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# Adverse Events with Biomedicines

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Giuseppe Tridente

# Adverse Events with Biomedicines

Prevention Through Understanding

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*Ex bono malum*  
*Ex malo bonum*

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## Part V Overview

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## Abbreviations

|           |                                       |
|-----------|---------------------------------------|
| 5FU       | 5-Fluorouracil                        |
| A&U       | Angioedema and urticaria              |
| AA        | Aplastic anemia/allergic asthma       |
| AAO       | American Academy of Ophthalmology     |
| AAV       | ANCA-associated vasculopathy          |
| ACCP      | American College of Chest Physicians  |
| ACS       | Acute coronary syndrome               |
| ACV       | Acyclovir                             |
| ADA       | Anti-drug antibody                    |
| ADC       | Antibody-drug conjugate               |
| ADCC      | Antibody dependent cell cytotoxicity  |
| ADR/ADE   | Adverse drug reaction/event           |
| ADRS/ARDS | Acute distress respiratory syndrome   |
| AE/AR     | Adverse event/reaction                |
| AFND      | Acute febrile neutrophilic dermatosis |
| AID/sAID  | Autoimmune disorders/secondary        |
| AIHA/AHA  | Autoimmune hemolytic anemia           |
| ALCL      | Anaplastic large cell lymphoma        |
| ALL       | Acute lymphoblastic leukemia          |
| ALP       | Alkaline phosphatase                  |
| ALS/G     | Anti-lymphocyte serum/globulin        |
| ALT       | Alanine transaminase                  |
| AMD       | Age-related macular degeneration      |
| AMF       | Autocrine motility factor             |
| AML       | Acute myeloid leukemia                |
| ANA       | Anti-nuclear antibody                 |
| ANC       | Absolute neutrophil blood count       |
| ANCA      | Anti neutrophil cytoplasmic antibody  |
| APC       | Antigen presenting cell               |
| APRIL     | Another proliferation inducing ligand |
| ARDS/ADRS | Acute respiratory distress syndrome   |
| AREG      | Amphiregulin                          |
| ARF       | Acute renal failure                   |
| AS        | Ankylosing spondylitis                |

|         |   |
|---------|---|
| ASCT    | Allogenic stem cell transplant  |
| AST     | Aspartate transaminase  |
| ATE     | Arterial thromboembolic events  |
| ATG     | Anti-thymocyte globulin   |
| AZA     | Azathyoprine  |
| B cells | Bone-marrow dependent lymphocytes                                     |
| B-PLL   | B-cell prolymphocytic leukemia  |
| B&J     | Bone and joint  |
| BAE     | Biological adverse event  |
| BBB     | Blood brain barrier   |
| BBW     | Black box warning   |
| BC/mBC  | Breast cancer/metastatic  |
| BCC     | Basal cell carcinoma  |
| BCL     | B-cell leukemia/lymphoma  |
| BCMA    | B cell maturation antigen   |
| BCRP    | Breast cancer resistant protein                                       |
| BFU-E   | Burst forming unit erythroid  |
| BKV     | Polyoma virus BK  |
| BmD     | Bone marrow depression/hypoplasia                                     |
| BRB     | Blood retinal barrier   |
| BRM     | Biological response modifiers   |
| BR3     | BlyS receptor 3   |
| BRVO    | Lateral branch retinal vein obstruction                               |
| BUN     | Blood urea nitrogen   |
| c-Fms   | Transmembrane receptor tyrosine kinase for M-CSF                      |
| C&P     | Chemical injury and poisoning   |
| CAD/CAO | Coronary artery disease/occlusion                                     |
| CAPS    | Cryopyrin associated periodic syndromes                               |
| CC      | Colon cancer  |
| cCTL    | Cutaneous T cell lymphoma   |
| CD      | Crohn's disease   |
| CDC     | Complement dependent cytotoxicity                                     |
| CDR     | Complementary-determining region                                      |
| CEP     | Chronic eosinophilic pneumonia  |
| CERA    | Continuous erythropoietin receptor activators                         |
| CF      | Cystic fibrosis   |
| CFC/CFU | Colony forming cell/unit  |
| CGD     | Chronic granulomatous disease   |
| CHD     | Congenital heart disease  |
| CHF     | Congestive heart failure  |
| CHOP    | Cyclophosphamide, vincristine, prednisolone, adriamycin (doxorubicin) |
| CHP     | Cytophagic histiocytic panniculitis                                   |
| CHVP    | Cyclophosphamide, doxorubicin, teniposide/etoposide, prednisone       |

---

|                   |   |
|-------------------|---|
| CID               | Chronic immune-mediated disease   |
| CINCA             | Chronic infantile neurological cutaneous articular syndrome               |
| CIT               | Chemotherapy-induced thrombocytopenia                                     |
| CKD               | Chronic kidney disease  |
| CLL               | Chronic lymphocytic leukemia  |
| CLS               | Capillary leak syndrome   |
| CMV               | Cytomegalovirus   |
| CNS               | Central nervous system  |
| CNTF              | Ciliary neurotrophic factor   |
| COPD              | Chronic obstructive pulmonary disease                                     |
| CPK               | Creatine phospho kinase   |
| CRC/mCRC          | Colo-rectal cancer/metastatic   |
| CRF               | Chronic renal failure   |
| CRP               | C-reactive protein  |
| CRS/CRRS          | Cytokine release (related) syndrome                                       |
| CRVO              | Central retinal vein obstruction  |
| CS                | Corticosteroids   |
| CSF/-1R/M-/G-/GM- | Colony stimulating factor/type 1 receptor/macrophage/<br>granulocyte      |
| CSS               | Churg-Strauss syndrome  |
| CTCAE             | Common terminology criteria for adverse events classification (grade 1–5) |
| cTCL              | Cutaneous T cell lymphoma   |
| CTLA-4            | Cytotoxic T lymphocyte antigen-4  |
| CVA/CVD           | Cerebro-vascular accident/disorder  |
| CVE               | Cardio-vascular events  |
| CVP               | Cyclosporine, vincristine, prednisolone                                   |
| CYA/CsA           | Cyclosporin A   |
| D&G               | Dental and gingival   |
| DC                | Dendritic cell  |
| DIC               | Disseminated intravascular coagulation                                    |
| DIH               | Drug-induced hepatitis  |
| DIHS              | Drug-induced hypersensitivity syndrome                                    |
| DIPG              | Diffuse intrinsic pontine glioma  |
| DIRA              | Deficiency of IL-1Ra  |
| DLBCL             | Diffuse large B cell lymphoma   |
| DLT               | Dose-limiting toxicity  |
| DMARD             | Disease-modifying antirheumatic drug                                      |
| DME               | Diabetic macular edema  |
| DRAE              | Drug-related adverse event  |
| DRESS             | Drug reaction with eosinophilia and systemic syndrome                     |
| dsDNA             | Double-stranded DNA   |
| DT                | Diphtheria toxin  |
| DVT               | Deep vein thrombosis  |
| E/T               | Embolia/thrombosis  |

---

|                |  |
|----------------|--|
| EBV            | Epstein-Barr virus                                   |
| ECL            | Electrochemiluminescence                             |
| EFD            | Ejection fraction decrease (cardiac)                 |
| EGF/EGFR       | Epithelial growth factor/receptor                    |
| ELAM           | Endothelial-leukocyte adhesion molecule (E-selectin) |
| EM             | Erythema multiforme                                  |
| EMA/EMEA       | European Medicines Agency                            |
| EOC            | Epithelial ovarian cancer                            |
| EpCAM          | Epithelial cell adhesion molecule                    |
| EPO/EpoR       | Erythropoietin/receptor                              |
| ERA            | Enthesitis-related arthritis                         |
| Erb            | Erythroblastic leukemia viral oncogene (EGFR, HER)   |
| EREG           | Epiregulin   |
| ESA            | Erythropoiesis stimulating agents                    |
| ESI            | Events of special interest/emergency severity index  |
| EUV            | Eudravigilance, Europe                               |
| FA             | Folic acid   |
| FAERS/AERS     | FDA adverse events reporting system                  |
| FBS            | Foreign body sensation (eye)                         |
| FC             | Fludarabine, cyclophosphamide                        |
| FCAS           | Familial cold autoimmune syndrome                    |
| FCUS           | Familial cold urticaria syndrome                     |
| FDA            | Food and drug administration, USA                    |
| FGF/FGFR       | Fibroblast growth factor/receptor                    |
| FCL            | Follicle center lymphoma                             |
| FL             | Follicular lymphoma                                  |
| FLS            | Flu-like syndrome                                    |
| FLT3           | Fms-like tyrosine kinase-3                           |
| FMF            | Familial mediterranean fever                         |
| FOLFIRI/FOLFOX | 5-FU, leucovorin, irinotecan/oxaliplatin             |
| FP             | Fusion protein                                       |
| FTC            | Fallopian tube cancer                                |
| GA             | Gout arthritis                                       |
| G-CSF          | Granulocyte colony stimulatory factor                |
| G-CSF/GM-CSF   | Granulocyte/monocyte colony stimulatory factor       |
| GBM            | Glioblastoma multiforme                              |
| GBS            | Guillain-Barrè syndrome                              |
| GC/mGC         | Gastric cancer/metastatic                            |
| GCV            | Ganciclovir  |
| GFR            | Glomerular filtration rate                           |
| GI             | Gastro-intestinal                                    |
| GIP            | Gastro-intestinal perforation                        |
| GIST           | Gastro-intestinal stromal tumor                      |
| GN             | Glomerulonephritis                                   |
| GU             | Genito-urinary                                       |

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|               |   |
|---------------|---|
| GvH/GvHR/GHVD | Graft versus host/reaction/disease                              |
| HA            | Hemolytic anemia  |
| HAART         | Highly active antiretroviral therapy                            |
| HACA          | Human anti-chimeric antibodies                                  |
| HAHA          | Human anti-human antibodies                                     |
| HALT          | Hormone ablation therapy  |
| HAMA          | Human anti-mouse antibodies                                     |
| HB-EGF        | Heparin-binding epithelial growth factor                        |
| HBV/HCV       | Hepatitis viruses   |
| HCC           | Hepatocellular carcinoma  |
| HCL           | Hairy cell leukemia   |
| HE            | Hemorrhagic events  |
| HER1,2..      | Human epidermal growth factors                                  |
| HES           | Hypereosinophilic syndrome                                      |
| HFS           | Hand-foot syndrome (palmar-plantar erythrodysesthesia syndrome) |
| HGF           | Hepatocyte growth factor  |
| HIF           | Hypoxia-inducible factor  |
| HL            | Hodgkin's lymphoma  |
| HLH/HPS       | Hemophagocytic lymphohistiocytosis/syndrome                     |
| H&N           | Head and neck   |
| HNC           | Head and neck carcinoma   |
| HS            | Hidradenitis suppurativa  |
| HSCT          | Hematopoietic stem cell transplantation                         |
| HSTCL         | Hepatosplenic T cell lymphoma                                   |
| HSV           | Herpes simplex virus  |
| HT            | Heart transplant  |
| HUS/aHUS      | Hemolytic uremic syndrome/atypical                              |
| HZV           | Herpes zoster virus   |
| IBD           | Inflammatory bowel disease                                      |
| ICAM          | Intracellular adhesion molecule                                 |
| ICH           | Intracranial hemorrhage   |
| IDS           | Immunodeficiency syndrome                                       |
| IFL           | Irinotecan/fluorouracil/leucovorin                              |
| IFN           | Interferon  |
| IGF-1         | Insuline-like growth factor 1                                   |
| IL-1, 2, 3    | Interleukins  |
| IL-1Ra        | IL-1 receptor antagonist  |
| IL-1RAP       | IL-1 receptor accessory protein                                 |
| ILD           | Interstitial lung disease                                       |
| IMID          | Immune-mediated inflammatory disease                            |
| INN           | International nonproprietary name                               |
| INR           | International normalized ratio (prothrombin time)               |
| IOP           | Increased intraocular pressure                                  |
| IP            | Intraperitoneal administration                                  |

|                        |  |
|------------------------|--|
| IR/IRR/IRS             | Infusion (related) reaction/syndrome                             |
| IrADR/IrADE            | Immune-related adverse drug reaction/event                       |
| IRIS                   | Immune reconstitution inflammatory syndrome                      |
| ISR                    | Injection site reaction  |
| ITAM                   | Immunoreceptor activation motif                                  |
| ITCP/ITP               | Immune thrombocytopenia  |
| ITIM                   | Immunoreceptor tyrosine-based inhibitory motif                   |
| Itk                    | IL-2 inducible leukocyte tyrosine kinase                         |
| IV                     | Intra-venous administration                                      |
| IVI                    | Intra-vitreous injection   |
| JAK                    | Janus associated kinase  |
| JCA                    | Juvenile chronic arthritis                                       |
| JIA                    | Juvenile idiopathic arthritis                                    |
| JRA                    | Juvenile rheumatoid arthritis                                    |
| JC/JCV                 | John Cunningham polyomavirus                                     |
| KGF                    | Keratinocyte growth factor                                       |
| Kit/c-kit              | Tyrosine kinase receptor, or CD117, or stem cell factor receptor |
| KLH                    | Keyhole limpet hemocyanin  |
| KRAS                   | Kirsten rat sarcoma viral oncogene (V-Ki-ras2)                   |
| KSHV                   | Kaposi sarcoma-associated herpesvirus                            |
| LAK                    | Lymphokine-activated killer cells                                |
| LBL                    | Lymphoblastic leukemia/lymphoma                                  |
| LCF                    | Lymphocyte chemoattractant factor                                |
| Lck                    | Lymphocyte specific protein tyrosine kinase                      |
| LCV                    | Leukocytoclastic vasculitis                                      |
| LFA-1                  | Lymphocyte function-associated antigen-1                         |
| LFT                    | Liver functional tests (ALT/AST,etc)                             |
| LIF                    | Leukemia inhibitory factor                                       |
| LLS                    | Lupus-like syndrome  |
| LRTI/D                 | Lower respiratory tract infections/disorders                     |
| LT- $\alpha$ / $\beta$ | Lymphotoxins   |
| LT                     | Liver transplant   |
| LVD/LVCD/LVEF          | Left ventricular cardiac dysfunction/ejection fraction           |
| mAb                    | Monoclonal antibody  |
| MAC                    | Membrane attack complement complex                               |
| MACE                   | Major adverse cardiovascular event                               |
| MAF                    | Macrophage activating factor                                     |
| MAH                    | Market authorization holder                                      |
| MALT                   | Mucosal associated lymphoid tissue                               |
| MAPK                   | Mitogen-activated protein kinase                                 |
| MAS                    | Macrophages activation syndrome                                  |
| MCL                    | Mantle cell lymphoma   |
| MCP-1                  | Monocyte chemotactic protein-1                                   |
| MDS                    | Myelo-dysplastic syndrome  |

---

|         |   |
|---------|---|
| MF      | Mycosis fungoides                                       |
| MF/MFN  | Myelofibrosis/myeloproliferative neoplasm               |
| MI      | Myocardial infarction                                   |
| MIP-1,2 | Macrophage inflammatory proteins                        |
| MLC/MLR | Mixed lymphocyte culture/reaction                       |
| MM      | Malignant melanoma                                      |
| MMF     | Mycophenolate mofetil                                   |
| MMP3    | Matrix-metalloproteinase-3                              |
| MO      | Malignant osteoporosis                                  |
| MOF     | Multi-organ failure                                     |
| MOMP    | Mitochondrial outer membrane permeabilization           |
| MPA     | Microscopic polyangiitis                                |
| MR      | Mucocutaneous reactions                                 |
| MRA     | Myeloma receptor antibody                               |
| MS      | Multiple sclerosis                                      |
| MTD     | Maximum tolerated dose                                  |
| MTX     | Methotrexate  |
| MWS     | Muckle-Wells syndrome                                   |
| NCCN    | National Comprehensive Cancer Network                   |
| NESP    | Novel erythropoiesis-stimulating protein                |
| NF      | Nephrotic syndrome                                      |
| NHA     | Non-erythrocytic anemia                                 |
| NHL     | Non-Hodgkin's lymphoma                                  |
| NK      | Natural killer cells                                    |
| NKCL    | NK cell lymphoma  |
| NMO     | Neuromyelitis optica                                    |
| NMSC    | Non-melanoma skin cancer                                |
| NODAT   | New onset diabetes after transplantation                |
| NOMID   | Neonatal onset multisystem inflammatory disorder        |
| NPC     | Nasopharyngeal carcinoma                                |
| NPSLE   | Neuropsychiatric SLE                                    |
| NSAID   | Non-steroidal anti-inflammatory drug                    |
| NSCLC   | Non-small cell lung carcinoma                           |
| oJIA    | Oligoarticular JIA                                      |
| ON      | Optic neuritis  |
| ONJ     | Osteonecrosis of the jaw                                |
| OP      | Osteoporosis  |
| OPG     | Osteoprotegerin   |
| P&R     | Peritoneal and retroperitoneal                          |
| PAMP    | Pathogen associated molecular patterns                  |
| PAPA    | Pyogenic arthritis, pyoderma gangrenosum, acne syndrome |
| PAR     | Perennial allergic rhinitis                             |
| PBPC    | Peripheral blood precursor cells                        |
| PBSCT   | Peripheral blood stem cell transplant                   |
| PC      | Prostate cancer   |



---

|            |  |
|------------|--|
| PDGF/PDGFR | Platelet-derived growth factor/receptor                          |
| PE         | Pulmonary embolism   |
| PEDF       | Pigment epithelium-derived growth factor (ocular)                |
| PEG        | Polyethylene glycol  |
| PG         | Pyoderma gangrenosum   |
| PGF/PIGF   | Placental growth factor  |
| PJIA       | Polyarticular juvenile idiopathic arthritis                      |
| PK/PKD     | Pharmacokinetics/dynamics  |
| PM/DM      | Polymyositis/dermatomyositis                                     |
| PML        | Progressive multifocal leukoencephalopathy                       |
| PMN; PNP/m | Peripheral motor neuropathy                                      |
| PMO        | Postmenopausal osteoporosis                                      |
| PNP        | Peripheral neuropathy  |
| PNS        | Paraneoplastic syndrome  |
| PNH        | Paroxysmal nocturnal hemoglobinuria                              |
| PPC        | Primary peritoneal cancer  |
| PPES       | Palmar-plantar erythrodysesthesia syndrome                       |
| PPMS       | Primary progressive multiple sclerosis                           |
| PRCA       | Pure red cell aplasia  |
| Ps         | Psoriasis  |
| PsA        | Psoriatic arthritis  |
| PSN; PNP/s | Peripheral sensory neuropathy                                    |
| Psoralens  | Drugs containing chemicals reacting to ultraviolet light         |
| PTCA       | Percutaneous transluminal coronary angioplasty                   |
| PTEN       | Phosphatase and tensin homolog                                   |
| PTLD       | Post-transplant lymphoproliferative disorder                     |
| PUVA       | Psoralen and ultraviolet A therapy                               |
| RA         | Rheumatoid arthritis   |
| RANK/RANKL | Receptor activator of nuclear factor kappa-B receptor/<br>ligand |
| RBS/nRBC   | Red blood cells/nucleated RBC                                    |
| RCA        | Red cell aplasia   |
| RCC/mRCC   | Renal cell carcinoma/metastatic                                  |
| ReA        | Reactive arthritis   |
| REMS       | Risk evaluation and mitigation strategy—program                  |
| RPLS/PRES  | Reversible posterior (leuco)-encephalopathy syndrome             |
| RRMS       | Relapsing remitting multiple sclerosis                           |
| RTK        | Receptor tyrosine kinases  |
| RVO        | Retinal vein obstruction   |
| SAA        | Serum amyloid A  |
| SADE/SADR  | Suspected adverse event/reaction                                 |
| SAE        | Serious adverse event  |
| sALCL      | systemic anaplastic large cell lymphoma                          |
| SAR        | Seasonal allergic rhinitis                                       |
| SC         | Subcutaneous administration                                      |

---

|         |   |
|---------|---|
| SCC     | Squamous cell carcinoma   |
| SCCHN   | Squamous cell carcinoma, head and neck  |
| SCLC    | Small cell lung carcinoma   |
| SCF     | Stem cell factor  |
| ser     | Serious   |
| sev     | Severe  |
| SIE     | Serious infection event   |
| SIR     | Standardized incidence ratio  |
| SIRS    | Systemic inflammatory response syndrome   |
| SJIA    | Systemic juvenile idiopathic arthritis  |
| SJS     | Stevens-Johnson syndrome  |
| SLE     | Systemic lupus erythematosus  |
| SM      | Systemic mastocytosis   |
| SOC     | Standard of care (therapy)  |
| SRA     | Soluble receptor analogue   |
| SRE     | Skeletal-related event  |
| SS      | Sjögren's syndrome  |
| SSLS    | Serum sickness-like syndrome  |
| STATs   | Signal transducers and activators of transcription                              |
| SUSAR   | Suspected unexpected serious adverse reaction                                   |
| SzS     | Sézary syndrome   |
| T cells | Thymus-dependent lymphocytes  |
| TAC     | Tacrolimus  |
| TACE    | TNF- $\alpha$ converting enzyme   |
| TACI    | Transmembrane activator and calcium modulator and cyclophilin ligand interactor |
| TB      | Tuberculosis  |
| TCC     | Thrombocytosis  |
| TCL     | T cell lymphoma   |
| TCP/TP  | Thrombocytopenia  |
| TCR     | T cell receptor   |
| TEAE    | Treatment emergent adverse event  |
| TEN     | Toxic epidermal necrolysis  |
| TGA     | Therapeutic Goods Administration, Australia, New Zealand                        |
| TGF     | Transforming growth factor  |
| TIA     | Transient ischemic attack   |
| TKI     | Tyrosine kinase inhibitor   |
| TLS     | Tumor lysis syndrome  |
| TNF     | Tumor necrosis factor   |
| TPO     | Thrombopoietin  |
| TRAF    | TNF receptor-associated factor(s)   |
| TRAP    | TNF receptor-associated periodic syndrome                                       |
| TSH     | Thyroid stimulating hormone   |
| TVA     | Thrombosis of vascular access   |

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|               |  |
|---------------|--|
| TYK           | Tyrosine kinase                              |
| UC            | Ulcerative colitis                           |
| UF            | Unknown frequency                            |
| ULN/LLN       | Upper/lower limit of normal                  |
| URI/URTI/URTD | Upper respiratory (tract) infection/disorder |
| URTD          | Upper respiratory tract disorders            |
| uSpA          | Undifferentiated spondyloarthritis           |
| UT/UTI        | Urinary tract/infection                      |
| VEGF/VEGFR    | Vascular endothelial growth factor/receptor  |
| VIT           | Venom immunotherapy                          |
| VOD           | Hepatic veno-occlusive disease               |
| VP1           | Viral protein1 (JCV)                         |
| VTE           | Venous thrombotic event/thromboembolism      |
| WBC           | White blood cells                            |
| W&E           | Water and electrolytes                       |
| WG            | Wegener granulomatosis                       |