures in transplant recipients.

Table A2-41, Cluster 40

Cluster 40 focuses on induction of tolerance in dendritic cells, and the application of these tolerogenic dendritic cells to autoimmunity (741)
Regulatory Dendritic Cells.
Handbook of experimental pharmacology "dendritic cells": the use of dexamethasone in the induction of tolerogenic DCs.
Dendritic cell modulation as a new interventional approach for the treatment of asthma.
Regulatory dendritic cells in autoimmunity: A comprehensive review.
Tolerogenic Dendritic Cell-Based Approaches in Autoimmunity.
Tolerogenic Dendritic Cells Generated by In Vitro Treatment With SAHA Are Not Stable In Vivo.
Dendritic cells: regulators of alloimmunity and opportunities for tolerance induction.
Dendritic cells: vehicles for tolerance induction and prevention of autoimmune diseases.
Tolerogenic dendritic cells and their potential applications.
Natural and Induced Tolerogenic Dendritic Cells.

Immunomodulatory dendritic cells inhibit Th1 responses and arthritis via different mechanisms.
How tolerogenic dendritic cells induce regulatory T cells.
Galangin treatment during dendritic cell differentiation confers tolerogenic properties in response to lipopolysaccharide stimulation.
The regulatory role of dendritic cells in the immune tolerance.
Tolerogenic dendritic cells: role and therapeutic implications in systemic lupus erythematosus.

Table A2-42, Cluster 41

Cluster 41 focuses on mechanisms of tolerance induction through the transplantation of donor hematopoietic stem cells (450)
Induction of tolerance in autoimmune diseases by hematopoietic stem cell transplantation: getting closer to a cure?
Immune roles of dendritic cells in stem cell transplantation.
Reconstitution of self-tolerance after hematopoietic stem cell transplantation.
Hematopoietic stem cells and solid organ transplantation.
Induction of tolerance in organ recipients by hematopoietic stem cell transplantation.
Therapeutic plasticity of stem cells and allograft tolerance.
Mechanisms of tolerance induction through the transplantation of donor hematopoietic stem cells: central versus peripheral tolerance.
Increased mitochondrial apoptotic priming of human regulatory T cells after allogeneic hematopoietic stem cell transplantation.
Clinical tolerance after allogeneic hematopoietic stem cell transplantation: a study of influencing factors.
Assessing the potential role of photopheresis in hematopoietic stem cell transplant.
Graft Engineering and Adoptive Immunotherapy: New Approaches to Promote Immune Tolerance After Hematopoietic Stem Cell Transplantation.
Immune reconstitution and tolerance after allogeneic hematopoietic stem cell transplantation.
CD4+CD25+ regulatory T cells in hematopoietic stem cell transplantation.
Resetting tolerance in autoimmune disease.
From 'megadose' haploidentical hematopoietic stem cell transplants in acute leukemia to tolerance induction in organ transplantation.

Table A2-43, Cluster 42

Cluster 42 focuses on adverse reactions related to immune checkpoint inhibitor therapy for cancer, emphasizing impacts of the PD-1/PD-L1 blockade (296)
Adverse and unconventional reactions related to immune checkpoint inhibitor therapy for cancer.
Current methods and emerging approaches for detection of programmed death ligand 1.
Regulation of Intrinsic Functions of PD-L1 by Post-Translational Modification in Tumors.
PD1/PD-L1 immune checkpoint as a potential target for preventing brain tumor progression.
Strategies to Improve the Antitumor Effect of Immunotherapy for Hepatocellular Carcinoma.
Immune Checkpoint Inhibitors.
Cardiac Toxicity Associated with Immune Checkpoint Inhibitors: A Systematic Review.
Manipulation of the Immune System for Cancer Defeat: A Focus on the T Cell Inhibitory Checkpoint Molecules.

Immune checkpoint inhibitors for treatment of thymic epithelial tumors: how to maximize benefit and optimize risk?
Programmed cell death-1 and its ligands: Current knowledge and possibilities in immunotherapy.
The role of PD-1 signaling in health and immune-related diseases.
Pivotal role of PD-1/PD-L1 immune checkpoints in immune escape and cancer progression: Their interplay with platelets and FOXP3+Tregs related molecules, clinical implications and combinational potential with phytochemicals.
MET-Oncogenic and JAK2-Inactivating Alterations Are Independent Factors That Affect Regulation of PD-L1 Expression in Lung Cancer.
Translational Biomarkers and Rationale Strategies to Overcome Resistance to Immune Checkpoint Inhibitors in Solid Tumors.
Glycolytic activation of peritumoral monocytes fosters immune privilege via the PFKFB3-PD-L1 axis in human hepatocellular carcinoma.

Table A2-44, Cluster 43

Cluster 43 focuses on T cell tolerance, emphasizing peripheral tolerance in CD8+ T cells (470)
Dickkopf-3, an immune modulator in peripheral CD8 T-cell tolerance.
Generation of human CD8 T regulatory cells by CD40 ligand-activated plasmacytoid dendritic cells.
Peripheral tolerance in CD8+ T cells.
Different mechanisms regulate CD4(+) T cell independent induction of oral and nasal tolerance of CD8(+) T cells.
Distinct mechanisms mediate naive and memory CD8 T-cell tolerance.
Evidence that CD8 T-cell homeostasis and function remain intact during murine pregnancy.
CD4+ T cell help impairs CD8+ T cell deletion induced by cross-presentation of self-antigens and favors autoimmunity.
Cognate CD4+ help elicited by resting dendritic cells does not impair the induction of peripheral tolerance in CD8+ T cells.
CD4+ T cells orchestrate both amplification and deletion of CD8+ T cells.
Cross-presentation: inducing CD8 T cell immunity and tolerance.
Mechanism of T cell tolerance induced by myeloid-derived suppressor cells.
Uncoupling of proliferative potential and gain of effector function by CD8(+) T cells responding to self-antigens.
Tolerogenic maturation of liver sinusoidal endothelial cells promotes B7-homolog 1-dependent CD8+ T cell tolerance.
The ThPOK transcription factor differentially affects the development and function of self-specific CD8(+) T cells and regulatory CD4(+) T cells.
Negligible Role for Deletion Mediated by cDC1 in CD8(+) T Cell Tolerance.

Table A2-45, Cluster 44

Cluster 44 focuses on mechanisms of immune privilege, especially ocular immune privilege (175)
History and physiology of immune privilege.
Ocular immune privilege in the year 2010: ocular immune privilege and uveitis.
A vision of cell death: Fas ligand and immune privilege 10 years later.
Immune privilege or privileged immunity?

Mechanisms of immune privilege in the anterior segment of the eye: what we learn from corneal transplantation.
Ocular immune privilege.
"Corneal Nerves, CD11c(+) Dendritic Cells and Their Impact on Ocular Immune Privilege".
Neuroimmunomodulation and immune privilege: the role of neuropeptides in ocular immunosuppression.
Structural, cellular and molecular aspects of immune privilege in the testis.
Mechanisms of immune privilege in the eye and hair follicle.
CNS infection and immune privilege.
Immune privilege in the anterior chamber of the eye.
What is immune privilege (not)?
Immune privilege of the eye and fetus: parallel universes?
Impact of inflammation on ocular immune privilege.

Table A2-46, Cluster 45

Cluster 45 focuses on enhancing regulatory T cells for tolerance inducing immunotherapy, with some emphasis on FOXP3+ regulatory T cells (877)
Tissue Treg Secretomes and Transcription Factors Shared With Stem Cells Contribute to a Treg Niche to Maintain Treg-Ness With 80% Innate Immune Pathways, and Functions of Immunosuppression and Tissue Repair.
Which types of regulatory T cells play important roles in implantation and pregnancy maintenance?
Foxp3, Regulatory T Cell, and Autoimmune Diseases.
CD4+CD25+ regulatory T cells in transplantation: progress, challenges and prospects.
Natural Tregs and autoimmunity.
Pathological conditions re-shape physiological Tregs into pathological Tregs.
CD45 ligation expands Tregs by promoting interactions with DCs.
Single CD28 stimulation induces stable and polyclonal expansion of human regulatory T cells.
Treg Enhancing Therapies to Treat Autoimmune Diseases.
T-regulatory cells-what relationship with immunosuppressive agents?
Monitoring the frequency and function of regulatory T cells and summary of the approaches currently used to inhibit regulatory T cells in cancer patients.
Cross talk between human regulatory T cells and antigen-presenting cells: Lessons for clinical applications.
FOXP3+ regulatory T cells: from suppression of rejection to induction of renal allograft tolerance.
Regulatory T Cells in Systemic Sclerosis.
Regulatory T cells: a review.

Table A2-47, Cluster 46

Cluster 46 focuses on the immunological basis for recurrent fetal loss and pregnancy complications (484)
Natural killer cells and regulatory T cells in early pregnancy loss.
Innate immune responses to toll-like receptor stimulation are altered during the course of pregnancy.
Pregnancy and rheumatoid arthritis: insights into the immunology of fetal tolerance and control of autoimmunity.

Inflammation-Related Molecules at the Maternal-Fetal Interface during Pregnancy and in Pathologically Altered Endometrium.
Immunologic Memory in Pregnancy: Focusing on Memory Regulatory T Cells.
Functional prominence of natural killer cells and natural killer T cells in pregnancy and infertility: A comprehensive review and update.
The immune system and microbiome in pregnancy.
Lymphocyte Activation in the Development of Immune Tolerance in Women with Recurrent Pregnancy Loss.
Immunological Basis for Recurrent Fetal Loss and Pregnancy Complications.
Dominant immune cells in pregnancy and pregnancy complications: T helper cells (TH1/TH2, TH17/Treg cells), NK cells, MDSCs, and the immune checkpoints.
Innate and Adaptive Immune Systems in Physiological and Pathological Pregnancy.
Cytokine imbalance at materno-embryonic interface as a potential immune mechanism for recurrent pregnancy loss.
Evaluating Markers of Immune Tolerance and Angiogenesis in Maternal Blood for an Association with Risk of Pregnancy Loss.
[The relationship between inflammatory and immunological processes during pregnancy. Practical aspects].
Role of Decidual Natural Killer Cells in Human Pregnancy and Related Pregnancy Complications.

Table A2-48, Cluster 47

Cluster 47 focuses on the role of gut microbiota in the regulation of the immune response (412)
Gut Microbiota Modulation on Intestinal Mucosal Adaptive Immunity.
Adaptive immune education by gut microbiota antigens.
Gut Microbiota, the Immune System, and Cytotoxic T Lymphocytes.
Interactions between Gut Microbiota and Immunomodulatory Cells in Rheumatoid Arthritis.
[The role of gut microbiota in the regulation of the immune response].
Troublesome friends within us: the role of gut microbiota on rheumatoid arthritis etiopathogenesis and its clinical and therapeutic relevance.
Crosstalk Between Gut Microbiota and Innate Immunity and Its Implication in Autoimmune Diseases.
Intestinal microbiota in inflammatory bowel disease: friend of foe?
In Silico Evaluation of Putative S100B Interacting Proteins in Healthy and IBD Gut Microbiota.
Intestinal dysbiosis in systemic lupus erythematosus: cause or consequence?
Influence of gastrointestinal commensal bacteria on the immune responses that mediate allergy and asthma.
The effect of diet on hypertensive pathology: is there a link via gut microbiota-driven immunometabolism?
Enteric Virome Sensing-Its Role in Intestinal Homeostasis and Immunity.
Total Lipopolysaccharide from the Human Gut Microbiome Silences Toll-Like Receptor Signaling.
Immunological Tolerance and Function: Associations Between Intestinal Bacteria, Probiotics, Prebiotics, and Phages.

Table A2-49, Cluster 48

Cluster 48 focuses on mechanisms of tumor escape from the immune system, especially tumor-induced immunosuppression (886)
Mechanisms of tumor escape from the immune system: adenosine-producing Treg, exosomes and tumor-associated TLRs.
The tumor immunosuppressive microenvironment impairs the therapy of anti-HER2/neu antibody. [Tumor-induced immunosuppression].
Impaired function of dendritic cells within the tumor microenvironment.
Tricks tumors use to escape from immune control.
Rat adenocarcinoma 13762 expresses tumor rejection antigens but tumor-bearing animals exhibit tumor-specific immunosuppression.
The mechanisms tumor cells utilize to evade the host's immune system.
Induction of antigen-specific T cell anergy: An early event in the course of tumor progression.
Endothelial cells as key determinants of the tumor microenvironment: interaction with tumor cells, extracellular matrix and immune killer cells.
Tumor expression of 4-1BB ligand sustains tumor lytic T cells.
The Dog as a Model to Study the Tumor Microenvironment.
Tumor-host immune interactions and dendritic cell dysfunction.
Effect of tumor cells and tumor microenvironment on NK-cell function.
Cell-based cancer gene therapy: breaking tolerance or inducing autoimmunity?
Mechanisms of T cell tolerance and suppression in cancer mediated by tumor-associated antigens and hormones.

Table A2-50, Cluster 49

Cluster 49 focuses on induction of immunological tolerance by oral administration of albumin (289)
Induction of immunological tolerance by oral, but not intravenous and intraportal, administration of ovalbumin and the difference between young and old mice.
Allergen-specific immunosuppression by ovalbumin fused with diphtheria toxin in mice sensitized with albumins of different origin.
Ovalbumin-specific IgE modulates ovalbumin-specific T-cell response after repetitive oral antigen administration.
Chemical denaturation of ovalbumin abrogates the induction of oral tolerance of specific IgG antibody and DTH responses in mice.
Antigen-specific T cell activation and proliferation during oral tolerance induction.
Blockade of CTLA-4 promotes airway inflammation in naive mice exposed to aerosolized allergen but fails to prevent inhalation tolerance.
Intranasal treatment with ovalbumin but not the major T cell epitope ovalbumin 323-339 generates interleukin-10 secreting T cells and results in the induction of allergen systemic tolerance.
Suppression of Th1 and Th17, but not Th2, responses in a CD8(+) T cell-mediated model of oral tolerance.
An established immune response against ovalbumin is suppressed by a transferable serum factor produced after ovalbumin feeding: a role of CD25+ regulatory cells.
Intradermal immunization with ovalbumin-loaded poly-epsilon-caprolactone microparticles conferred protection in ovalbumin-sensitized allergic mice.
Transfer of T cells from intranasal ovalbumin-immunized mice ameliorates allergic response in ova-sensitized recipient mice.

[Therapeutic effects of tolerogenic dendritic cells on ovalbumin allergic BALB/c mice].
Platelet Gene Therapy Promotes Targeted Peripheral Tolerance by Clonal Deletion and Induction of Antigen-Specific Regulatory T Cells.
Restricted aeroallergen access to airway mucosal dendritic cells in vivo limits allergen-specific CD4+ T cell proliferation during the induction of inhalation tolerance.
Induction of systemic tolerance in normal but not in transgenic mice through continuous feeding of ovalbumin.

Table A2-51, Cluster 50

Cluster 50 focuses on regulatory T cell therapy in solid organ transplantation (619)
Treg Therapy for the Induction of Immune Tolerance in Transplantation-Not Lost in Translation?
Regulatory Cell Therapy in Organ Transplantation: Achievements and Open Questions.
Clinical transplantation tolerance: the promise and challenges.
Role of T cells in graft rejection and transplantation tolerance.
Transplantation tolerance.
Transplantation tolerance.
Recent Progress in Cell Therapy in Solid Organ Transplantation.
The history and development of organ transplantation: biology and rejection.
[TLR4 and organ transplant rejection].
Relevance of regulatory T cell promotion of donor-specific tolerance in solid organ transplantation.
Immune Tolerance and Rejection in Organ Transplantation.
Avenues for immunomodulation and graft protection by gene therapy in transplantation.
Long-term outcomes of children after solid organ transplantation.
Mesenchymal Stromal Cell Therapy in Solid Organ Transplantation.
Apoptosis, graft rejection, and transplantation tolerance.

Table A2-52, Cluster 51

Cluster 51 focuses on the mechanisms of cancer immunoescape, emphasizing breast cancer (384)
The mechanisms of cancer immunoescape and development of overcoming strategies.
T cell recognition of novel shared breast cancer antigens is frequently observed in peripheral blood of breast cancer patients.
Tumor antigens heterogeneity and immune response-targeting neoantigens in breast cancer.
The Crowded Crosstalk between Cancer Cells and Stromal Microenvironment in Gynecological Malignancies: Biological Pathways and Therapeutic Implication.
The Adaptive Complexity of Cancer.
T cell memory, anergy and immunotherapy in breast cancer.
A current perspective on cancer immune therapy: step-by-step approach to constructing the magic bullet.
Targeted therapies in breast cancer: New challenges to fight against resistance.
Immunosuppression by breast cancer associated p43-effect of immunomodulators.
Immunotherapeutics for breast cancer.
Therapeutic Targeting of Cancer-Associated Fibroblasts in the Non-Small Cell Lung Cancer Tumor Microenvironment.

Immune Reactivation by Cell-Free Fetal DNA in Healthy Pregnancies Re-Purposed to Target Tumors: Novel Checkpoint Inhibition in Cancer Therapeutics.
Re-purposing cancer therapeutics for breast cancer immunotherapy.
Paradigm shift in oncology: targeting the immune system rather than cancer cells.
Neoantigen-based cancer immunotherapy.

Table A2-53, Cluster 52

Cluster 52 focuses on mechanisms of allograft tolerance induction (695)
The assessment of transplantation tolerance induced by anti-CD4 monoclonal antibody in the murine model.
Induction of cardiac allograft tolerance across a full MHC barrier in miniature swine by donor kidney cotransplantation.
Specific B cell tolerance is induced by cyclosporin A plus donor-specific blood transfusion pretreatment: prolonged survival of MHC class I disparate cardiac allografts.
The immunobiology of inductive anti-CD40L therapy in transplantation: allograft acceptance is not dependent upon the deletion of graft-reactive T cells.
New evidence for a role of allograft accommodation in long-term tolerance.
Co-transplantation of donor-derived hepatocytes induces long-term tolerance to cardiac allografts in a rat model.
Kidney-induced cardiac allograft tolerance in miniature swine is dependent on MHC-matching of donor cardiac and renal parenchyma.
[Pretreatment of donor dendritic cells with NBD-peptide prolongs mouse cardiac allograft survival].
Identification of immunodominant donor MHC peptides following rejection and donor strain transfusion-induced tolerance of heart allografts in adult rats.
Spontaneous allograft tolerance in B7-deficient mice independent of preexisting endogenous CD4+CD25+ regulatory T-cells.
Tissue-specific differences in the establishment of tolerance. Tolerogenic effects of lung allografts in rats.
New possibilities of therapeutic interventions in transplantation.
Monotherapy With Anti-CD70 Antibody Causes Long-Term Mouse Cardiac Allograft Acceptance With Induction of Tolerogenic Dendritic Cells.
Long-term cardiac allograft survival across an MHC mismatch after "pruning" of alloreactive CD4 T cells.
Induction of tolerance to heart transplants by simultaneous cotransplantation of donor kidneys may depend on a radiation-sensitive renal-cell population.

Table A2-54, Cluster 53

Cluster 53 focuses on regulatory T cells, emphasizing the role of FOXP3 in their development and function (338)
Regulatory T cells: hypotheses and limitations.
CD8+ regulatory T cells-A distinct T-cell lineage or a transient T-cell phenotype?
Regulatory T cells as potential immunotherapy in allergy.
Human regulatory T cells control TCR signaling and susceptibility to suppression in CD4+ T cells.
Control of regulatory T cell development by the transcription factor Foxp3.

An overview of regulatory T cells.
Crucial role of FOXP3 in the development and function of human CD25+CD4+ regulatory T cells.
Control of T cell responses, tolerance and autoimmunity by regulatory T cells: current concepts.
Mechanisms of action of regulatory T cells specific for paternal antigens during pregnancy.
[Regulatory T cells - a possible promising target in the treatment of autoimmune diseases].
Regulatory T-cell immunotherapy for tolerance to self antigens and alloantigens in humans.
Foxp3: a critical regulator of the development and function of regulatory T cells.
Identification of a previously unknown antigen-specific regulatory T cell and its mechanism of suppression.
What is the role of regulatory T cells in transplantation tolerance?
Molecular and functional characterization of allogantigen-specific anergic T cells suitable for cell therapy.

Table A2-55, Cluster 54

Cluster 54 focuses on allograft immune tolerance induction in rats (402)
Prolongation of corneal allograft survival by CTLA4-FasL in a murine model.
Vascularized whole thymus transplantation in Rowett nude rats: effect of thymus allograft volume on tolerance induction.
Effects of subconjunctival ranibizumab in a presensitized rat model of corneal graft.
[The Effects of Thymosin alpha1 on Immune Function of Mice after Skin Transplantation].
Induction of neonatal immunologic tolerance to heart transplantation by intrathymic myocardial cell inoculation in rats.
[Experimental study on immune tolerance induced by human Ad-CTLA-4Ig in rats with pancreaticoduodenal transplantation].
Recipient bone marrow-derived stromal cells prolong graft survival in a rat hind limb allotransplantation model.
[The effects of sinomenine on the expression of ICAM-1 and IL-2 during the rejection of rat cardiac allograft].
Effects of combined immune therapy on survival and Th1/Th2 cytokine balance in rat orthotopic liver transplantation.
[CD4+CD25+ T cells involved in induction of rat corneal allograft immune tolerance].
[Implication of different expression of IL-2 mRNA and IL-10 mRNA in CD4(+)CD25(+)T cell induced immune tolerance of liver transplantation in rat].
[Effect of T suppressor cells on the maintenance phase of tolerance to cardiac allografts in the rats].
Gemcitabine with cyclosporine or with tacrolimus exerts a synergistic effect and induces tolerance in the rat.
Influence of recipient pretreatment with donor spleen cells and 15-deoxyspergualin on rat skin graft survival.
Prolongation of skin allograft survival by combined feeding of donor spleen cells and cyclosporine in mice.

Table A2-56, Cluster 55

Cluster 55 focuses on mechanisms underlying immune self-tolerance (507)
The immune system victorious: selective preservation of self.

Linkage of immune self-tolerance with the positive selection of T cells.
Breaking self-tolerance in nonobese diabetic mice.
Is T Cell Negative Selection a Learning Algorithm?
Presentation of a self-peptide for in vivo tolerance induction of CD4+ T cells is governed by a processing factor that maps to the class II region of the major histocompatibility complex locus.
Unique T cell antagonist properties of the exact self-correlate of a peptide antigen revealed by self-substitution of non-self-positions in the peptide sequence.
[Foreign and self--the challenge for the immune system].
(Altered) self peptides and the regulation of self reactivity in the peripheral T cell pool.
Central tolerance of T cells.
Self-reactive T cell hybridomas and tolerance. Same range of antigen dose dependence but higher numbers of self-reactive T cell hybridomas from mice in which self-tolerance has been broken by antiserum treatment.
Immune Tolerance Maintained by Cooperative Interactions between T Cells and Antigen Presenting Cells Shapes a Diverse TCR Repertoire.
Thymic selection: to thine own self be true.
Dynamic tuning of T cell reactivity by self-peptide-major histocompatibility complex ligands.
Self major histocompatibility complex class I antigens expressed solely in lymphoid cells do not induce tolerance in the CD4+ T cell compartment.
T cell anergy as a strategy to reduce the risk of autoimmunity.

Table A2-57, Cluster 56

Cluster 56 focuses on autoimmunity, autoimmune diseases, and the role of genetic and epigenetic influences on defective immune tolerance underlying autoimmunity (420)
[Autoimmune thyroid disease and other non-endocrine autoimmune diseases].
The genetics and epigenetics of autoimmune diseases.
Genetic basis of defects in immune tolerance underlying the development of autoimmunity.
Immunologic basis for autoimmunity and the potential influences of xenobiotics.
Polygenic autoimmune disease risk alleles impacting B cell tolerance act in concert across shared molecular networks in mouse and in humans.
Current and future immunomodulation strategies to restore tolerance in autoimmune diseases.
Genetic and epigenetic influences on the loss of tolerance in autoimmunity.
The autoimmune ecology: an update.
Is FCRL3 a new general autoimmunity gene?
Human autoimmune diseases: a comprehensive update.
Endocrine autoimmune disease: genetics become complex.
A methodological review of induced animal models of autoimmune diseases.
Genetic background of tolerance breakdown in rheumatoid arthritis.
Is localized autoimmunity the trigger for rheumatoid arthritis? Unravelling new targets for prevention.
The Role of Viral Infections in the Onset of Autoimmune Diseases.

Table A2-58, Cluster 57

Cluster 57 focuses on mechanisms of virus-induced immunosuppression and subsequent impact on autoimmune diseases (330)

[How the bovine viral diarrhea virus outwits the immune system].
Immunology of hepatitis B infection.
Immunopathogenesis of HIV infection: a specific anti-HIV tolerance as a mechanism of control of disease progression.
Virus-induced immunosuppression: immune system-mediated destruction of virus-infected dendritic cells results in generalized immune suppression.
Cytokine imbalance after measles virus infection has no correlation with immune suppression.
Pathogenesis of chronic hepatitis C: immunological features of hepatic injury and viral persistence.
Measles virus, immune control, and persistence.
Selection of and evasion from cytotoxic T cell responses in the central nervous system.
Bovine viral diarrhea virus quasispecies during persistent infection.
Propagation of respiratory viruses in human airway epithelia reveals persistent virus-specific signatures.
Viral Infections and Autoimmune Disease: Roles of LCMV in Delineating Mechanisms of Immune Tolerance.
Crohn's disease: the case for measles virus.
Chronic Type I IFN Is Sufficient To Promote Immunosuppression through Accumulation of Myeloid-Derived Suppressor Cells.
Current concepts on immunopathogenesis of hepatitis B virus infection.
CDw150(SLAM) is a receptor for a lymphotropic strain of measles virus and may account for the immunosuppressive properties of this virus.

Table A2-59, Cluster 58

Cluster 58 focuses on immunogenic collagen type II peptides in the induction of tolerance to collagen-induced arthritis (189)
Genetic control of tolerance to type II collagen and development of arthritis in an autologous collagen-induced arthritis model.
Systemic versus cartilage-specific expression of a type II collagen-specific T-cell epitope determines the level of tolerance and susceptibility to arthritis.
Differential activities of immunogenic collagen type II peptides in the induction of nasal tolerance to collagen-induced arthritis.
Identification and characterization of a major tolerogenic T-cell epitope of type II collagen that suppresses arthritis in B10.RIII mice.
Mucosal tolerance to experimental autoimmune myasthenia gravis is associated with down-regulation of AChR-specific IFN-gamma-expressing Th1-like cells and up-regulation of TGF-beta mRNA in mononuclear cells.
Cellular mRNA expression of interferon-gamma (IFN-gamma), IL-4 and transforming growth factor-beta (TGF-beta) in rats nasally tolerized against experimental autoimmune myasthenia gravis (EAMG).
Mechanisms of nasal tolerance induction in experimental autoimmune myasthenia gravis: identification of regulatory cells.
Breaking T cell tolerance against self type II collagen in HLA-DR4-transgenic mice and development of autoimmune arthritis.
Intrinsic tolerance in autologous collagen-induced arthritis is generated by CD152-dependent CD4+ suppressor cells.
Type II collagen in cartilage evokes peptide-specific tolerance and skews the immune response.

Nasal tolerance in experimental autoimmune myasthenia gravis (EAMG): induction of protective tolerance in primed animals.
Intravenous tolerization with type II collagen induces interleukin-4-and interleukin-10-producing CD4+ T cells.
Nasal tolerance to experimental autoimmune myasthenia gravis: tolerance reversal by nasal administration of minute amounts of interferon-gamma.
Synthetic peptides fail to induce nasal tolerance to experimental autoimmune myasthenia gravis.
Tolerance induction using lentiviral gene delivery delays onset and severity of collagen II arthritis.

Table A2-60, Cluster 59

Cluster 59 focuses on infection, emphasizing parasite-induced immune tolerance (348)
Plasmodium berghei-Released Factor, PbTIP, Modulates the Host Innate Immune Responses.
Immune Tolerance vs. Immune Resistance: The Interaction Between Host and Pathogens in Infectious Diseases.
Variation and covariation in infectivity, virulence and immunodepression in the host-parasite association Gammarus pulex-Pomphorhynchus laevis.
Friend or foe? The apparent benefits of gregarine (Apicomplexa: Sporozoa) infection in the European earwig.
Susceptible hosts: a resort for parasites right in the eye of the immune response.
Immunodominance: a new hypothesis to explain parasite escape and host/parasite equilibrium leading to the chronic phase of Chagas' disease?
Natural parasite infection affects the tolerance but not the response to a simulated secondary parasite infection.
Comparative transcriptomics reveals CrebA as a novel regulator of infection tolerance in D. melanogaster.
A dual role for immunosuppressor mechanisms in infection with Theileria annulata: well-regulated suppressor macrophages help in recovery from infection; profound immunosuppression promotes non-healing disease.
The impact of mucosal infections on acquisition and progression of tuberculosis.
The role of anorexia in resistance and tolerance to infections in Drosophila.
Infection risk dictates immunological divergence among populations in a Mediterranean lizard.
Parasite immunomodulation and polymorphisms of the immune system.
Infection deflection: hosts control parasite location with behaviour to improve tolerance.
Disease tolerance and immunity in host protection against infection.

Table A2-61, Cluster 60

Cluster 60 focuses on regulation of CD4 T cell tolerance and reactivity to self and non-self (859)
In vivo suppression of naive CD4 T cell responses by IL-2- and antigen-stimulated T lymphocytes in the absence of APC competition.
Interleukin 10 is a growth factor for a population of regulatory T cells.
CD40 stimulation in vivo does not inhibit CD4+ T cell tolerance to soluble antigens.
HLA-Class II Artificial Antigen Presenting Cells in CD4(+) T Cell-Based Immunotherapy.
TCR triggering of anergic CD4 T cells in murine AIDS induces apoptosis rather than cytokine synthesis and proliferation.

Regulation of CD4 T cell reactivity to self and non-self.
Trypanosoma cruzi-induced immunosuppression: selective triggering of CD4+ T-cell death by the T-cell receptor-CD3 pathway and not by the CD69 or Ly-6 activation pathway.
Targeting the TCR: T-cell receptor and peptide-specific tolerance-based strategies for restoring self-tolerance in CNS autoimmune disease.
Regulation of T cell immunity and tolerance in vivo by CD4.
Induction of tolerance in freshly isolated alloreactive CD4+ T cells by activated T cell stimulators.
Mechanisms of peripheral T cell tolerance.
Induction of peripheral T cell tolerance by antigen-presenting B cells. I. Relevance of antigen presentation persistence.
Relative resistance in the development of T cell anergy in CD4+ T cells from simian immunodeficiency virus disease-resistant sooty mangabeys.
Regulation of house dust mite responses by intranasally administered peptide: transient activation of CD4+ T cells precedes the development of tolerance in vivo.
THEMIS enhances the magnitude of normal and neuroinflammatory type 1 immune responses by promoting TCR-independent signals.

Table A2-62, Cluster 61

Cluster 61 focuses on immunosuppression in patients with HIV (452)
[Correlation of the manifestations of tuberculosis and the degree of immunosuppression in patients with HIV].
Germ cell tumors in patients infected by the human immunodeficiency virus.
Clinical observation of Shuanghuang Shengbai Granule () on prevention and treatment of myelosuppression caused by chemotherapy in cancer patients.
Risk for developing tuberculosis among anergic patients infected with HIV.
HIV infection, immune suppression, and uncontrolled viremia are associated with increased multimorbidity among aging injection drug users.
Association between gene expression biomarkers of immunosuppression and blood transfusion in severely injured polytrauma patients.
Relationship of blood transfusion, post-operative infections and immunoreactivity in patients undergoing surgery for gastrointestinal cancer.
Effects of chronic immunosuppression on long-term oncologic outcomes for colorectal cancer patients undergoing surgery.
Perioperative blood transfusion is associated with a gene transcription profile characteristic of immunosuppression: a prospective cohort study.
Mucocutaneous manifestations of human immunodeficiency virus (HIV) infection in children in relation to the degree of immunosuppression.
The efficacy and safety of bevacizumab as a salvage therapy for patients with advanced hepatocellular carcinoma targeting immune tolerance.
Specific immunotherapy in hepatocellular cancer: A systematic review.
[Immodin in the treatment of immunoparalysis in intensive care patients].
[Comparative study of immunologic consequences of autotransfusion and homologous transfusion in lung cancer surgery].
[Useful biological markers in the diagnosis of autoimmune status].

Table A2-63, Cluster 62

Cluster 62 focuses on TNF tolerance in monocytes and macrophages (473)
Monocyte anergy is present in patients with severe acute pancreatitis and is significantly alleviated by granulocyte-macrophage colony-stimulating factor and interferon-gamma in vitro.
Host responses to <i>Renibacterium salmoninarum</i> and specific components of the pathogen reveal the mechanisms of immune suppression and activation.
An optimized protocol for human M2 macrophages using M-CSF and IL-4/IL-10/TGF- β yields a dominant immunosuppressive phenotype.
TNF-alpha is a mediator of the anti-inflammatory response in a human neonatal model of the non-septic shock syndrome.
Impact of alloantigens and storage-associated factors on stimulated cytokine response in an in vitro model of blood transfusion.
Modulation of Decidual Macrophage Polarization by Macrophage Colony-Stimulating Factor Derived from First-Trimester Decidual Cells: Implication in Preeclampsia.
T cells activate the tumor necrosis factor-alpha system during hemodialysis, resulting in tachyphylaxis.
Macrophages with regulatory functions, a possible new therapeutic perspective in autoimmune diseases.
The role of tumor necrosis factor, interferon-gamma, transforming growth factor-beta, and nitric oxide in the expression of immunosuppressive functions of splenic macrophages induced by <i>Mycobacterium avium</i> complex infection.
Mechanisms of brain-mediated systemic anti-inflammatory syndrome causing immunodepression.
Surgical trauma: hyperinflammation versus immunosuppression?
Nitric oxide-mediated immunosuppression following murine <i>Echinococcus multilocularis</i> infection.
Epigallocatechin gallate, a potential immunomodulatory agent of tea components, diminishes cigarette smoke condensate-induced suppression of anti- <i>Legionella pneumophila</i> activity and cytokine responses of alveolar macrophages.
Macrophage heterogeneity in liver injury and fibrosis.
TNF Tolerance in Monocytes and Macrophages: Characteristics and Molecular Mechanisms.

Table A2-64, Cluster 63

Cluster 63 focuses on enhancing versus suppressive effects of stress on immune function, as well as the influence of innate immunity on immune tolerance (929)
Enhancing versus suppressive effects of stress on immune function: implications for immunoprotection and immunopathology.
Influence of Innate Immunity on Immune Tolerance.
The role of innate immune signaling in the pathogenesis of atopic dermatitis and consequences for treatments.
Toll like receptors and autoimmunity: a critical appraisal.
Leukocytes in glomerular injury.
[The role of macrophages in the development of neuroinflammation in multiple sclerosis].
Impact of innate and adaptive immunity on rejection and tolerance.
Interplay between innate and adaptive immunity in the development of non-infectious uveitis.
[Innate immunity and transplantation].
Keeping the balance between immune tolerance and pathogen immunity with endogenous neuropeptides.

Neuroimmunomodulation by nutrition in stress situations.
Innate immunity in allergic disease.
Stressor-induced alterations of adaptive immunity to vaccination and viral pathogens.
Relationship between redox status and cell fate in immunity and autoimmunity.
Long-term reprogramming of the innate immune system.

Appendix 3 – Contributing Factors to Immune System Dysfunctionality – A Brief Summary

The following is a reproduction of the summary component of Chapter 3 of the 2020 monograph (<https://repository.gatech.edu/entities/publication/a5c9c8e9-8cc9-4588-a065-2be90b43b8dc>), which contains the CFs to immune system dysfunction. The numbering of tables is that used in the 2020 monograph.

“Approximately 65% of the retrieved records were evaluated. The extracted contributing factors were assigned to one of five categories (Lifestyle, Iatrogenic, Biotoxin/Biomaterial, Occupational/Environmental, Psychosocial/Socioeconomic), even though many of the contributing factors could have been assigned to multiple categories. Table 3-1 contains contributing factors that have been shown repeatedly to weaken the immune system. They include:

TABLE 3-1
HIGH-FREQUENCY CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM

CATEGORY	CONTRIBUTING FACTOR
LIFESTYLE	smoking, excess alcohol, substance abuse, high-fat diet, protein-deficient diet, high-cholesterol diet, Western-style diets, chronic sleep restriction, etc.
IATROGENIC	immunosuppressive drugs, gamma radiation treatments, nanomedicinal products, adjuvanted vaccines, acetaminophen, non-steroidal antiinflammatory drugs (NSAIDs), surgical stress, serotonin reuptake inhibitors, selected anesthetics, selected antibiotics, highly active antiretroviral therapy drugs, etc.
BIOTOXIN/ BIOMATERIAL	aflatoxin, ochratoxin, T-2 toxin, anatoxin-A, mycotoxins, microcystin-LR, dietary toxic cyanobacteria, yessotoxin, scorpion venom; Streptomyces californicus; Pseudomonas aeruginosa; Rhinovirus, respiratory syncytial virus, etc.
OCCUPATIONAL/ ENVIRONMENTAL	microplastics, endocrine-disrupting chemicals, heavy metals, pesticides/insecticides/herbicides, nanoparticles, perfluorooctanoic acid (PFOA), polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), perfluorooctanesulfonate (PFOS), fine particulate matter, air pollution, acrylamide, aromatic halogenated disinfection byproducts, benzene, benzo(a)pyrene, crude oil, corexit, ultraviolet (UV) radiation, wireless radiation-cell phones/cell towers/WiFi, sodium fluoride, etc.

PSYCHOSOCIAL/ SOCIOECONOMIC	depression, chronic stress, restraint stress, social isolation, stressful life events, childhood adversity, etc.
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Eliminating/ameliorating these toxic exposures/behaviors will require a combination of individual motivations/efforts and government efforts, especially at the regulatory level. The factors in the Lifestyle category mainly require motivation and willpower to eliminate, although government regulation would be beneficial for controlling food additives and labelling contents of processed foods. For the iatrogenic category, government regulation is necessary for ensuring treatment safety. There is room for individual motivation in eliminating excessive or unnecessary use of painkillers, such as NSAIDs or opioids, and unnecessary/elective surgeries.

Members of the Biotoxin/Biomaterial category (especially the Biotoxin component) are more difficult for individuals to eliminate. As we are seeing with COVID-19, virus exposure is difficult to control (as is bacterial exposure). There are many mycotoxins listed in Table 3-1. Those found in food may result from improper storage and insufficient processing to eliminate mycotoxins. Those in indoor environments may result from insufficient moisture/humidity control. Some of these problems can be addressed by stricter government regulations.

The Occupational/Environmental category could benefit substantially from more rigorous government regulation. Most of the exposures are beyond the control of the individual; in fact, the individual most probably doesn't know he/she is being exposed to these substances.

For example, the Occupational Safety and Health Administration (OSHA) has responsibility for regulating most workplace toxic exposures. Out of the more than 85,000 chemicals registered with the EPA, OSHA issues Federally-enforceable Permissible Exposure Limits (PELs) for about 500 of these chemicals. In 2018, the first author published a study of the adequacy of OSHA's PELs [20], using a sampling technique. Of those substances that were sampled, their PELs were one-four orders of magnitude higher than exposures shown in the biomedical literature to cause damage.

As another example, the radiation exposure limits for wireless radiation (cell phone/cell towers/WiFi, etc.) approved by the FCC are from three-six orders of magnitude higher than exposures shown in the biomedical literature to cause damage, the discrepancy varying with the level of damage [21].

But, even in this category, individual choice and motivation play a role. People who want to strengthen their immune systems can choose (especially in the home environment, and partly in the work environment) to reduce exposure to wireless radiation, water with sodium fluoride, strong pesticides, strong disinfectants, etc.

The PsychoSocial/SocioEconomic category could benefit from some government interventions that reduce stressful situations for the individual (e.g., providing economic/health/occupational security, providing more protections for the most vulnerable (very young, elderly, disabled), etc.). Some of the types of adverse events and stresses are beyond the control of government or the individual, but here again, the individual can take steps to improve their responses to many of these types of stress.

Most of the studies, especially the laboratory studies, that gathered the data reported in Table 3-1 and the more extensive [Table A4-1](#) (shown in [Appendix 4](#)) focused on the effects of one stressor/toxic stimulus in isolation. In real-life, people are exposed to myriad toxic stimuli, both in parallel and over

different time periods. Typically, when toxic stimuli are combined, less of each constituent of the combination is required to cause damage compared to the amount determined from single stressor experiments.....Thus, real-life weakening of the immune system from myriad exposures to the toxic stimuli in Table 3-1 (and Table A4-1) is far greater than that reported in the single toxic stimulus studies.”