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**Report from the
National Birth Defect Registry
Birth Defects in Vietnam Veterans' Children**



**BIRTH DEFECT RESEARCH
FOR CHILDREN, INC**

Birth Defects Research for Children, Inc.

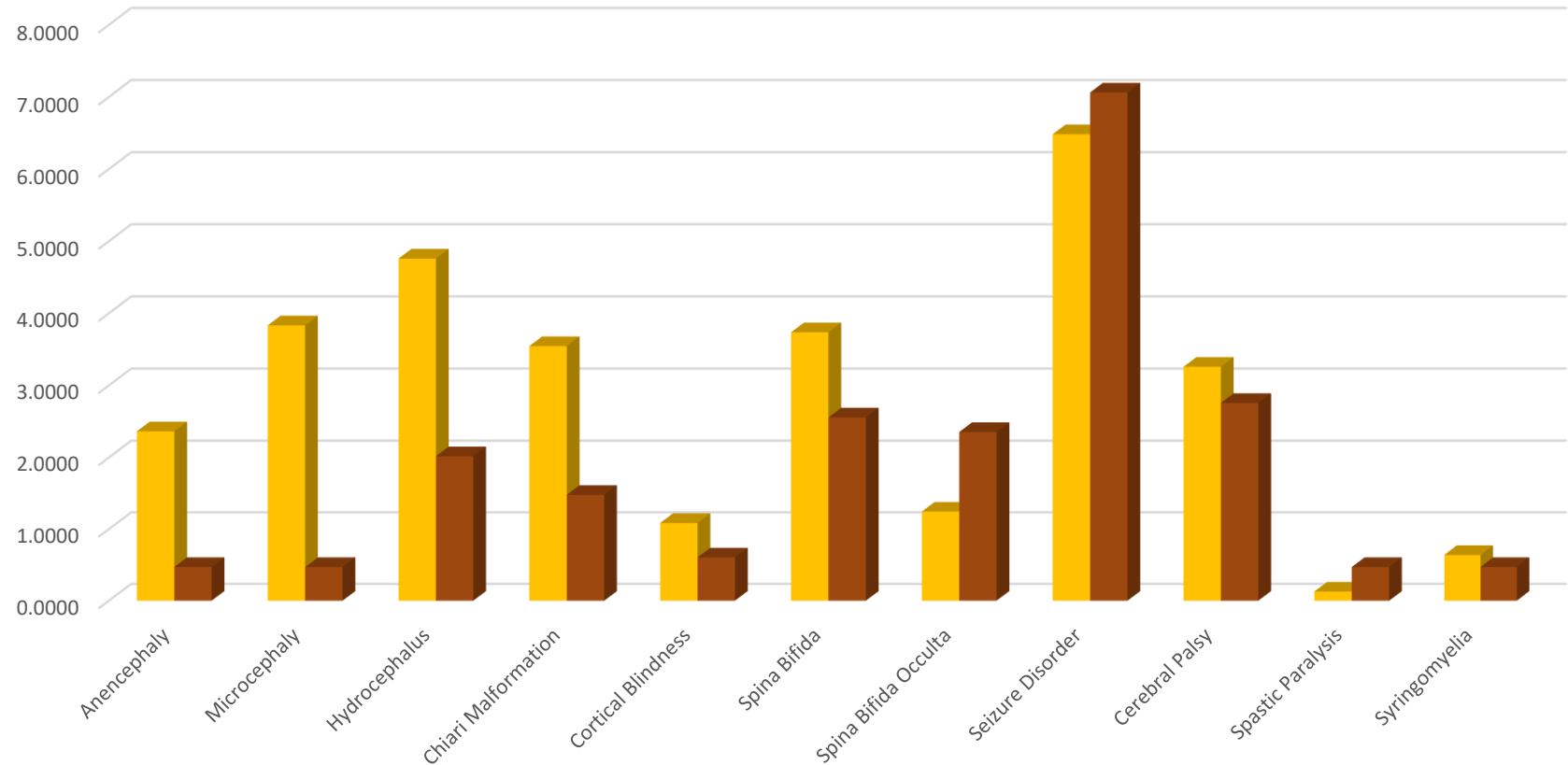
National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Agent Orange was a combination of two defoliants, 2-45T and 2-4D, contaminated by dioxin (TCDD), a toxic byproduct of the chemical production process. Over 19 million gallons of herbicides were sprayed in Vietnam between 1962-1971 to destroy crops and ground cover. The current scientific evidence argues not only that dioxin is a potent carcinogen, but that it appears to have even more profound non-cancer health and environmental hazard effects that include reproductive, developmental and immunological defects. Dioxin appears to act like a persistent synthetic hormone interfering with important physiological signaling systems that can lead to altered cell development, differentiation and regulation. This National Birth Defect Registry report shows the differences in structural and functional birth defects in the children of 1457 Vietnam veterans compared to 3131 children of non-veterans in the registry.

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Non-Veteran
Vietnam Veteran



Total Participants: 4618

Non-Veterans: 3131

Vietnam Veterans: 1487

File: 05/23/2017

Central Nervous System Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

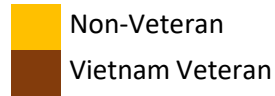
Central Nervous System Defects

Cases per 100

	Non Veterans	Vietnam Veterans
Anencephaly	2.3635	0.4707
Microcephaly	3.8326	0.4707
Hydrocephalus	4.7589	2.0175
Chiari Malformation	3.5452	1.4795
Cortical Blindness	1.0859	0.6052
Spina Bifida	3.7368	2.5555
Spina Bifida Occulta	1.2456	2.3537
Seizure Disorder	6.4836	7.0612
Cerebral Palsy	3.2577	2.7572
Spastic Paralysis	0.1278	0.4707
Syringomyelia	0.6388	0.4707

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

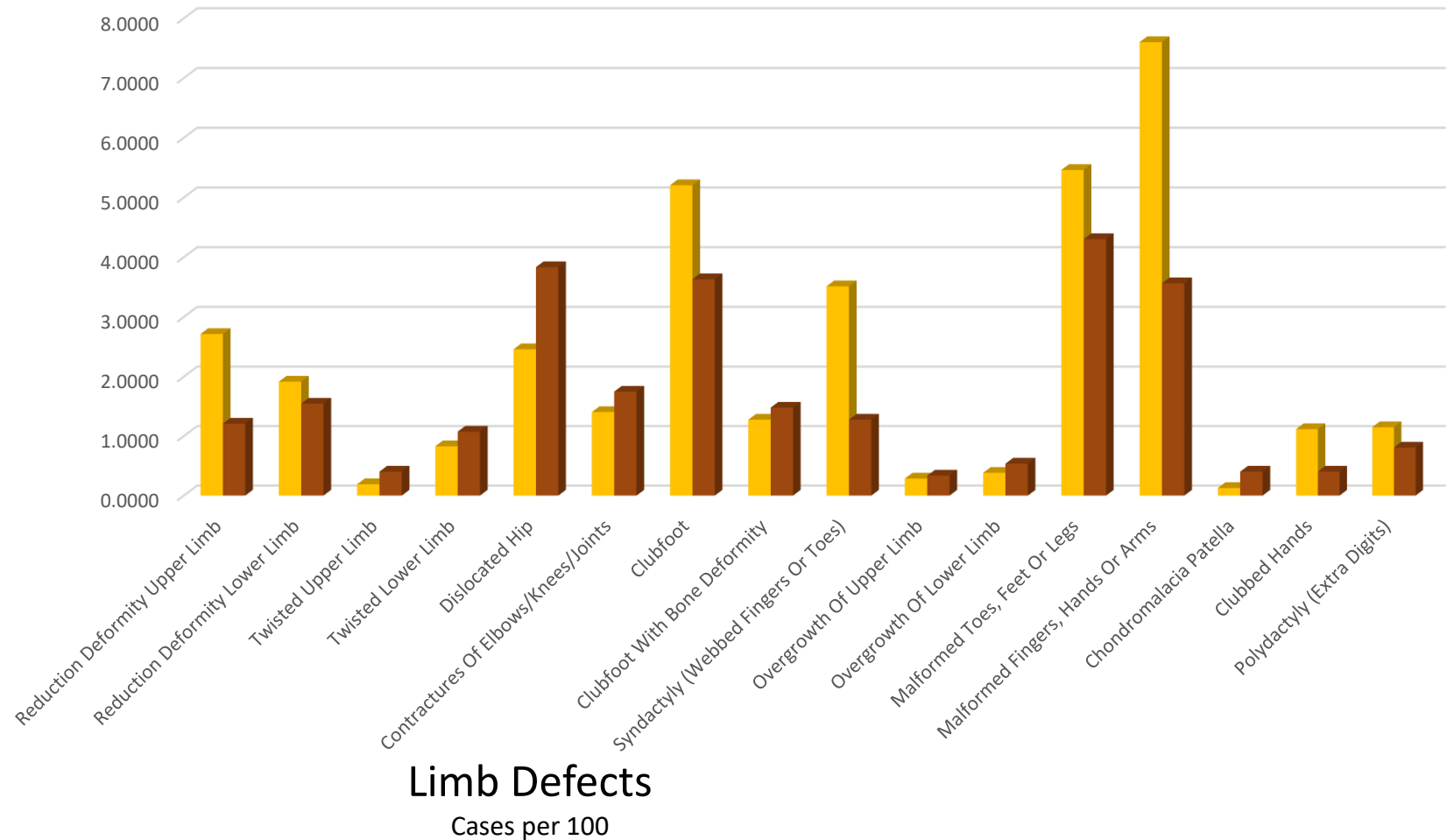


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Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

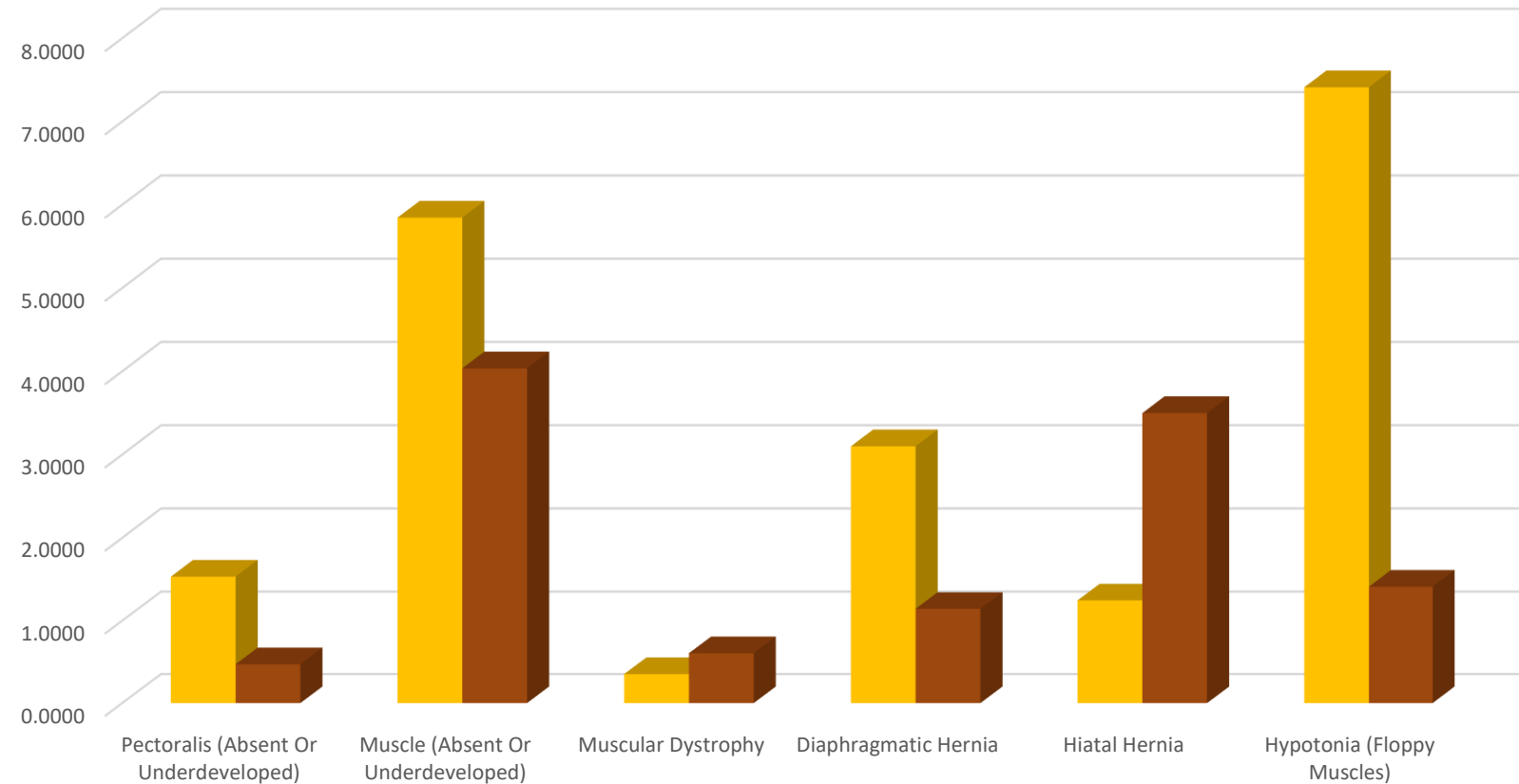
Limb Defects

	Cases per 100	Non Veterans	Vietnam Veterans
Reduction Deformity Upper Limb		2.7148	1.2105
Reduction Deformity Lower Limb		1.9163	1.5467
Twisted Upper Limb		0.1916	0.4035
Twisted Lower Limb		0.8304	1.0760
Dislocated Hip		2.4593	3.8332
Contractures Of Elbows/Knees/Joints		1.4053	1.7485
Clubfoot		5.2060	3.6315
Clubfoot With Bone Deformity		1.2775	1.4795
Syndactyly (Webbed Fingers Or Toes)		3.5133	1.2777
Overgrowth Of Upper Limb		0.2874	0.3362
Overgrowth Of Lower Limb		0.3833	0.5380
Malformed Toes, Feet Or Legs		5.4615	4.3040
Malformed Fingers, Hands Or Arms		7.6014	3.5642
Chondromalacia Patella		0.1278	0.4035
Clubbed Hands		1.1179	0.4035
Polydactyly (Extra Digits)		1.1498	0.8070

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Muscle Defects

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Muscle Defects

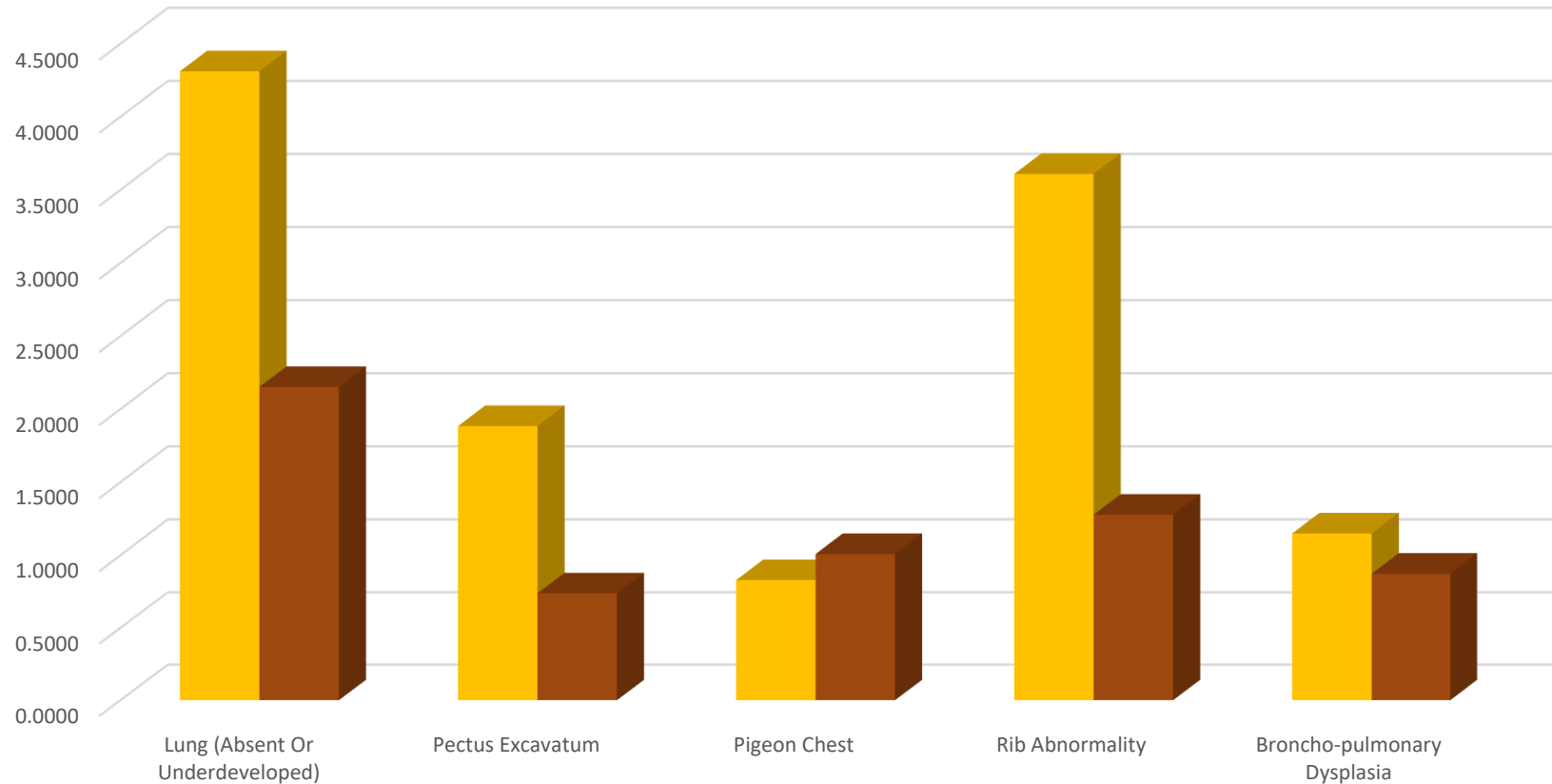
Cases per 100

	Non Veterans	Vietnam Veterans
Pectoralis (Absent Or Underdeveloped)	1.5331	0.4707
Muscle (Absent Or Underdeveloped)	5.8448	4.0350
Muscular Dystrophy	0.3513	0.6052
Diaphragmatic Hernia	3.0981	1.1432
Hiatal Hernia	1.2456	3.4970
Hypotonia (Floppy Muscles)	7.4098	1.4122

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Chest Defects

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Chest Defects

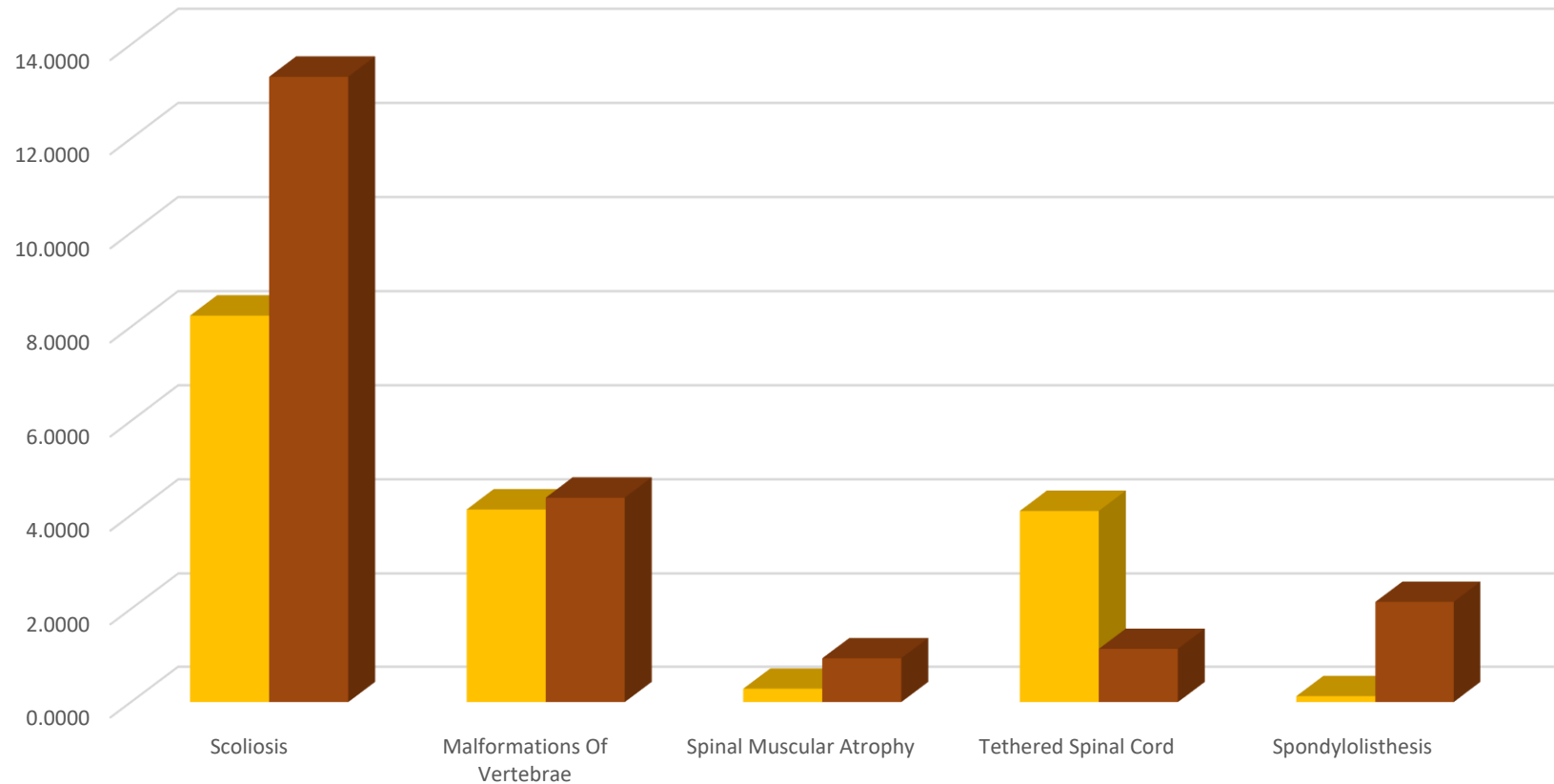
Cases per 100

	Non Veterans	Vietnam Veterans
Lung (Absent Or Underdeveloped)	4.3117	2.1520
Pectus Excavatum	1.8844	0.7397
Pigeon Chest	0.8304	1.0087
Rib Abnormality	3.6091	1.2777
Broncho-pulmonary Dysplasia	1.1498	0.8742

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Spine Defects

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Spine Defects

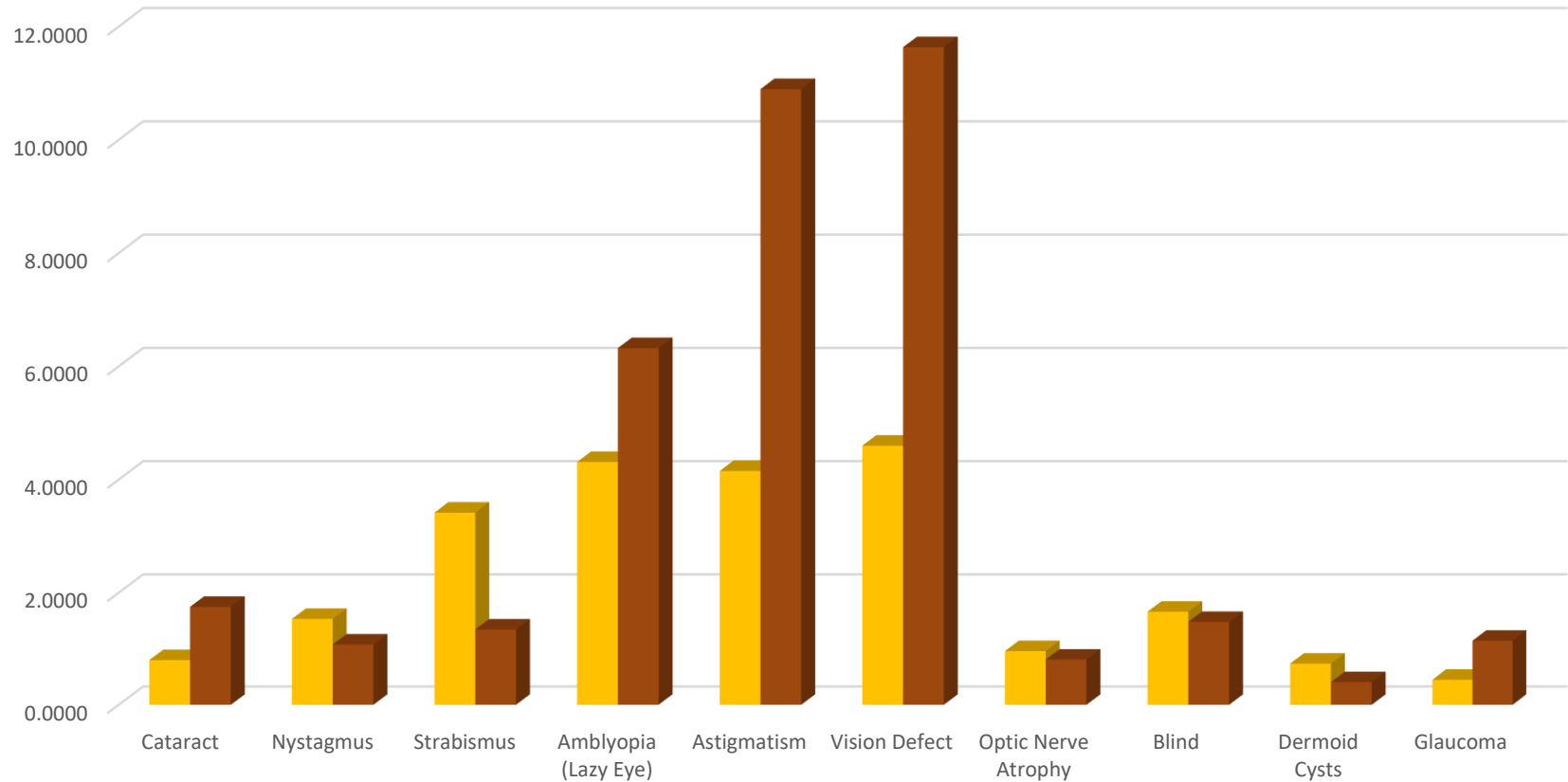
Cases per 100

	Non Veterans	Vietnam Veterans
Scoliosis	8.2402	13.3154
Malformations Of Vertebrae	4.1201	4.3712
Spinal Muscular Atrophy	0.2874	0.9415
Tethered Spinal Cord	4.0882	1.1432
Spondylolisthesis	0.1278	2.1520

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

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Eye Defects
Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

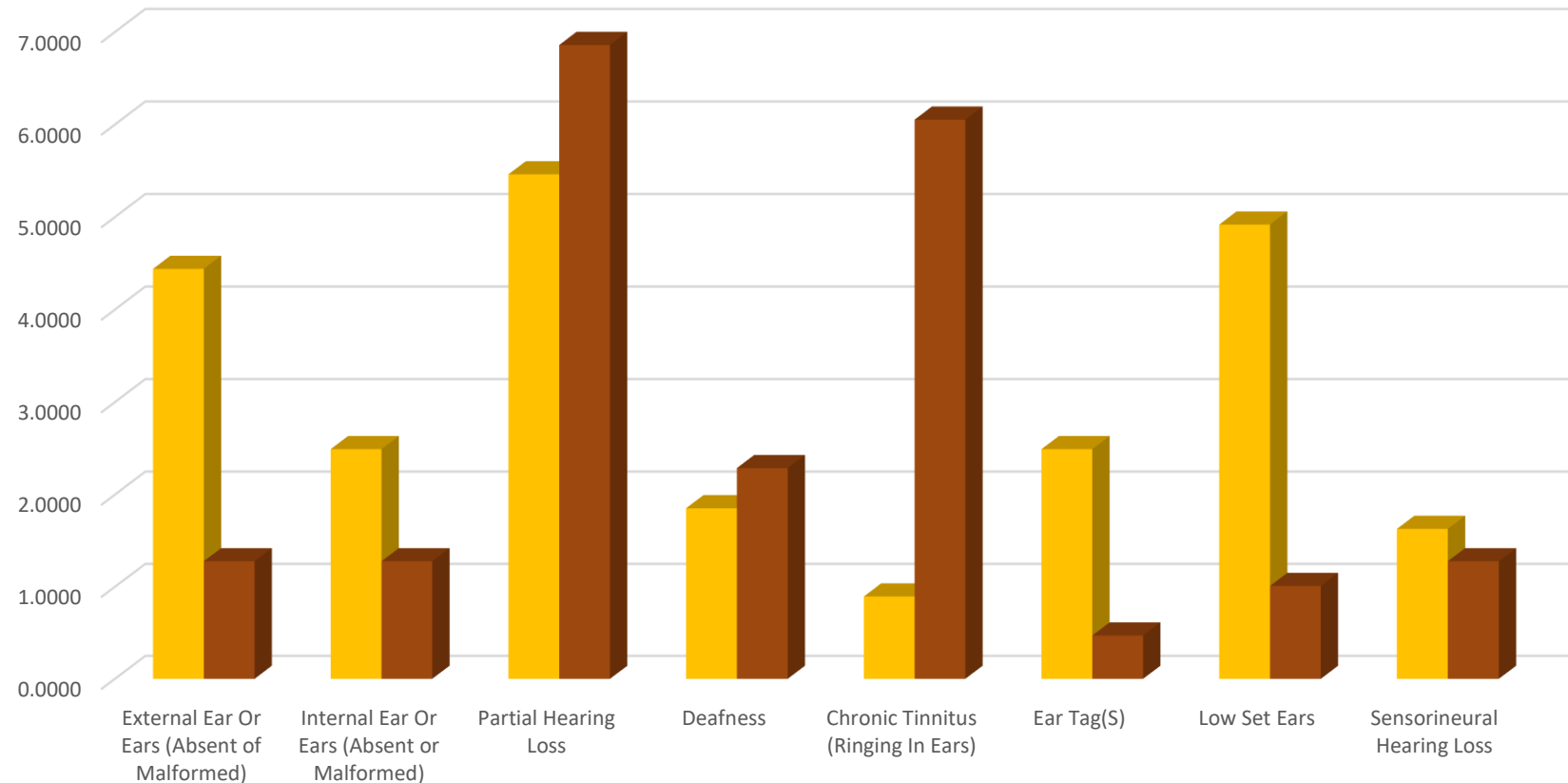
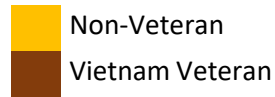
Eye Defects

Cases per 100

	Non Veterans	Vietnam Veterans
Cataract	0.7985	1.7485
Nystagmus	1.5331	1.0760
Strabismus	3.4174	1.3450
Amblyopia (Lazy Eye)	4.3117	6.3215
Astigmatism	4.1520	10.8944
Vision Defect	4.5992	11.6342
Optic Nerve Atrophy	0.9582	0.8070
Blind	1.6608	1.4795
Dermoid Cysts	0.7346	0.4035
Glaucoma	0.4471	1.1432

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans



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Ear Defects
Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Ear Defects

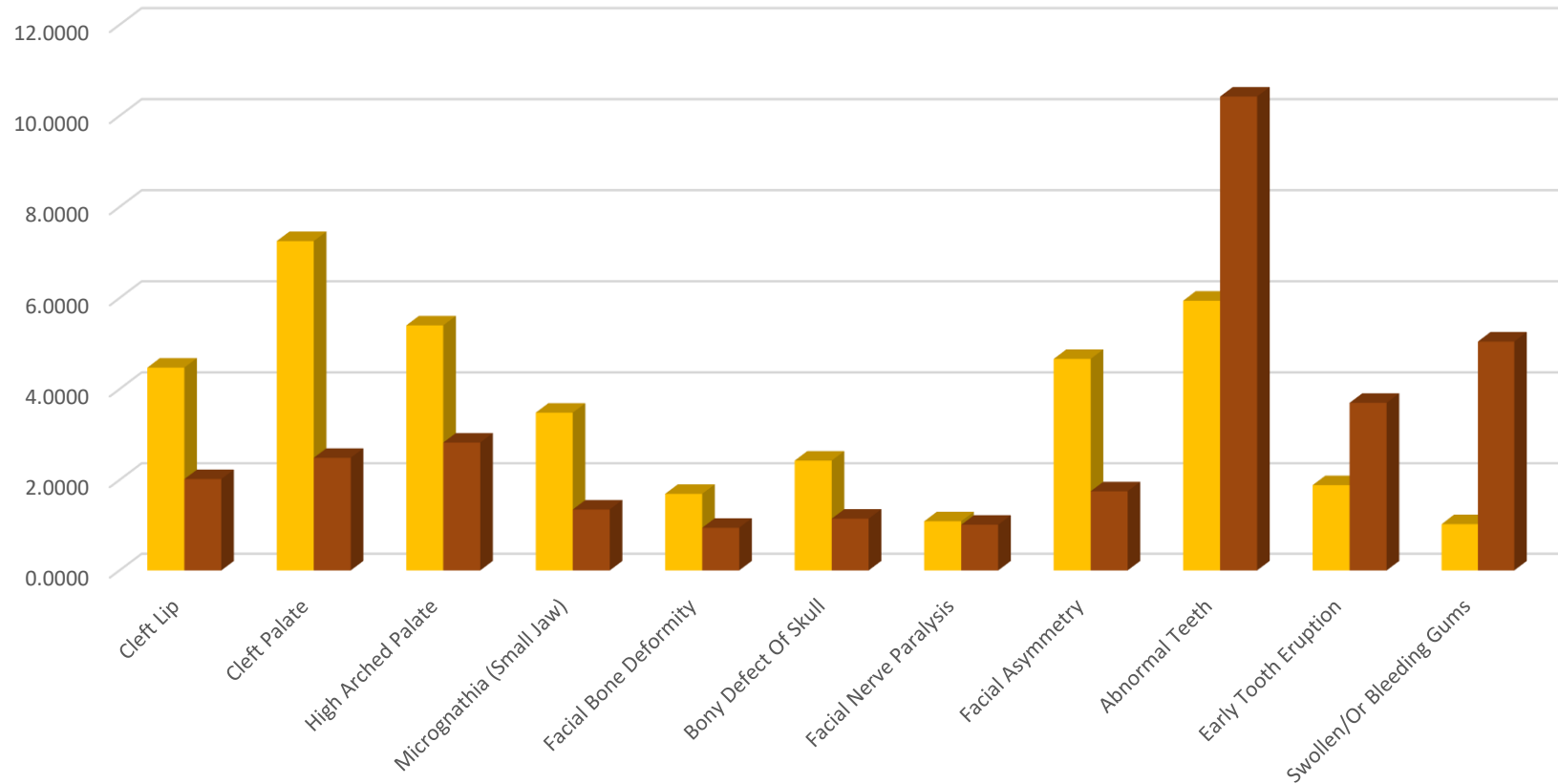
Cases per 100

	Non Veterans	Vietnam Veterans
External Ear Or Ears (Absent or Malformed)	4.4395	1.2777
Internal Ear Or Ears (Absent or Malformed)	2.4912	1.2777
Partial Hearing Loss	5.4615	6.8594
Deafness	1.8524	2.2865
Chronic Tinnitus (Ringing In Ears)	0.8943	6.0525
Ear Tag(S)	2.4912	0.4707
Low Set Ears	4.9186	1.0087
Sensorineural Hearing Loss	1.6289	1.2777

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

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Vietnam Veteran



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Cranial/Facial Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Cranial/Facial Defects

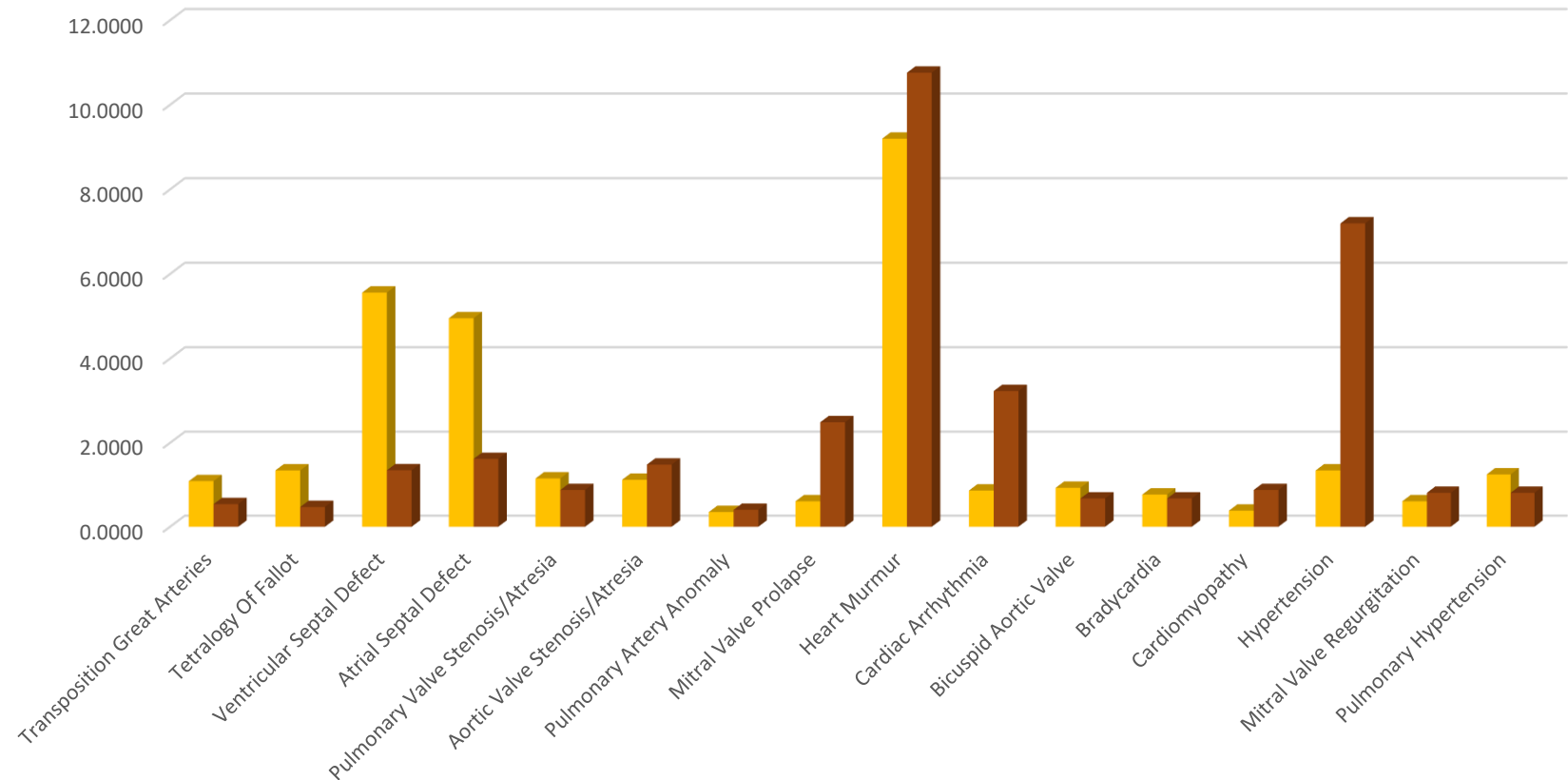
Cases per 100

	Non Veterans	Vietnam Veterans
Cleft Lip	4.4714	2.0175
Cleft Palate	7.2501	2.4882
High Arched Palate	5.3976	2.8245
Micrognathia (Small Jaw)	3.4813	1.3450
Facial Bone Deformity	1.6927	0.9415
Bony Defect Of Skull	2.4273	1.1432
Facial Nerve Paralysis	1.0859	1.0087
Facial Asymmetry	4.6630	1.7485
Abnormal Teeth	5.9406	10.4237
Early Tooth Eruption	1.8844	3.6987
Swollen/Or Bleeding Gums	1.0220	5.0437

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

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Cardiovascular Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Cardiovascular Defects

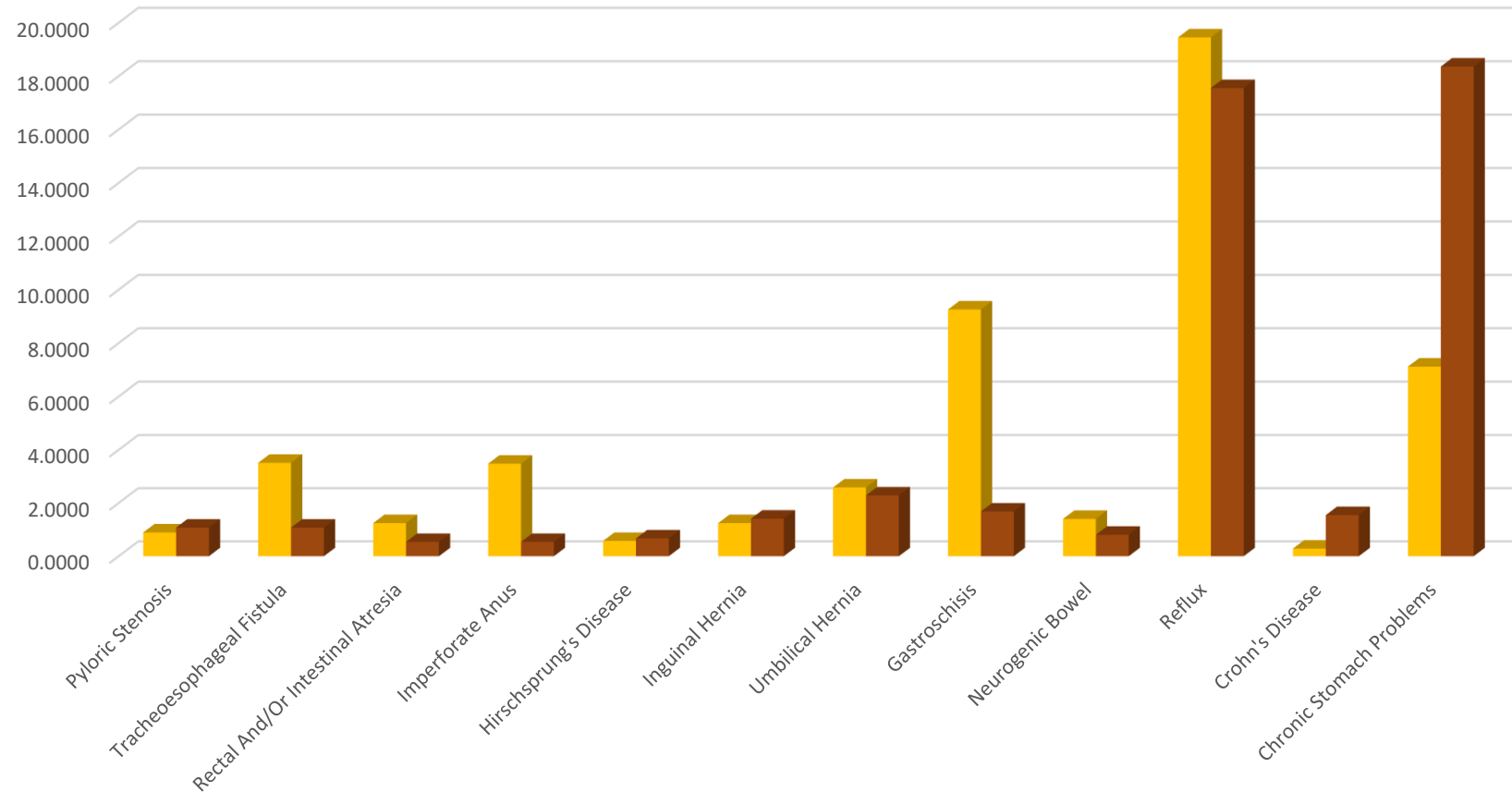
Cases per 100

	Non Veterans	Vietnam Veterans
Transposition Great Arteries	1.0859	0.5380
Tetralogy Of Fallot	1.3414	0.4707
Ventricular Septal Defect	5.5573	1.3450
Atrial Septal Defect	4.9505	1.6140
Pulmonary Valve Stenosis/Atresia	1.1498	0.8742
Aortic Valve Stenosis/Atresia	1.1179	1.4795
Pulmonary Artery Anomaly	0.3513	0.4035
Mitral Valve Prolapse	0.6068	2.4882
Heart Murmur	9.1983	10.7599
Cardiac Arrhythmia	0.8623	3.2280
Bicuspid Aortic Valve	0.9262	0.6725
Bradycardia	0.7665	0.6725
Cardiomyopathy	0.3833	0.8742
Hypertension	1.3414	7.1957
Mitral Valve Regurgitation	0.6068	0.8070
Pulmonary Hypertension	1.2456	0.8070

Birth Defects Research for Children, Inc.

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Gastrointestinal Defects

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Gastrointestinal Defects

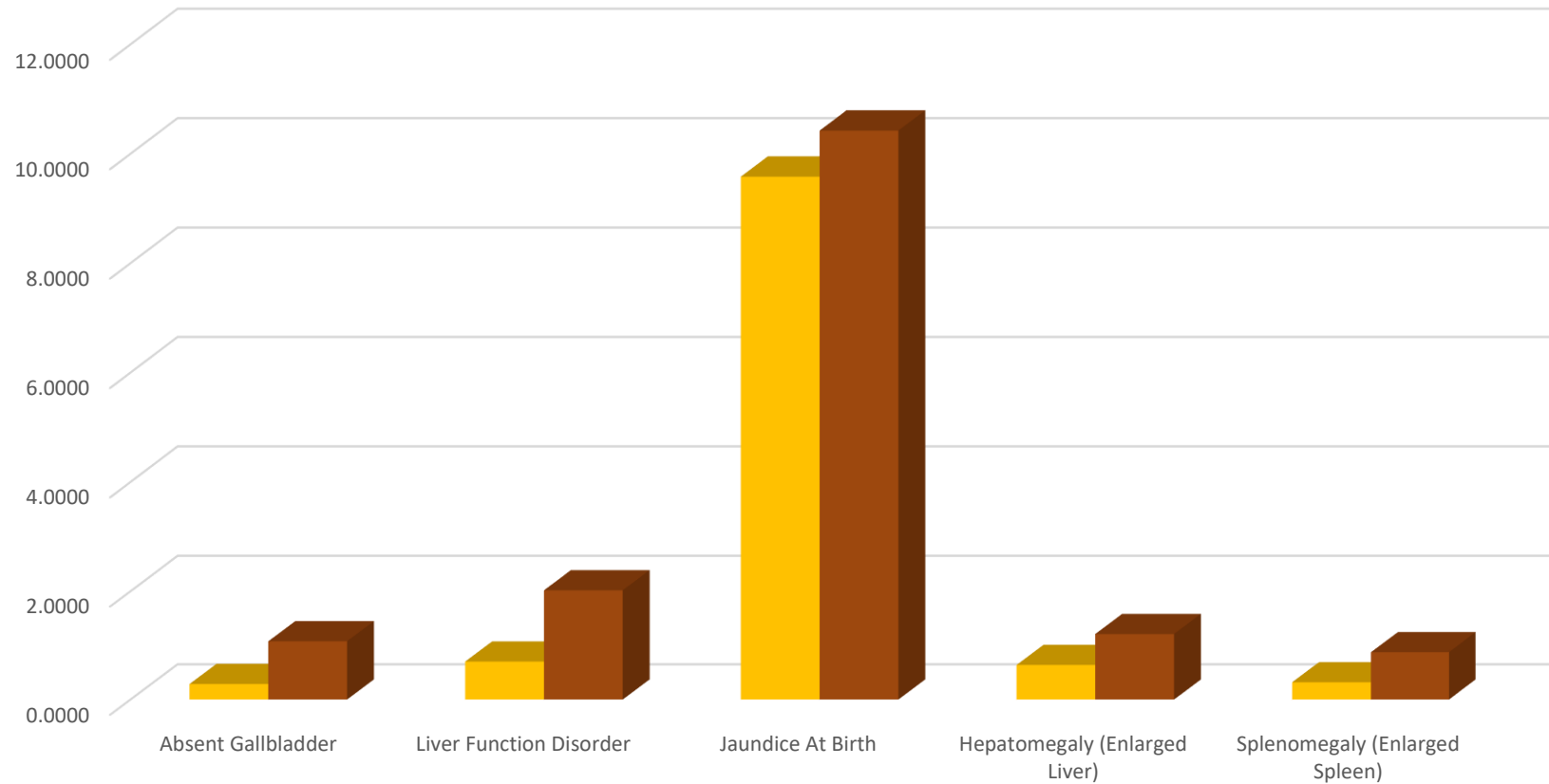
Cases per 100

	Non Veterans	Vietnam Veterans
Pyloric Stenosis	0.8943	1.0760
Tracheoesophageal Fistula	3.5133	1.0760
Rectal And/Or Intestinal Atresia	1.2456	0.5380
Imperforate Anus	3.4813	0.5380
Hirschsprung's Disease	0.5749	0.6725
Inguinal Hernia	1.2456	1.4122
Umbilical Hernia	2.5870	2.2865
Gastroschisis	9.2622	1.6812
Neurogenic Bowel	1.4053	0.8070
Reflux	19.4507	17.5521
Crohn's Disease	0.2874	1.5467
Chronic Stomach Problems	7.1223	18.3591

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

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Vietnam Veteran



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Liver/Bile Duct/Spleen Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Liver/Bile Duct/Spleen Defects

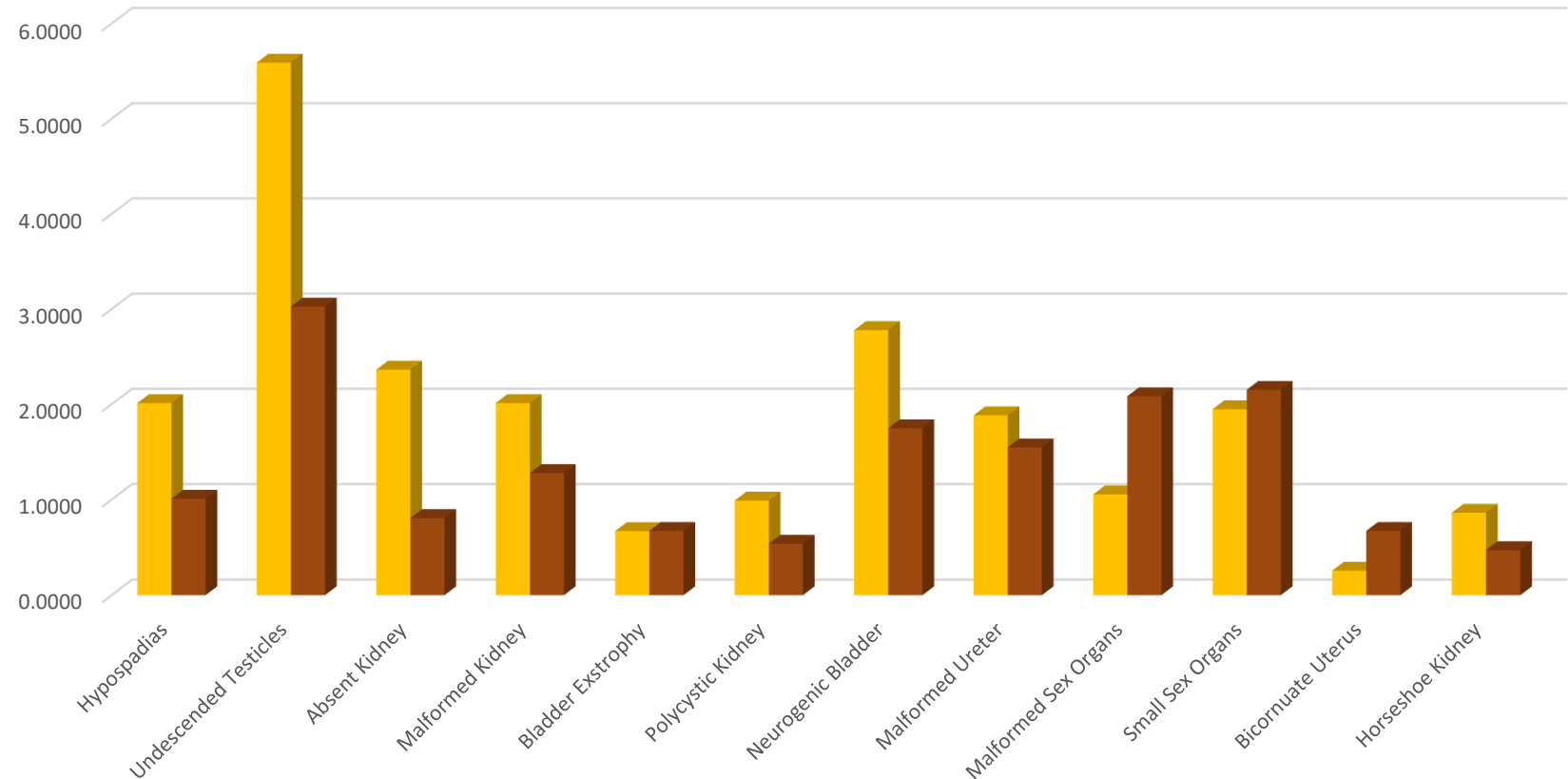
Cases per 100

	Non Veterans	Vietnam Veterans
Absent Gallbladder	0.2874	1.0760
Liver Function Disorder	0.7027	2.0175
Jaundice At Birth	9.5816	10.4237
Hepatomegaly (Enlarged Liver)	0.6388	1.2105
Splenomegaly (Enlarged Spleen)	0.3194	0.8742

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

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Vietnam Veteran



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Genitourinary Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

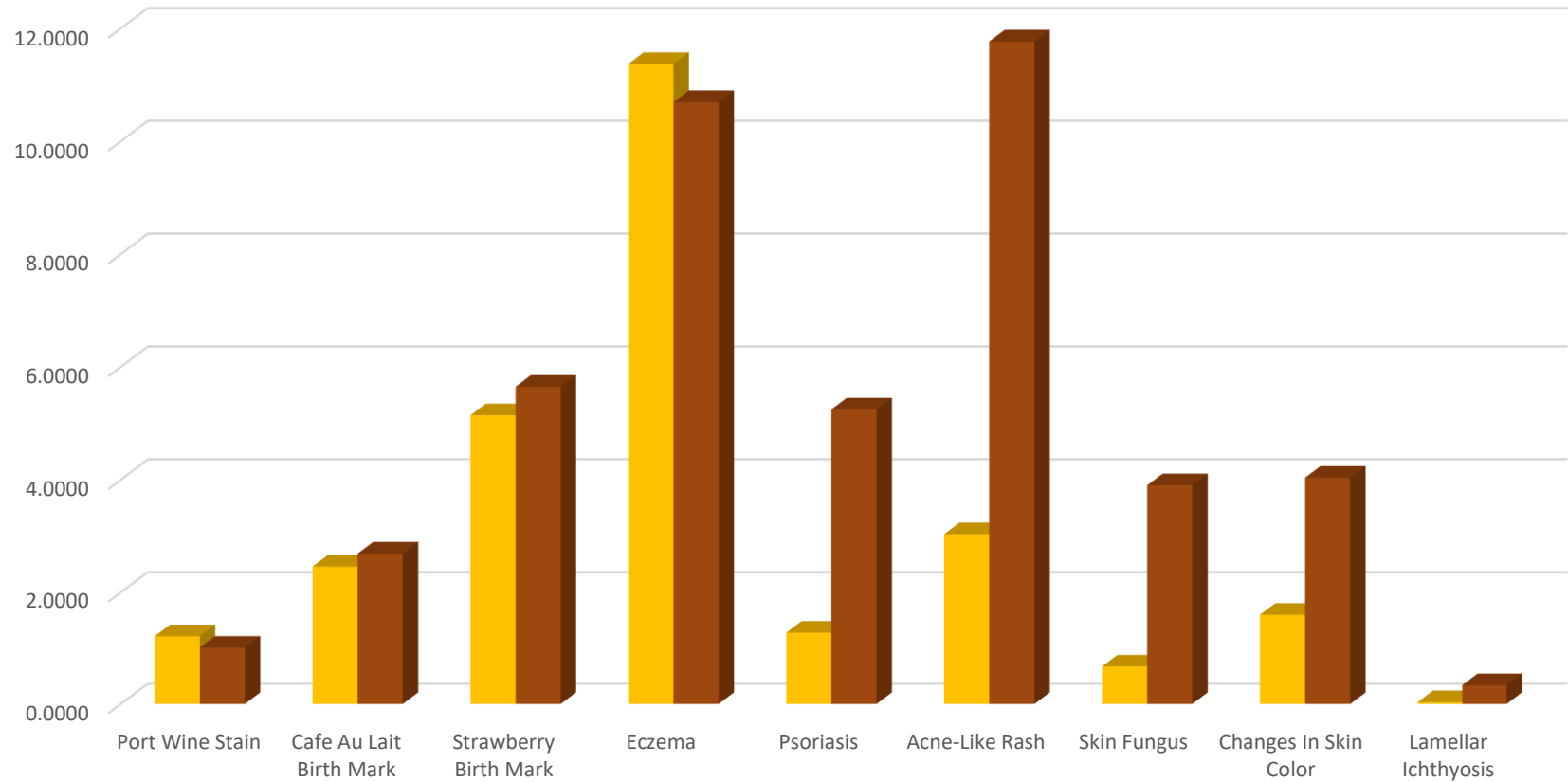
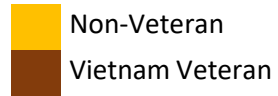
Genitourinary Defects

Cases per 100

	Non Veterans	Vietnam Veterans
Hypospadias	2.0121	1.0087
Undescended Testicles	5.5893	3.0262
Absent Kidney	2.3635	0.8070
Malformed Kidney	2.0121	1.2777
Bladder Exstrophy	0.6707	0.6725
Polycystic Kidney	0.9901	0.5380
Neurogenic Bladder	2.7787	1.7485
Malformed Ureter	1.8844	1.5467
Malformed Sex Organs	1.0540	2.0847
Small Sex Organs	1.9483	2.1520
Bicornuate Uterus	0.2555	0.6725
Horseshoe Kidney	0.8623	0.4707

Birth Defects Research for Children, Inc.

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Skin Defects

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Skin Defects

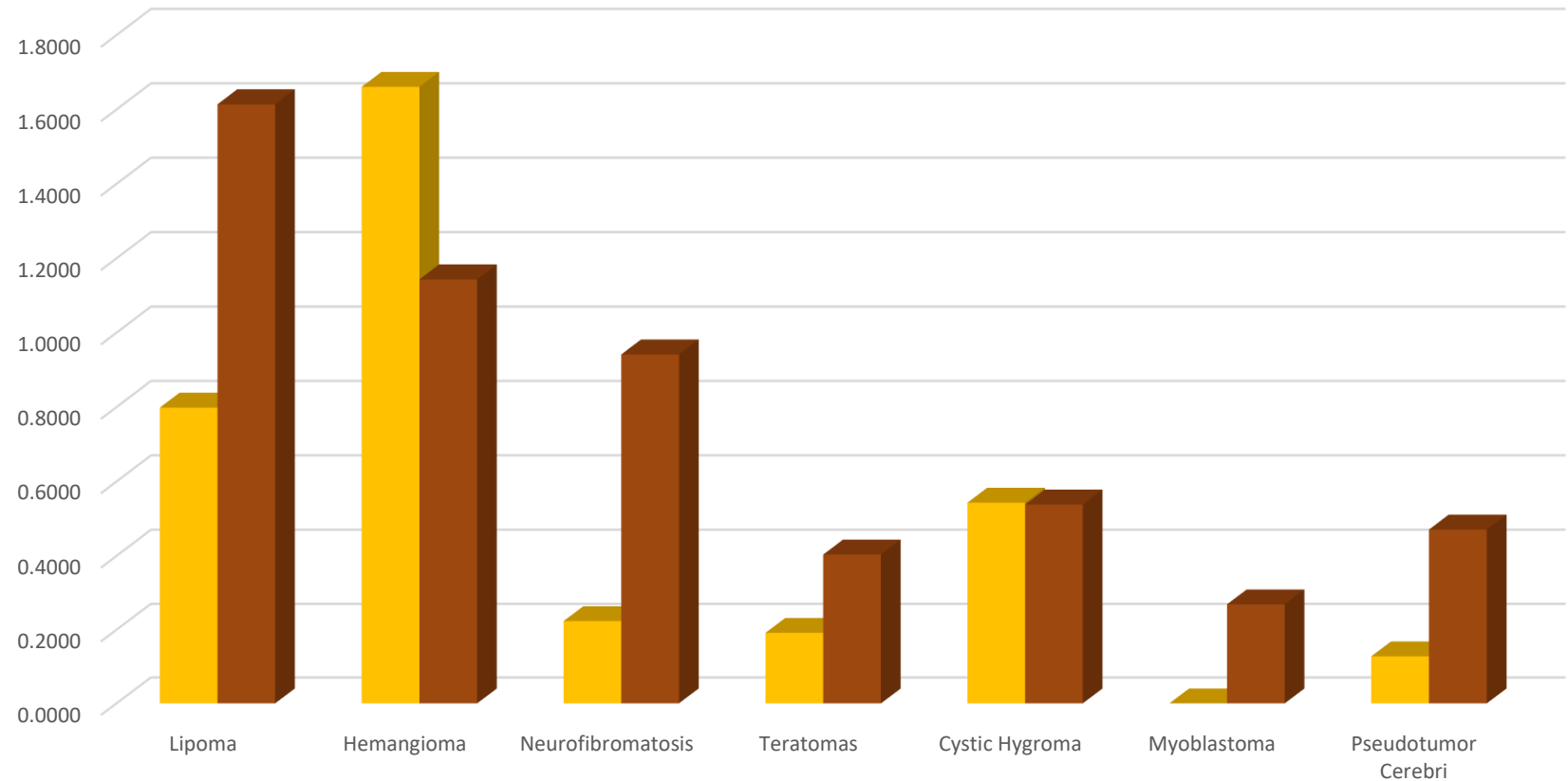
Cases per 100

	Non Veterans	Vietnam Veterans
Port Wine Stain	1.2137	1.0087
Cafe Au Lait Birth Mark	2.4593	2.6900
Strawberry Birth Mark	5.1421	5.6490
Eczema	11.3702	10.6927
Psoriasis	1.2775	5.2455
Acne-Like Rash	3.0342	11.7687
Skin Fungus	0.6707	3.9005
Changes In Skin Color	1.5969	4.0350
Lamellar Ichthyosis	0.0319	0.3362

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Non-Veteran
Vietnam Veteran



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Tumors (Benign)

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Tumors (Benign)

Cases per 100

	Non Veterans	Vietnam Veterans
Lipoma	0.7985	1.6140
Hemangioma	1.6608	1.1432
Neurofibromatosis	0.2236	0.9415
Teratomas	0.1916	0.4035
Cystic Hygroma	0.5430	0.5380
Myoblastoma	0.0000	0.2690
Pseudotumor Cerebri	0.1278	0.4707

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

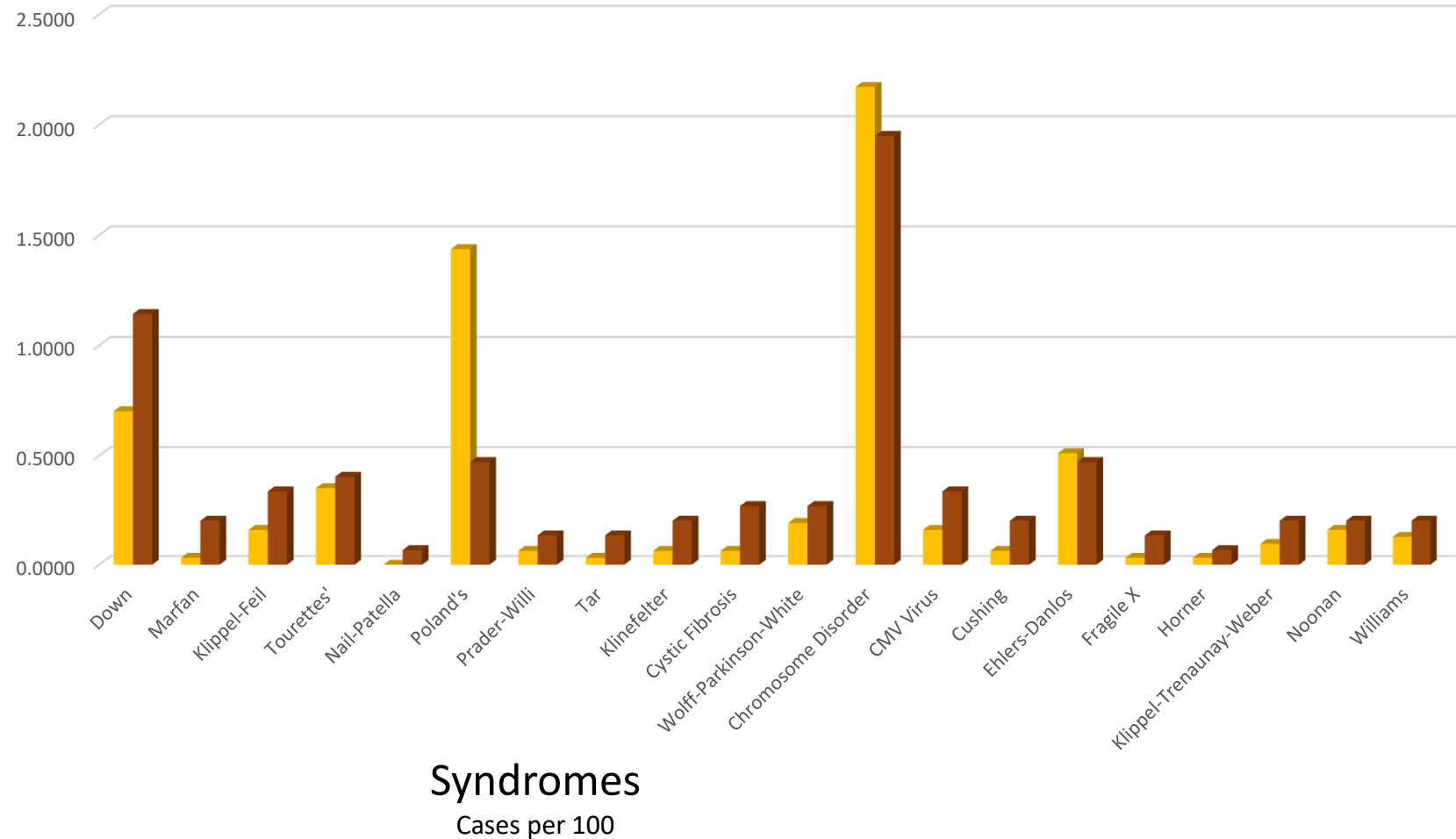
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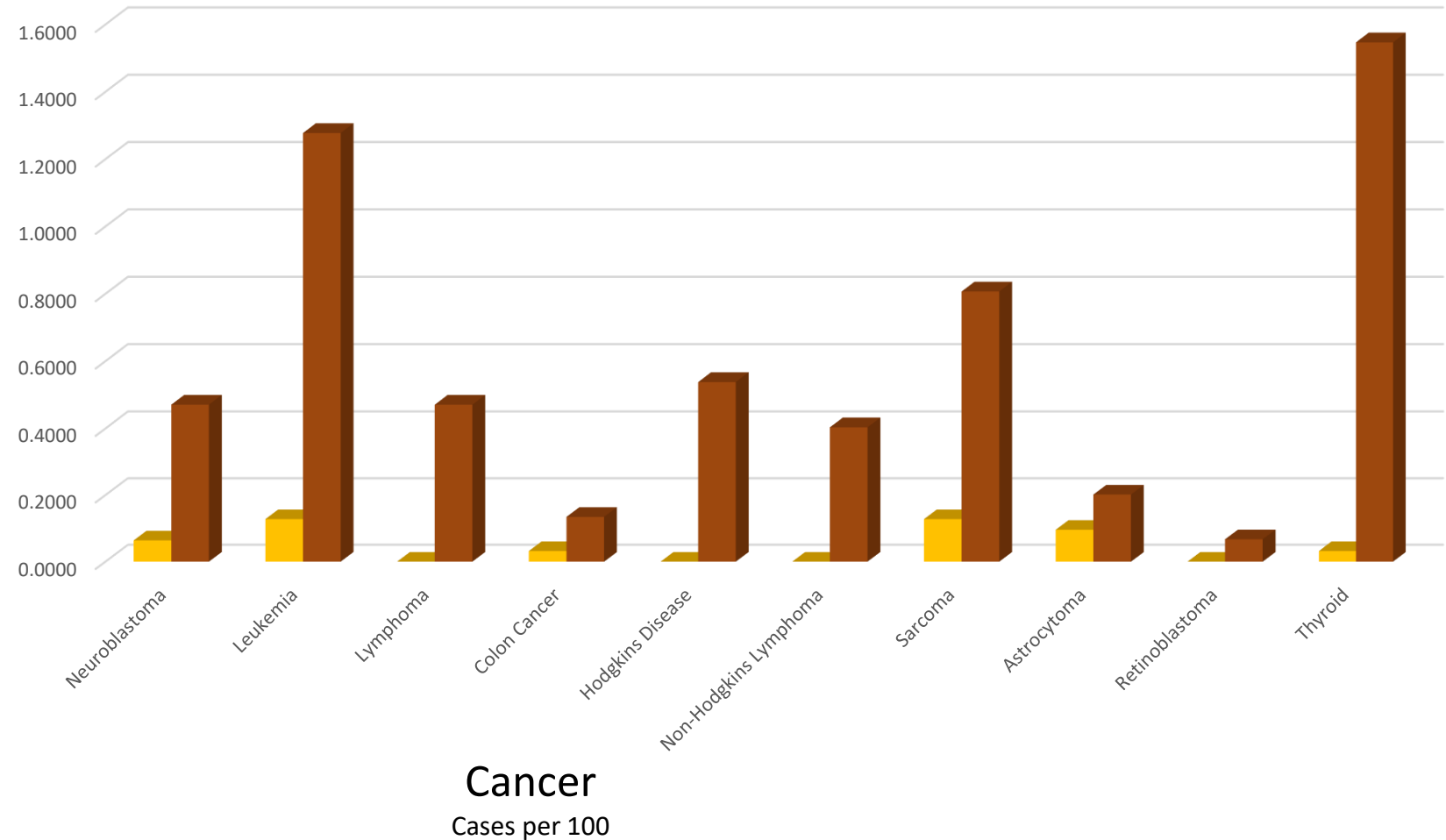
Syndromes

	Cases per 100	Non Veterans	Vietnam Veterans
Down		0.7027	1.1432
Marfan		0.0319	0.2017
Klippel-Feil		0.1597	0.3362
Tourettes'		0.3513	0.4035
Nail-Patella		0.0000	0.0672
Poland's		1.4372	0.4707
Prader-Willi		0.0639	0.1345
Tar		0.0319	0.1345
Klinefelter		0.0639	0.2017
Cystic Fibrosis		0.0639	0.2690
Wolff-Parkinson-White		0.1916	0.2690
Chromosome Disorder		2.1718	1.9502
CMV Virus		0.1597	0.3362
Cushing		0.0639	0.2017
Ehlers-Danlos		0.5110	0.4707
Fragile X		0.0319	0.1345
Horner		0.0319	0.0672
Klippel-Trenaunay-Weber		0.0958	0.2017
Noonan		0.1597	0.2017
Williams		0.1278	0.2017

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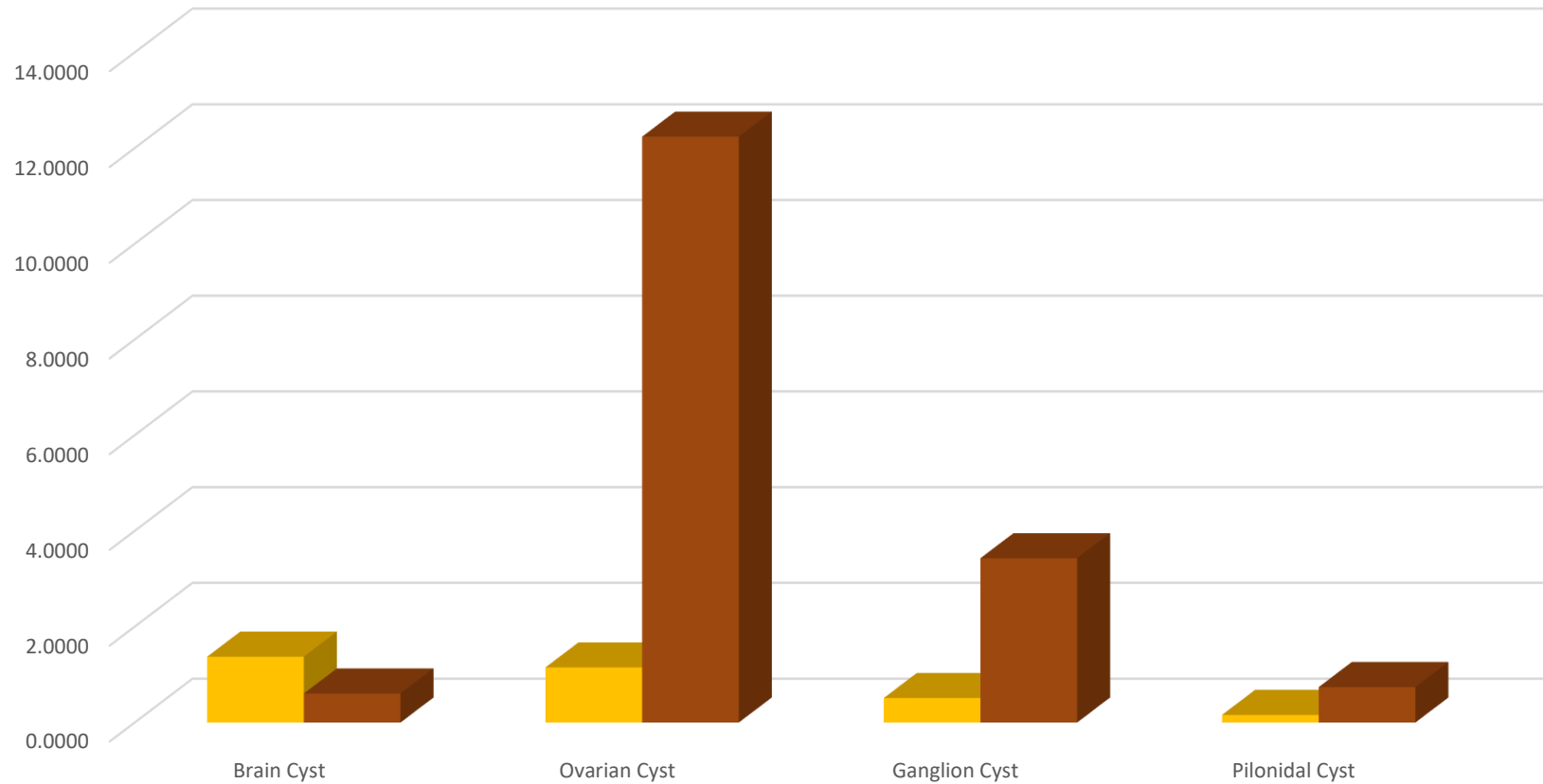
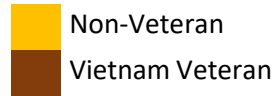
Cancer

Cases per 100

	Non Veterans	Vietnam Veterans
Neuroblastoma	0.0639	0.4707
Leukemia	0.1278	1.2777
Lymphoma	0.0000	0.4707
Colon Cancer	0.0319	0.1345
Hodgkins Disease	0.0000	0.5380
Non-Hodgkins Lymphoma	0.0000	0.4035
Sarcoma	0.1278	0.8070
Astrocytoma	0.0958	0.2017
Retinoblastoma	0.0000	0.0672
Thyroid	0.0319	1.5467

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Cysts
Cases per 100

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Cysts

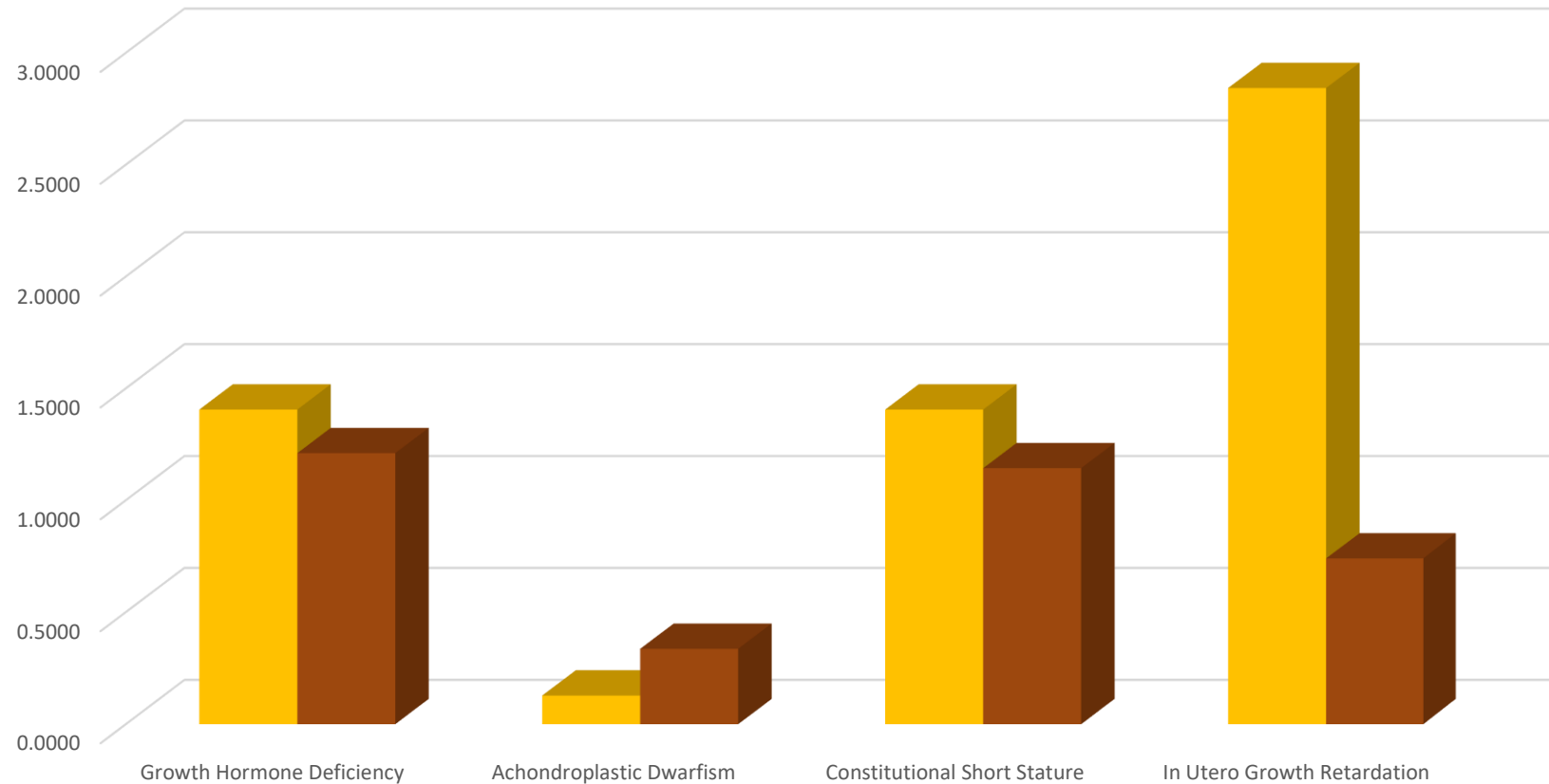
Cases per 100

	Non Veterans	Vietnam Veterans
Brain Cyst	1.3734	0.6052
Ovarian Cyst	1.1498	12.2394
Ganglion Cyst	0.5110	3.4297
Pilonidal Cyst	0.1597	0.7397

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Growth Disorders

Cases per 100

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Growth Disorders

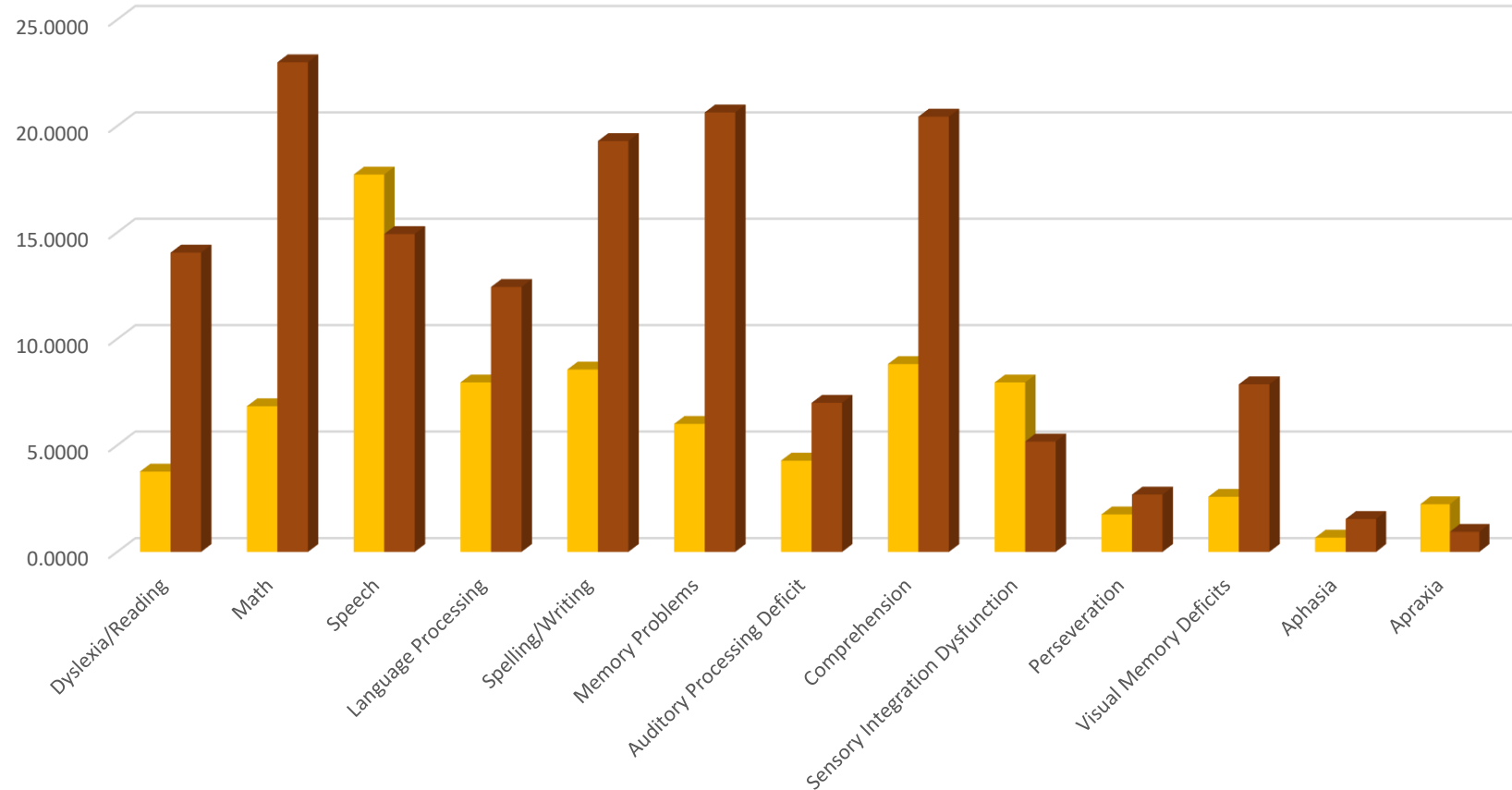
Cases per 100

	Non Veterans	Vietnam Veterans
Growth Hormone Deficiency	1.4053	1.2105
Achondroplastic Dwarfism	0.1278	0.3362
Constitutional Short Stature	1.4053	1.1432
In Utero Growth Retardation	2.8425	0.7397

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Learning Disabilities

Cases per 100

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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

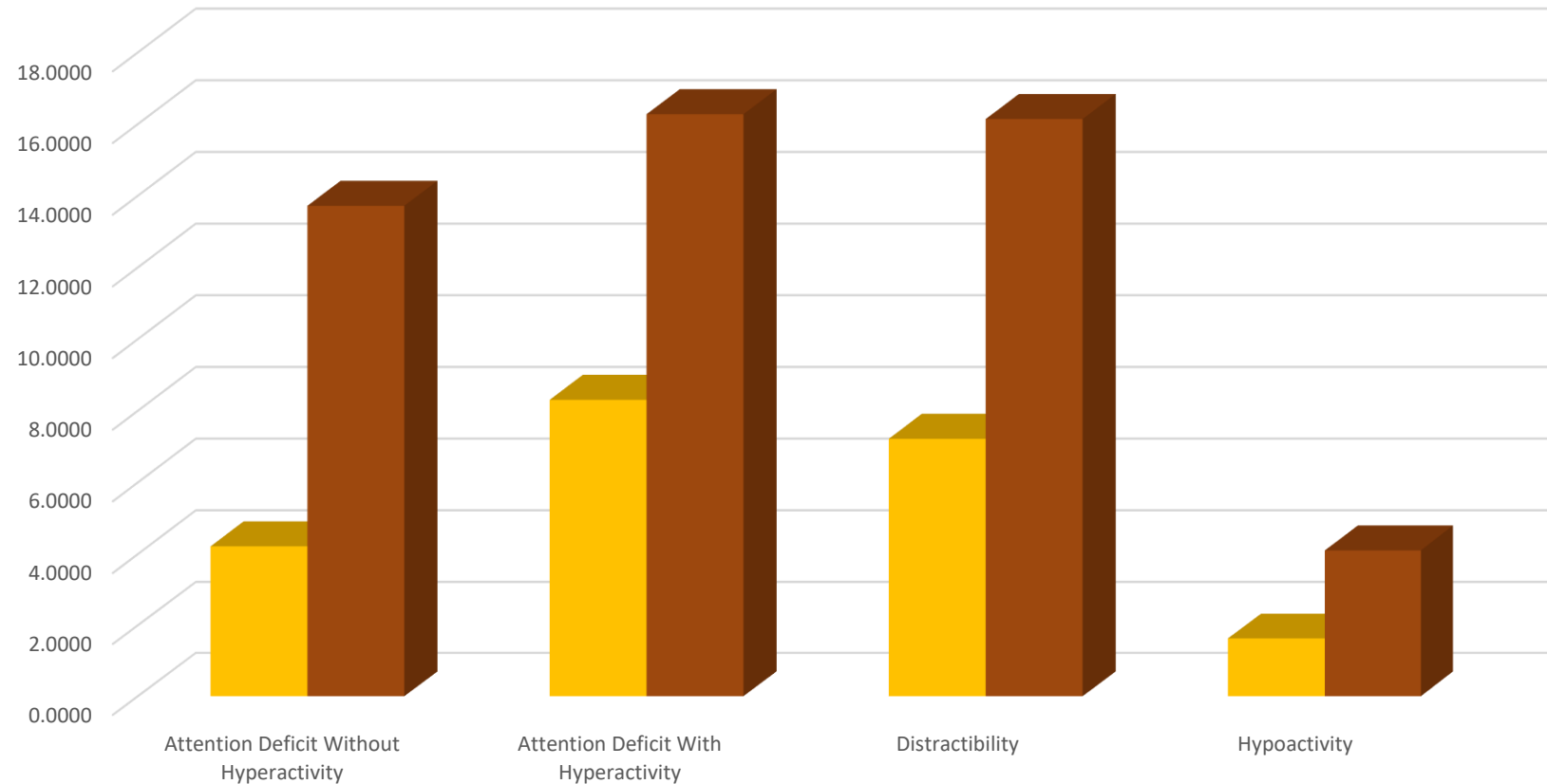
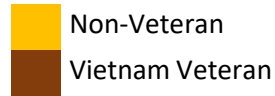
Learning Disabilities

Cases per 100

	Non Veterans	Vietnam Veterans
Dyslexia/Reading	3.7688	14.0551
Math	6.8349	22.9993
Speech	17.7260	14.9294
Language Processing	7.9527	12.4412
Spelling/Writing	8.5596	19.3006
Memory Problems	6.0045	20.6456
Auditory Processing Deficit	4.2798	6.9939
Comprehension	8.8151	20.4438
Sensory Integration Dysfunction	7.9527	5.1782
Perseveration	1.7566	2.6900
Visual Memory Deficits	2.5870	7.8682
Aphasia	0.6707	1.5467
Apraxia	2.2357	0.9415

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans



Total Participants: 4618

Non-Veterans: 3131

Vietnam Veterans: 1487

File: 05/23/2017

Attention Deficit/Activity Disorders

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Attention Deficit/Activity Disorders

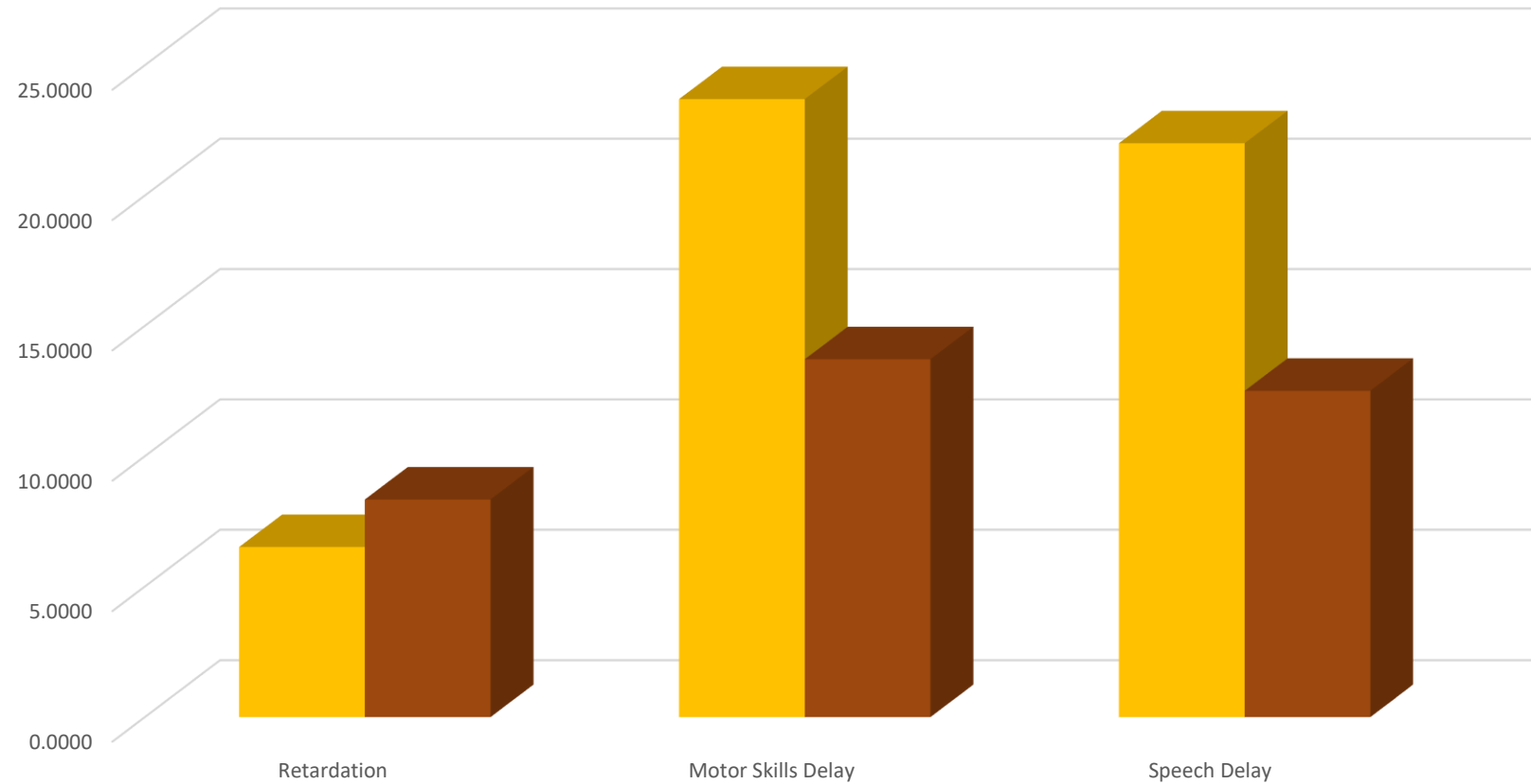
Cases per 100

	Non Veterans	Vietnam Veterans
Attention Deficit Without Hyperactivity	4.2159	13.7189
Attention Deficit With Hyperactivity	8.3041	16.2744
Distractibility	7.2181	16.1399
Hypoactivity	1.6289	4.1022

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Non-Veteran
Vietnam Veteran



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Developmental Delay

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Developmental Delay

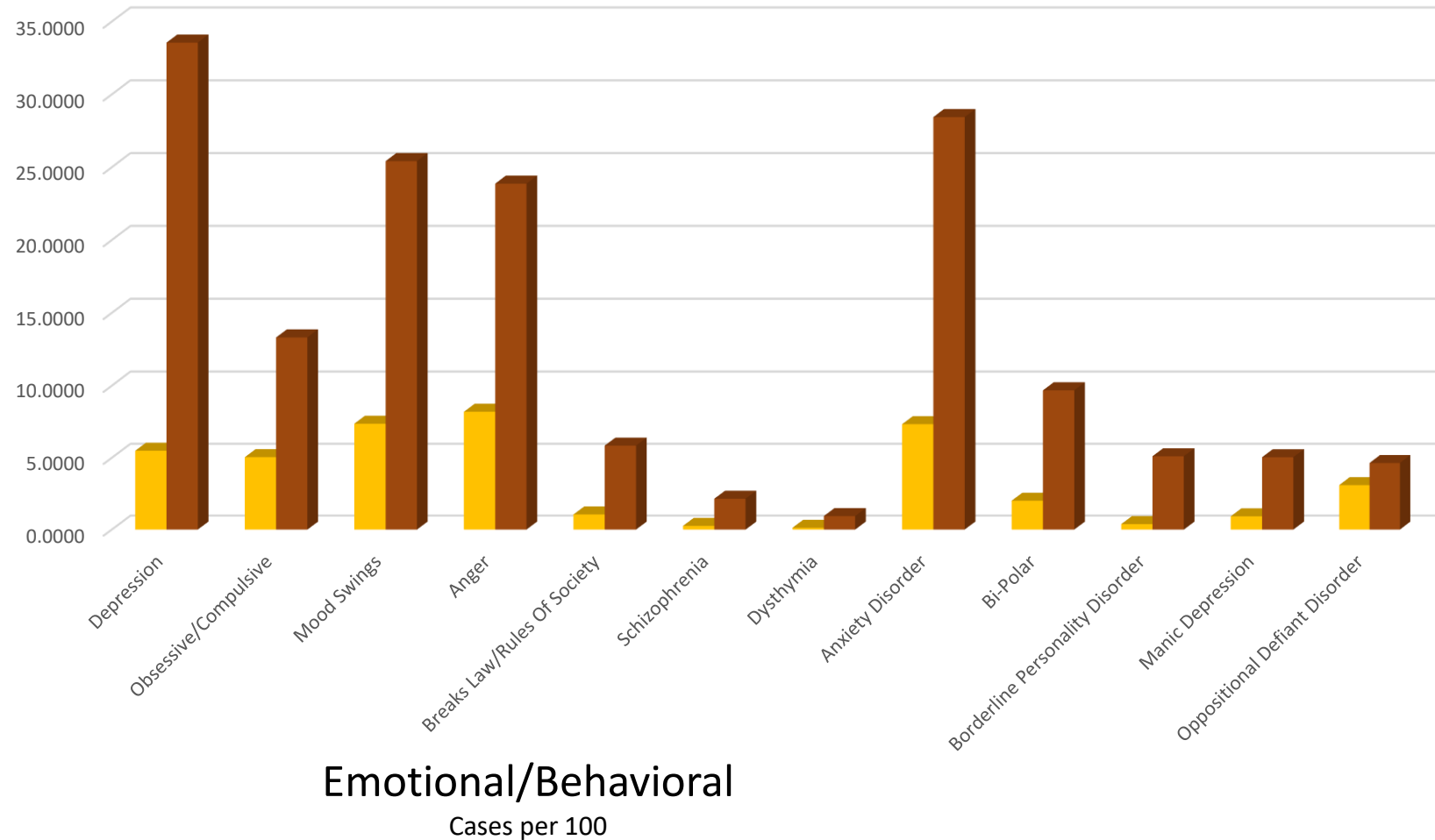
Cases per 100

	Non Veterans	Vietnam Veterans
Retardation	6.5155	8.3389
Motor Skills Delay	23.6985	13.7189
Speech Delay	22.0057	12.5084

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Non-Veteran
Vietnam Veteran



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National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Emotional/Behavioral

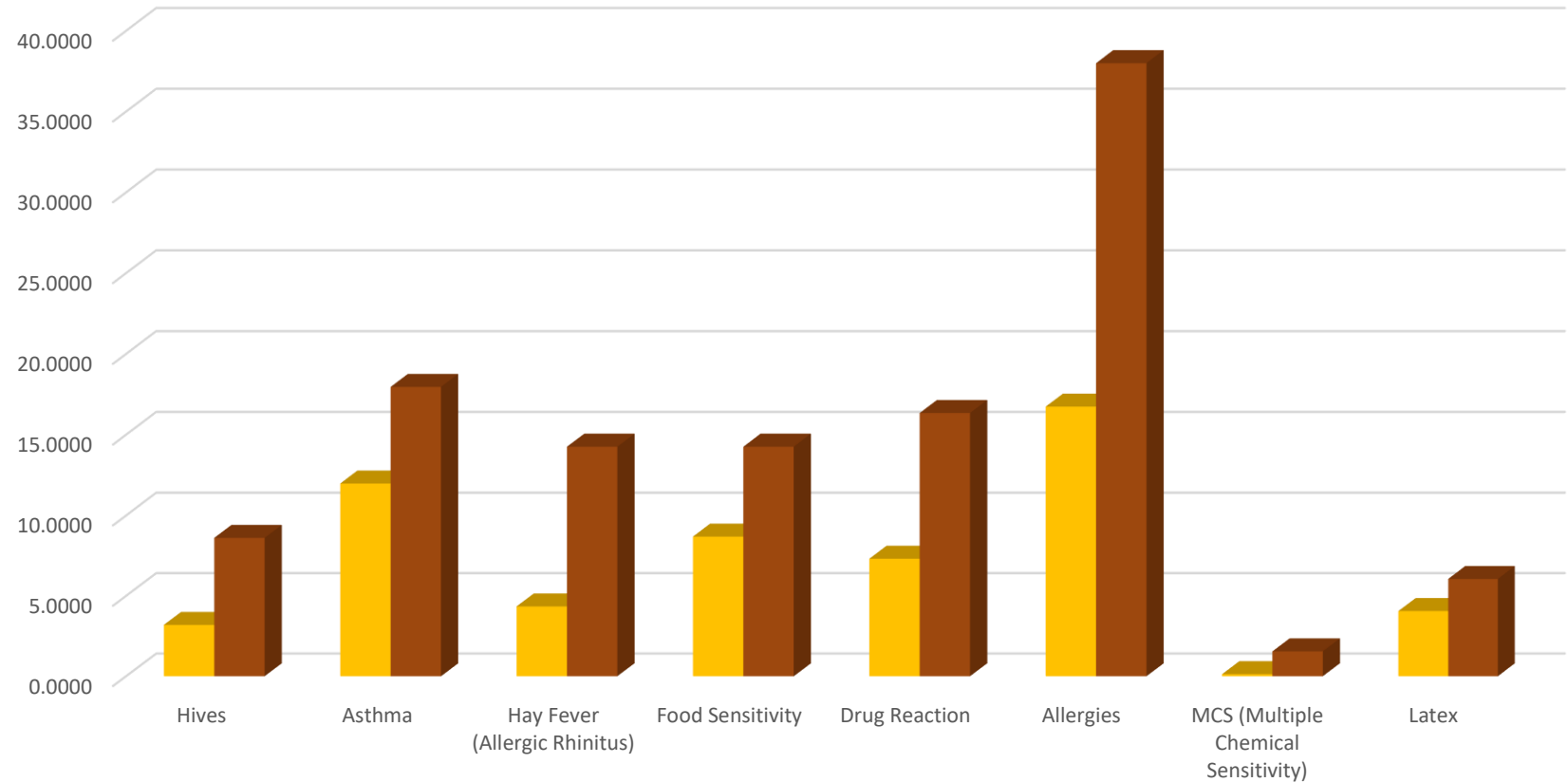
Cases per 100

	Non Veterans	Vietnam Veterans
Depression	5.4935	33.5575
Obsessive/Compulsive	5.0463	13.3154
Mood Swings	7.3778	25.4203
Anger	8.2082	23.8736
Breaks Law/Rules Of Society	1.0540	5.8507
Schizophrenia	0.2555	2.1520
Dysthymia	0.1278	0.9415
Anxiety Disorder	7.3459	28.4465
Bi-Polar	2.0121	9.6839
Borderline Personality Disorder	0.3833	5.1110
Manic Depression	0.9262	5.0437
Oppositional Defiant Disorder	3.0981	4.6402

Birth Defects Research for Children, Inc.

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Non-Veteran
Vietnam Veteran



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Allergies

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Allergies

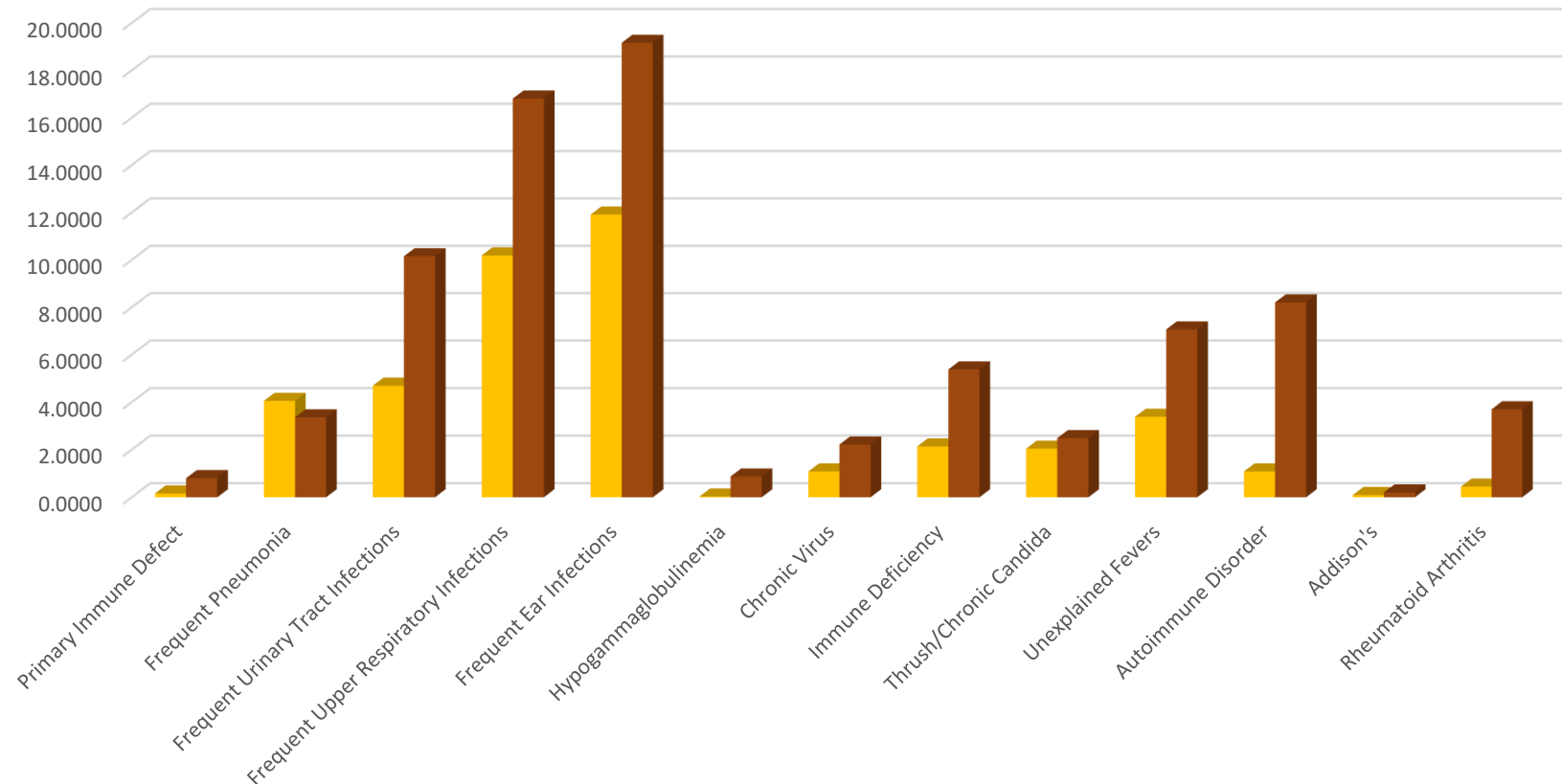
Cases per 100

	Non Veterans	Vietnam Veterans
Hives	3.1939	8.6079
Asthma	11.9770	17.9556
Hay Fever (Allergic Rhinitis)	4.3437	14.2569
Food Sensitivity	8.6873	14.2569
Drug Reaction	7.3140	16.3416
Allergies	16.7359	37.9960
MCS (Multiple Chemical Sensitivity)	0.1278	1.5467
Latex	4.0562	6.0525

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Non-Veteran
Vietnam Veteran



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Immune Response Disorders

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Immune Response Disorders

Cases per 100

	Non Veterans	Vietnam Veterans
Primary Immune Defect	0.1597	0.8070
Frequent Pneumonia	4.0562	3.3625
Frequent Urinary Tract Infections	4.6950	10.1547
Frequent Upper Respiratory Infections	10.1884	16.8124
Frequent Ear Infections	11.9131	19.1661
Hypogammaglobulinemia	0.0319	0.8742
Chronic Virus	1.0859	2.2192
Immune Deficiency	2.1399	5.3800
Thrush/Chronic Candida	2.0441	2.4882
Unexplained Fevers	3.3855	7.0612
Autoimmune Disorder	1.0859	8.2044
Addison's	0.0958	0.2017
Rheumatoid Arthritis	0.4471	3.6987

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

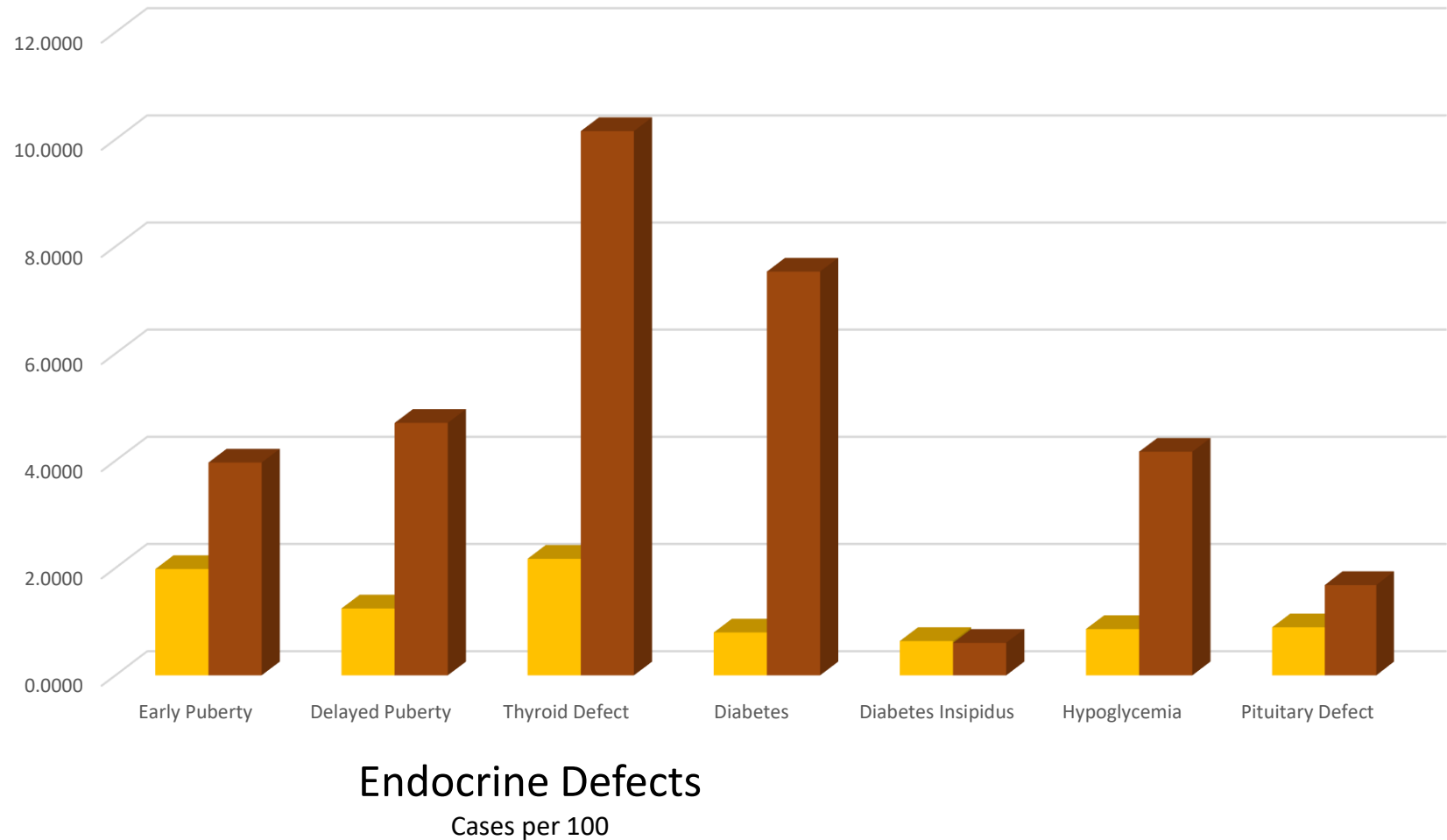
Non-Veteran
Vietnam Veteran

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Vietnam Veterans: 1487

File: 05/23/2017



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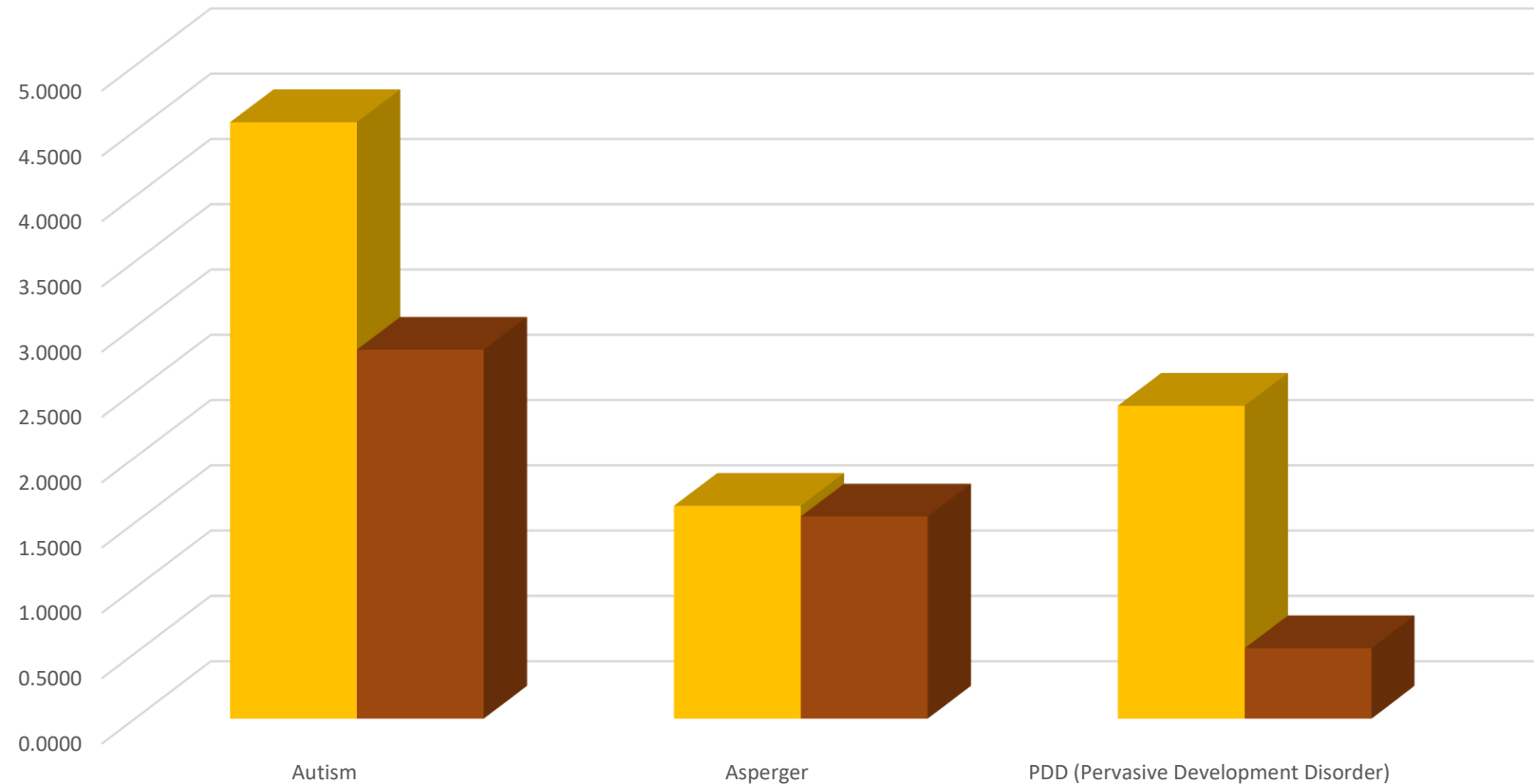
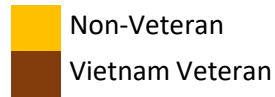
Endocrine Defects

Cases per 100

	Non Veterans	Vietnam Veterans
Early Puberty	1.9802	3.9677
Delayed Puberty	1.2456	4.7075
Thyroid Defect	2.1718	10.1547
Diabetes	0.7985	7.5319
Diabetes Insipidus	0.6388	0.6052
Hypoglycemia	0.8623	4.1695
Pituitary Defect	0.8943	1.6812

Birth Defects Research for Children, Inc.

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Autism Spectrum Disorders

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

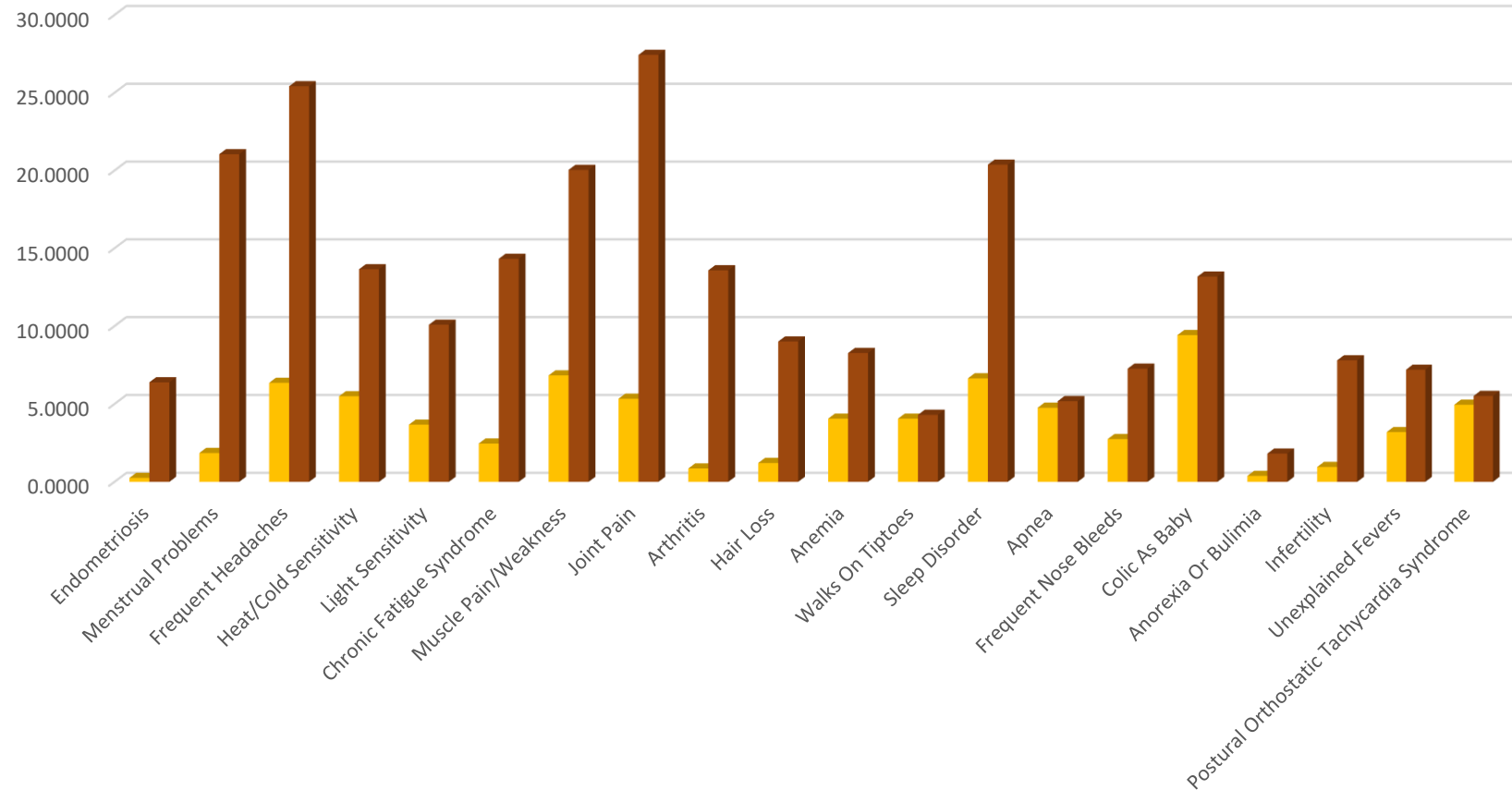
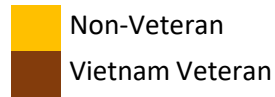
Autism Spectrum Disorders

Cases per 100

	Non Veterans	Vietnam Veterans
Autism	4.5672	2.8245
Asperger	1.6289	1.5467
PDD (Pervasive Development Disorder)	2.3954	0.5380

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans



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File: 05/23/2017

Miscellaneous Defects

Cases per 100

Birth Defects Research for Children, Inc.

National Birth Defects Registry – Children of Vietnam Veterans and Non-Veterans

Miscellaneous Defects

	Cases per 100	Non Veterans	Vietnam Veterans
Endometriosis		0.2555	6.3887
Menstrual Problems		1.8524	21.0491
Frequent Headaches		6.3558	25.4203
Heat/Cold Sensitivity		5.4935	13.6516
Light Sensitivity		3.6729	10.0874
Chronic Fatigue Syndrome		2.4593	14.3241
Muscle Pain/Weakness		6.8349	20.0403
Joint Pain		5.3338	27.4378
Arthritis		0.8623	13.5844
Hair Loss		1.2137	9.0114
Anemia		4.0562	8.2717
Walks On Tiptoes		4.0562	4.3040
Sleep Disorder		6.6432	20.3766
Apnea		4.7589	5.1782
Frequent Nose Bleeds		2.7467	7.2629
Colic As Baby		9.4219	13.1809
Anorexia Or Bulimia		0.3833	1.8157
Infertility		0.9582	7.8009
Unexplained Fevers		3.1939	7.1957
Postural Orthostatic Tachycardia Syndrome		4.9505	5.5145