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Computer assisted strabismus/amblyopia diagnosis

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Abstract

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COMPUTER ASSISTED STRABISMUS/AMBLYOPIA DIAGNOSIS

by -

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Spring, 1984

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COMPUTER ASSISTED STRABISMUS/AMBLYOPIA DIAGNOSIS

INTRODUCTION

The use of computers in medical diagnosis has been a controversial topic. Schartz¹ identified some common physician complaints of computer diagnosis: patient dehumanization, time consuming, removing the art from clinical diagnosis, and that the numbers obtained are meaningless guesses. Proponents of computer diagnosis counter these arguments by claiming decreased diagnosis time, more doctor-patient communication due to the emphasis on case history, and the use of the computer as a diagnostic tool which "assists" the physician in a final diagnosis.^{2,3} With these latter goals in mind, this thesis will attempt to aide in the diagnosis of strabismus and amblyopia using a computer data base linked to a signs and symptoms retrieval program. The program will have two functions: (1) Description of types of strabismus/amblyopia diagnosis via input of diagnosis number, and (2) Signs and symptom input resulting in the search and retrieval of tentative diagnosis. This is a data retrieval system and assigns no weighting to the tentative diagnosis. We intend that the program be used as an aide to clinical diagnosis and an educational device in the study of strabismus/amblyopia. The final diagnosis should result from the physician's experience, knowledge, intuition, and assessment of clinical findings.

LITERATURE REVIEW

In 1959 Ledley and Lusted⁴ laid the foundations for computer diagnosis with their discussion of reasoning processes and how these could be automated. They stressed the idea that probabilistic concepts are inherent in diagnosis and that assigning a numerical likelihood to each disease was very beneficial in a differential diagnosis.

Bayes' theorem, a statistical formula, was incorporated for the first time in computer diagnosis in 1961 by Warner, et al,⁵ and is currently being used extensively in computer diagnosis. A recently published article by Wagner, et al⁶ lists approximately 600 references on computer diagnosis with 219 of them using Bayes' theorem. Bayesian models are currently being used in cardiology,⁷ endocrinology,⁸ nephrology,⁹ and many more in general medicine. Ophthalmology is included in this list with their first system designed by Fritz, et al.¹⁰ In 1978 one of the most extensive systems for computer diagnosis was developed by Weiss, et al¹¹ in the field of glaucoma consultation.

Programs utilizing the Bayes model rely on large data bases which include a large number of reliably diagnosed case histories and are performed with a very standardized set of findings and observations. Once the findings have been put into the computer the Bayes theorem provides the means of determining how likely each disease is, given the inputted signs, symptoms, and lab results. Computer assisted programs using the Bayesian model have proven successful in limited fields such as acute abdominal pain. The computer team is claiming 92% accuracy in diagnosis compared to the 80% accuracy found in senior clinicians.³ However, when computer diagnosis is applied to a broader range of ailments the clinical

staff obtains a higher accuracy. This was shown in the Internist-1 program used to diagnose general internal medical problems.¹² Limitations to this system are most frequently caused by omission, incomplete knowledge of the subject matter and the constant use of value judgement by the clinician. The Bayesian model also does not conveniently allow for the possibility of multiple diseases in the same patient or the representation of non-independence of symptoms with a disease.

The National Library of Medicine in Bethesda, Md. has developed a prototype of a hepatitis knowledge base which consists of huge bodies of text over a wide range of medical problems. This data base type of system is designed to provide the clinician with more information and at a faster rate than reference material. The information available includes signs and symptoms, etiology, synonyms, and laboratory and pathology data for a named disease. In the field of pharmacology the following would be given: contra-indications, pharmacokinetics, and drug interactions.

The convenience and increased ability to provide a faster and more complete diagnosis with the aid of a computer is rapidly coming into day-to-day use. At the present time the A.M.A. and G.T.E. are inaugurating the first nationwide electronic medical-health information system which will be available to the physician with a computer terminal.¹³ Most researchers are in favor of this type of system on the premise that if the physician does not think of the correct diagnosis, he cannot make it. A useful computer system can provide a list of possible diagnoses or symptoms once the proper correlate has been introduced.

The ultimate goal of diagnosis computer advocates is artificial intelligence systems. The computer would be fed pertinent data (signs, symptoms, case history, etc.), analyze the data, decide the best course of management, and be able to explain how it arrived at its decision. These decisions are made by either algorithmic or heuristic methods of reasoning. At the present time this level of program is in the prototype phase, and a viable artificial intelligence program has yet to be written. This type of program is more likely to be accepted by physicians since it goes beyond "black box" computing by explaining its reasoning, and like the physician, it increases its knowledge base by the outcome of previous cases. A drawback to this type of system is the expense of the hardware needed for artificial intelligence programs. This can be circumvented by linking to a large computer via an office terminal.

Relative to other areas of medicine, little use of computer assisted diagnosis has occurred in ophthalmology, even though ophthalmological diagnosis lends itself to such techniques.¹⁰ Many eye diseases can be subdivided into mutually exclusive categories simply by anatomical location, and ophthalmological measurements are often more precise than other clinical scales. Ophthalmological pathology programs have been designed for glaucoma consultation,¹¹ the differential diagnosis of leukocoria,² retinoblastoma diagnosis,¹⁴ and differential diagnosis of ocular disease.¹⁰ Programs applying to strabismus/amblyopia have been limited to ocular motility analysis,¹⁵ and strabismus surgery selection.¹⁶ Neither of these programs have application to optometric practice due to the nature of diagnosis and treatment of strabismus/amblyopia by ophthalmology.

The authors were unable to find reference to computerized diagnosis of strabismus/amblyopia in the optometric literature. Furthermore, the only optometric computer assisted diagnostic program known to the authors was created by Harry Wiessner and Jim Mayer as an aid in pathology diagnosis.

METHODOLOGY

The program is an adaptation of an existing pathology search program created by Harry Wiessner and Jim Mayer as a fourth year thesis project at Pacific University College of Optometry. The following characteristics will be found in the program:

1. The tentative diagnoses will differ by at least one sign or symptom.
2. The tentative diagnosis will be listed with no reference to probability (as in a Bayesian type program).
3. When entering data there will be no need to enter a symbol more than once.
4. Symptoms and signs will have codes, but to minimize errors the program will display the entire alphanumeric value.
5. Illegal sign and symptom codes will be detected and screened out.
6. A dictionary of signs and symptoms and their proper code numbers will be included in the program.
7. Each diagnosis will contain a description of occurrence, signs/symptoms, differentiation, treatment, prognosis, and references.

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PROGRAM DESCRIPTION

The computer program which follows is a modification of the Computer Assisted Ocular Pathology Search program written by Harry Wiessner and Jim Mayer. Minimal changes were necessary to adapt their program for strabismus/amblyopia diagnosis. The program is written in BASIC computer language for an 80 character screen, and requires 16128 bytes of internal memory. The data files can be stored using about 100,000 bytes of disc space. Fifty-six dysfunction descriptions and 159 signs/symptoms are stored on disc space.

The program consists of two sections. The first section (lines 10 to 5940) involves loading, listing, and editing of the three data files. The second section (lines 6100 to 12860) involves the data search, retrieval, and output. A more detailed description of these sections follows.

Section one is separated from section two at the beginning of the program by choosing a 1 or 2. Within section one, three data files are utilized to store signs/symptoms, dysfunction data and descriptions. The sign/symptom file contains abbreviated s/s names (up to 16 characters long) and the corresponding s/s number. This file is used as a check of inputted s/s data by printing the abbreviated s/s name opposite to each s/s number that a program user inputs. The s/s number is also the file number where the abbreviated s/s name is located. The string variable E\$ is used to input s/s terms of 16 characters or less. These characters are followed by a negative sentinel which makes the total number of bytes per record equal to 17.

The second file is the data file. It contains information about each dysfunction and about the entire program. Dysfunction data is listed starting with record number five. The first two records contain variables describing the size, and dimension values of the stored data. The third and fourth records are empty, in case a future need for storage space arises.

Variables in the first two records have the following functions:

- M5-- File number of the highest numbered dysfunction listed in the dysfunction description file. Used to keep file access within the proper range of file numbers.
- F2-- Greatest number of signs/symptoms that a program user can input in one search sequence (program adds one more character for the negative sentinal value, which indicates the end of a string). Fifteen is the value used, but the user can choose any number wished. The greater the number chosen, the more storage space and running time is required.
- F3-- Greatest number of s/s that can be contained in a data file for a dysfunction. This includes the negative sentinal value and the heating values. Thirty would be large enough to store the presently listed data.
- F, F1, F4, F5-- These variables all have the same value and are used to dimension arrays in the search section of the program. The dimension for these is presently set at $F2/3 * M5$ or 300. This value should be large enough, but can easily be changed if more than 5 matches per dysfunction are frequently encountered.

A4-- Data file number where first dysfunction number is found. Since the first four data file numbers are reserved, the first dysfunction (#1) is found on data file number 5.

A5-- Greatest data file number (highest dysfunction number +4).

A6-- Lowest s/s file number.

A7-- Greatest s/s file number.

A8-- Lowest description file number.

A9-- Greatest description file number.

Variables from the fifth record on contain information about each dysfunction. The first line contains numeric values corresponding to specific variables. These variables have the following functions:

D-- Dysfunction number.

M1-- Lowest s/s number in this dysfunction.

M2-- Highest s/s number in this dysfunction.

M3-- Total number of s/s listed for this dysfunction, including the negative sentinal value.

D1-- Record number which contains the first line of this dysfunction in the dysfunction description file.

D2-- Record number which contains the last line of this dysfunction in the dysfunction description file.

The next lines contain numbers decoded into a string (Y\$) which represent heading positions and s/s numbers. Heading positions are indicated by the first six numbers decoded into Y\$. These headings are cause, onset, signs/symptoms, differentiation, treatment, and prognosis. Numbers following these six are s/s numbers in numerical order followed by the negative sentinal. All numbers in these lines can be up to four digits in length. Headings can be removed from the description printout by

assigning a zero value instead of the usual heading number. The headings name, and references cannot be removed, and appear always at the first and last line of the dysfunction description respectively. The data file from the fifth record on has the following format:

Dysfunction number ---- D, M1, M2, M3, D1, D2

Y\$ (sectioned to fit the page). First six numbers are heading locations.

The description file is the third disc file. It presently is storing 56 descriptions and is accessed by the user for a short review of these dysfunctions. Input to this file is limited to 49 characters per line. References must fit on the last line, therefore one or two capital abbreviations are used to indicate the reference.

Section two of the program (lines 6100 to 12860) is the search portion, which the typical user will be more involved with. After the user chooses a 2, indicating he/she wishes to enter the search section, another choice will be made between running a symptom search or listing a specific dysfunction.

The symptom search begins by inputting the patient's name and age. The user then inputs s/s numbers chosen from the s/s list, and follows the last number by a zero to indicate the last s/s. Up to 15 s/s numbers may be entered. The computer checks to see if any numbers are identical, then prints abbreviated s/s names (from the s/s file) opposite the entered s/s number. This allows the user to check for proper input. The computer then internally orders the s/s numbers from least to greatest.

Next the user is asked to choose the minimum number of s/s to identify within each disease data file. For example, if three is chosen then at least three of the above entered s/s numbers must be contained in

a dysfunction before it will be listed. The larger the number, the more specific the search will be.

Now the computer checks each data file to see if the range of s/s input numbers overlaps the data file range. If an overlap occurs the data for that dysfunction is searched.

The search routine uses two arrays which have been ordered from least to greatest. Array "P" is the input numbers and array "L" is data file numbers. Each s/s number matched between arrays is stored in array "C" and the number of the dysfunction being searched is placed in array "B". The number of matches is recorded in array "G", and the number of the dysfunction matched in array "H".

Next, array "G" is ordered from greatest to least to enable the dysfunction with the greatest number of matches to be listed first. The program then finds all s/s matches which were tagged in only one dysfunction.

The user now receives a printout of the search. The signs tagged are listed from greatest to least. Dysfunction numbers and names within a group of equally tagged dysfunctions are listed from least to greatest. S/s matched to only one dysfunction are listed below the disease name.

Now the user can change the minimum number of signs to identify and rerun the search, obtain a description of any dysfunction listed, obtain another search printout, or end the program. Descriptions are obtained by inputting the appropriate dysfunction number.

DYSFUNCTION LIST

Esotropia

Accommodative Esotropia-Convergence Excess	1
Accommodative Esotropia-Divergence Insufficiency	2
Accommodative Esotropia-Partial	3
Accommodative Esotropia-Refractive	4
Non-Accommodative Esotropia-Acquired Acute	5
Non-Accommodative Esotropia-Acquired Acute (Type 3)	6
Non-Accommodative Esotropia-Acquired Basic	7
Non-Accommodative Esotropia-Acquired Convergence Excess	8
Non-Accommodative Esotropia-Acquired Cyclic	9
Non-Accommodative Esotropia-Acquired Divergence Insuf	10
Non-Accommodative Esotropia-Acquired Myopic (Type 1)	11
Non-Accommodative Esotropia-Acquired Myopic (Type 2)	12
Non-Accommodative Esotropia-Alternating	13
Non-Accommodative Esotropia-Congenital	14
Non-Accommodative Esotropia-Microtropia	15
Non-Accommodative Esotropia-Secondary	16
Non-Accommodative Esotropia-Consecutive	17
Hypo-Accommodative Esotropia	18

Exotropia

Acute Exotropia	19
Basic Exotropia	20
Convergence Insufficiency Exotropia	21
Divergence Excess Exotropia	22
Essential Exotropia	23
Psychopathic Exotropia	24
Secondary Exotropia	25
Simulated Divergence Excess Exotropia	26

Vertical Tropia

Dissociated Vertical Deviations	27
Inferior Oblique Overaction-Primary	28
Inferior Oblique Overaction-Secondary	29
Superior Oblique Overaction-Primary	30
Superior Oblique Overaction-Secondary	31
Tight Lateral Rectus Syndrome	32
Purely Concomitant Hyperdeviations	33

Amblyopia

Ametropic Amblyopia	34
Anisometric Amblyopia	35
Exanopsia Amblyopia	36
Meridional Amblyopia	37
Nystagmoid Amblyopia	38
Organic Amblyopia	39
Strabismic Amblyopia	40

Cyclodeviations

A,V,D,Y Syndrome

Palsy and Paralysis

Divergence Paralysis	43
Double Depressor Palsy	44
Double Elevator Palsy	45
Third Nerve Palsy	46
Fourth Nerve Palsy	47
Sixth Nerve Palsy	48
Paralytic Esotropia	49

Paralytic Overtones

Duane's Retraction Syndrome	50
Intermittent Superior-Oblique Tendon Sheath Syndrome	51
Mobius Syndrome	52
Nystagmus Blockage Syndrome	53

Non-Paralytic Overtones

Johnson's Adherence Syndrome	54
Non-Paralytic Fibrosis	55
Strabismus Fixus	56

SIGNS/SYMPTOMS
Numerical Listing

1. Sudden diplopia
2. Deviation at near = far
3. Deviation increases with age
4. Deviation greater than 40 pd
5. Forced duction test negative
6. Alternating deviation
7. Fusional amplitude low
8. Accommodative amplitude low
9. Orthophoria at near
10. Deviation at near greater than far
11. Deviation between 20-40 pd
12. AC/A low
13. Suppression
14. Deviation at near less than far
15. Fusional divergence low
16. Myopia, 1-5 diopters
17. Myopia, .5-10 diopters
18. Low abduction
19. Diplopia
20. Myopia, greater than 10 diopters
21. Adduction excessive
22. Limited ocular mobility in all gazes
23. Emmetropia
24. Hyperopia, 0-2 diopters
25. Hyperopia, 2-5 diopters
26. Amblyopia
27. Eccentric fixation
28. Vertical tropia
29. Retinoblastoma
30. Cross fixation during lateral gaze
31. Anomalous retinal correspondence
32. Latent nystagmus
33. AC/A high

34. "A" pattern
35. "V" pattern
36. Unilateral deviation
37. Constant deviation
38. Variable deviation
39. Intermittent diplopia
40. Bifocal correction has no effect
41. Miotics have no effect
42. Concomitant deviation
43. History of EOM surgery
44. Relative foveal scotoma
45. Esotropia
46. Pendular vertical movements of occluded eye
47. Excycloduction of non-fixating eye
48. Dissociation with red lens
49. Bilateral deviation
50. Deviation = during lateral gazes
51. Upturn of eye during adduction
52. Hypertropia OS during dextroversion
53. Hypertropia OD during levoversion
54. Increased field of fixation in nasal quadrant
55. Diplopia during horizontal gaze
56. Compensatory head turn
57. Cyclotropia
58. Excyclotropia
59. Compensatory head tilt
60. Downturn of eye during adduction
61. Increased rotation of eye in field of action of SO
62. Subjective incyclotropia
63. Exotropia
64. Hyperopia, greater than 5 diopters
65. Anisometropia
66. Microtropia
67. Hyperopia
68. History of occlusion
69. Astigmatism, high, uncorrected

70. Decreased duction in field of IR
71. Decreased duction in field of SO
72. Decreased duction in field of SR
73. Decreased duction in field of IO
74. Fixation with unaffected eye
75. Pseudo Graefe sign (lid elevation during downgaze)
76. Widening of palpebral fissure during adduction
77. Narrowing of palpebral fissure during abduction
78. Pupil fixed and dilated
79. Globe retraction during adduction
80. Ptosis
81. Objective cyclotropic deviation
82. Past pointing
83. Widening of palpebral fissure during abduction
84. Dolls head phenomena absent
85. Narrowing of palpebral fissure during adduction
86. Upturn of eye limited during adduction
87. Compensatory chin tilt
88. Limited lateral ocular mobility
89. Tongue palsy
90. History of mental retardation
91. Deafness
92. Ectropion
93. History of hydrocephalus and increased intracranial pressure
94. Discordant nystagmus
95. Pupil constriction as strabismus increases and nystagmus decreases
96. Pseudoparalysis of lateral recti
97. Downturned fixation bilaterally
98. History of familial occurrence
99. Eyes straighten during anesthesia
100. Refractive error factor insignificant
101. Cyclic bouts of esotropia (24,48,76,92 hours)
102. Intermittent deviation
103. Inferior oblique overaction
104. Blind spot syndrome

105. Hypertropia of non-fixating eye
106. Cyclotropia of non-fixating eye
107. Deviation uncorrected by near spectacle Rx
108. Deviation corrected by distance spectacle Rx
109. Rotation of foveola
110. Esotropia at far
111. Esophoria at near
112. Mixed accommodative and non-accommodative signs
113. Deviation corrected by near spectacle Rx
114. Incomitant deviation
115. Stereoacuity decreased
116. Deviation between 0-5 pd
117. Deviation increases during fatigue
118. Hypertropia in non-fixating eye
119. Vertical tropia rare during primary gaze
120. Deviation maximum during abduction
121. Bielschowsky's head tilt test positive
122. Increased vertical tropia during vertical gaze
123. Asymmetric deviation
124. Low adduction
125. Overaction of all 4 obliques
126. Media opacities
127. Myopia of amblyopic eye
128. Nystagmus
129. No detectable pathology
130. Paretic cyclovertical tropia
131. Cyclotropia unchanged during monocular/binocular transition
132. Asthenopia
133. Deviation OD = OS
134. Diplopia uncrossed at 2-3 meters
135. Fusion at 50-60 cm
136. Retraction and adduction of globe during upgaze
137. Pupil reacts to convergence and adduction
138. No subjective cyclotropia
139. IO overaction during fixation with non-parietic eye

140. Ametropia greater in affected eye
141. History of congenital ocular anomaly
142. Diplopia during adduction
143. Forced duction test positive
144. Increased vertical tropia during adduction
145. Increased visual acuity during adduction
146. Increased nystagmus during abduction
147. Fixation with adducting eye
148. Fibrosis of all EOMs
149. Disrupted convergence during superior and lateral gaze
150. Fixed deviation at all distances
151. History of emotional anomalies
152. Diverging anatomical characteristics
153. Unilateral blindness
154. Occlusion and +3.00 diopter sphere tests positive
155. Abduction excessive
156. NPC receded
157. Convergence excess
158. Divergence insufficiency
159. History of physical trauma

SIGN/SYMPTOM LIST

CATEGORICAL

Case History

Ocular History of:

Asthenopia	132
Congenital ocular anomaly	141
Deviation increases during fatigue	117
E O M surgery	43
Familial occurrence	98
Occlusion	68

General Health History of:

Blindness, unilateral	153
Deafness	91
Emotional anomalies	151
Hydrocephalus and increased intracranial pressure	93
Mental retardation	90
Physical trauma	159

External/Internal Exam

Compensatory chin tilt	87
Compensatory head tilt	59
Compensatory head turn	56
Diverging anatomical characteristics (oxycephaly)	152
Ectropian	92
Media opacities	126
No detectable pathology	129
Ptosis	80
Pupil constriction as strabismus increases and nystagmus decreases	95
Pupil fixed and dilated	78
Retinoblastoma	29
Rotation of foveola	109
Tongue palsy	89

Refractive Status

Amblyopia	26
Ametropia greater in affected eye	140
Anisometropia	65
Astigmatism, high, uncorrected	69
Emmetropia	23
Hyperopia	67
Hyperopia, 0-2 diopters	24
Hyperopia, 2-5 diopters	25
Hyperopia, greater than 5 diopters	64
Myopia, 1-5 diopters	16
Myopia, 5-10 diopters	17
Myopia, greater than 10 diopters	20
Myopia of amblyopic eye	127
Pupil reacts to convergence and adduction	137
Refractive error factor insignificant	100
Visual acuity increases during adduction	145

Deviation

Type:

Alternating deviation	6
"A" pattern	34
Assymmetric deviation	123
Bilateral deviation	49
Blind spot syndrome	104
Concomitant deviation	42
Constant deviation	37
Cyclic bouts of esotropia, 24,48,76,92 hours	101
Cyclotropia	57
Cyclotropia of non-fixating eye	106
Esotropia	45
Esotropia at far	110
Esotropia at near	111
Excyclotropia	58
Exotropia	63
Fixed deviation at all distances	150

Hypertropia of non-fixating eye	..	..	..	..	..	..	..	..	105
Incomitant deviation	..	..	..	..	..	..	..	..	114
Intermittent deviation	..	..	..	..	..	..	..	..	102
Microtropia	..	..	..	..	..	..	..	..	66
No subjective cyclotropia	..	..	..	..	..	..	..	..	138
Objective cyclotropic deviation	..	..	..	..	..	..	..	..	81
Paretic cyclovertical tropia	..	..	..	..	..	..	..	..	130
Subjective incyclotropia	..	..	..	..	..	..	..	..	62
Unilateral deviation	..	..	..	..	..	..	..	..	36
"V" pattern	..	..	..	..	..	..	..	..	35
Variable deviation	..	..	..	..	..	..	..	..	38
Vertical tropia	..	..	..	..	..	..	..	..	28

Size:

Deviation at near = far	..	..	..	..	..	..	..	..	2
Deviation at near less than far	..	..	..	..	..	..	..	..	14
Deviation at near greater than far	..	..	..	..	..	..	..	..	10
Deviation between 0-5 pd	..	..	..	..	..	..	..	..	116
Deviation between 20-40 pd	..	..	..	..	..	..	..	..	11
Deviation greater than 40 pd	..	..	..	..	..	..	..	..	4
Deviation = during lateral gazes	..	..	..	..	..	..	..	..	50
Deviation increases with age	..	..	..	..	..	..	..	..	3
Deviation maximum during abduction	..	..	..	..	..	..	..	..	120
Deviation OD = OS	..	..	..	..	..	..	..	..	133
Orthophoria at near	..	..	..	..	..	..	..	..	9

Motility Anomalies

Limitations:

Decreased duction in field of IO	73
Decreased duction in field of IR	70
Decreased duction in field of SO	71
Decreased duction in field of SR	72
Disrupted convergence during superior & lateral gaze	149
Divergence insufficiency	158
Excycloduction of non-fixating eye	47
Fibrosis of all EO Ms	148
Limited lateral ocular mobility	88
Limited ocular mobility in all gazes	22
Low adduction	124
Pseudoparalysis of lateral recti	96
Upturn of eye limited during adduction	86

Others:

Abduction excessive	155
Adduction excessive	21
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Narrowing of palpebral fissure during adduction	85
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Upturn of eye during adduction	51
Vertical tropia increased during adduction	144
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Anomalous retinal correspondence	31
Cross fixation during lateral gaze	30
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Field of fixation increased in nasal quadrant	54
Fixation with unaffected eye	74
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Diplopia	19
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Diplopia uncrossed at 2-3 meters	134
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Miotics have no effect	41
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SIGNS/SYMPTOMS DATA FILE

- | | |
|---------------------|----------------------|
| 1. SUDDEN DIPLOPIA | 34. A PATTERN |
| 2. DEV @ N=F | 35. V PATTERN |
| 3. DEV INC W AGE | 36. UNILAT DEV |
| 4. DEV >=40 PD | 37. CONSTANT DEV |
| 5. F DUCT TEST - | 38. VARIABLE DEV |
| 6. ALT DEV | 39. INT DIPLOPIA |
| 7. FUS AMP LOW | 40. BIF CORR NO EFF |
| 8. ACC AMP LOW | 41. MIOTIC NO EFF |
| 9. ORTHOPHORIA @ N | 42. CONCOM DEV |
| 10. DEV @ N>F | 43. HX EOM SURG |
| 11. DEV 20-40 PD | 44. REL FOVEAL SCOT |
| 12. AC/A LOW | 45. ESOTROPIA |
| 13. SUPPRESSION | 46. PEND VERT MOV |
| 14. DEV @ N<F | 47. EXCYCLO NON FIX |
| 15. FUS DIV LOW | 48. DISS W RED LENS |
| 16. MYOPIA 1-5 D | 49. BILAT DEV |
| 17. MYOPIA 5-10 D | 50. DEV = LAT GAZ |
| 18. LOW ABDUCTION | 51. UPTURN DUR ADD |
| 19. DIPLOPIA | 52. HYPT L DEXTROV |
| 20. MYOPIA >10 D | 53. HYPT R LEVOV |
| 21. ADD EXCESS | 54. INC FIELD FIX |
| 22. LIM MOB ALL GAZ | 55. DIP HOR GAZ |
| 23. EMMETROPIA | 56. COMP HEAD TURN |
| 24. HYPEROPIA 0-2 D | 57. CYCLOT |
| 25. HYPEROPIA 2-5 D | 58. EXCYCLOT |
| 26. AMBLYOPIA | 59. COMP HEAD TILT |
| 27. ECC FIX | 60. DOWNTURN W ADD |
| 28. VERT TROPIA | 61. INC ROT FIELD SO |
| 29. RETINOBLASTOMA | 62. SUBJ INCYCLOT |
| 30. CR FIX LAT GAZ | 63. EXOTROPIA |
| 31. ARC | 64. HYPEROPIA >5 D |
| 32. LAT NYSTAG | 65. ANISOMETROPIA |
| 33. AC/A HIGH | 66. MICROTROPIA |

67. HYPEROPIA	102. INT DEV
68. HX OCCLUSION	103. INF OBL OVER
69. ASTIG HIGH UNCOR	104. BLIND SPOT SYN
70. DEC DUCT IR	105. HYPERT NON FIX
71. DEC DUCT SO	106. CYCLOT NON FIX
72. DEC DUCT SR	107. DEV UNCOR N SRX
73. DEC DUCT IO	108. DEV COR DX SRX
74. FIX W UNAFF EYE	109. ROT OF FOVEOLA
75. PSEUDO GRAEFE	110. ESOT @ F
76. WID PALP FIS ADD	111. ESOPHORIA @ N
77. NAR PALP FIS ABD	112. MIX ACC & NONACC
78. PUPIL FIX DIAL	113. DEV COR N SRX
79. GLOBE RET ADD	114. INCOMITANT
80. PTOSIS	115. DEC STEREO
81. OBJ CYCLOT DEV	116. DEV 0-5 PD
82. PAST POINT	117. DEV INC FAT
83. WID PALP FIS ABD	118. HYPERT W NON FIX
84. DOL HEAD PHEN -	119. VERT TROP RARE
85. NAR PALP FIS ADD	120. DEV MAX ABD
86. UPTURN LIM ADD	121. BIELSCHOWSKY +
87. COMP CHIN TILT	122. INC VERT VERT
88. LIM LAT MOB	123. ASYM DEV
89. TONGUE PALSY	124. LOW ADD
90. HX MENT RETARD	125. OVERACT 4 OBL
91. DEAFNESS	126. MEDIA OPAC
92. ECTROPION	127. MYOPIA AMBLYO
93. HX HYDRO @ INC ICP	128. NYSTAGMUS
94. DISCORD NYSTAG	129. - PATH
95. P CON STRAB INC	130. PARETIC CYCLOV T
96. PSEUDO LR	131. CYCLOT UNCHANG
97. DOWNTURN FIX BIL	132. ASTHENOPIA
98. HX FAM OCC	133. DEV OD =OS
99. STRAIGHT W ANEST	134. DIP UNCROS 2-3 M
100. REF ERR INSIG	135. FUSION 50-60 CM
101. CYCLIC ESOT	136. RETRACT & ADD GLOB

- 137. PUP RXN CONV & ADD
- 138. -SUBJ CYCLOT
- 139. IO OVERACT FIX
- 140. INC AMETROPIA
- 141. HX CONG OC ANOM
- 142. DIPLOPIA W ADD
- 143. FORCE DUCT T+
- 144. INC VERT T ADD
- 145. INC VA ADD
- 146. INC NYSTAG ABD
- 147. FIX ADD EYE
- 148. FIBROSIS ALL EOM
- 149. DISRUPT CONV S&L
- 150. FIX DEV@ALL DIST
- 151. HY EMOTION ANOM
- 152. DIV ANAT CHAR
- 153. UNILAT BLIND
- 154. OCC&3D TEST+
- 155. ABD EXCESS
- 156. NPC RECEDED
- 157. CONV EXCESS
- 158. DIVER INSUFF
- 159. HX PHYS TRAUMA

DYSFUNCTION
DATA FILE

FORMAT:

DYSFUNCTION NO:----D,M1,M2,M3,D1,D2

Y\$, (SECTIONED TO FIT THE PAGE)

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 122 -1

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 123 -1

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0 0 589 592 594 595 42 45 133 134 135 -1

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612 613 614 0 619 0 19 26 36 59 72 73 74 114 141
-1

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626 627 628 0 634 0 26 75 76 77 78 80 136 137 -1

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641 642 643 648 649 0 19 28 36 49 59 138 139 -1

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656 657 658 0 0 0 14 18 19 36 45 49 82 124 141
-1

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667 668 669 0 0 672 1 45 56 59 82 114 159 -1

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681 682 683 0 692 693 13 18 26 45 49 56 59 63 65
79 83 84 85 124 140 141 -1

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142 143 144 -1

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716 0 718 0 0 0 34 35 45 56 80 88 89 90 91
92 -1

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727 0 728 0 737 0 38 45 56 93 94 95 96 145 146
147 -1

54 ---- 54 18 114 3 742 746
743 0 745 0 0 0 18 114 -1 -

55 ---- 55 45 149 10 750 760
751 752 753 0 759 0 45 80 87 97 98 114 141 148 149
-1

56 ---- 56 13 150 7 764 773
765 766 767 0 770 771 13 22 45 63 114 150 -1

DYSFUNCTION DESCRIPTION FILE

NAME: 1--ACCOMMODATIVE ESOTROPIA
CONVERGENCE EXCESS (NON-REFRACTIVE)
CAUSE: ABNORMAL LINK BETWEEN ACCOMMODATION AND
CONVERGENCE; EFFORT TO ACCOMMODATE CAUSES LARGE
ACCOMMODATIVE CONVERGENCE
ONSET: 8 MONTHS TO 7 YEARS (30 MONTHS AVE.)
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION;
CONVERGENCE EXCESS; DEVIATION AT NEAR > FAR;
HYPEROPIA, 2-5 DIOPTERS; DEVIATION UNCORRECTED BY
NEAR SPECTACLE RX; AC/A HIGH; DEVIATION CORRECTED
BY DISTANCE SPECTACLE RX; INCREASED VERTICAL
TROPIA DURING ADDUCTION; "A" PATTERN; "V"
PATTERN; VERTICAL TROPIA; AMBLYOPIA
TREATMENT: BIFOCALS; MIOTICS; VISUAL TRAINING TO ELIMINATE
SUPPRESSION AND DEVELOP FUSIONAL DIVERGENCE
AMPLITUDE WHILE CLEARING TARGET AND RELAXATION OF
ACCOMMODATION
PROGNOSIS: ANGLE STARTS AS INTERMITTENT W/DIPLOPIA AND
PROGRESSES TO FIXED W/SUPPRESSION; SUCCESS OF
TREATMENT FAVORABLE
REFERENCES: V-292; LB-325; LJ-307; D-194

NAME: 2--ACCOMMODATIVE ESOTROPIA
DIVERGENCE INSUFFICIENCY
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DIVERGENCE
INSUFFICIENCY; ESOTROPIA AT FAR; ESOPHORIA AT
NEAR
TREATMENT: BO PRISM; VISUAL TRAINING TO INCREASE DIVERGENCE;
SURGERY
REFERENCES: LJ-307

NAME: 3--ACCOMMODATIVE ESOTROPIA
PARTIAL
ONSET: 2-3 YEARS (USUALLY)
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; HX OF
CONGENITAL OCULAR ANOMALY; MIXED ACCOMMODATIVE
AND NON-ACCOMMODATIVE SIGNS; MIOTICS HAVE NO
EFFECT; BIFOCAL CORRECTION HAS NO EFFECT;
UNILATERAL DEVIATION; AMBLYOPIA; ARC;
ACCOMMODATIVE AMPLITUDE LOW; CONSTANT DEVIATION
TREATMENT: CORRECT FULL REFRACTIVE ERROR; BIFOCALS AFTER
DEVIATION IS ELIMINATED; VISUAL TRAINING TO
ELIMINATE AMBLYOPIA; SURGERY FOR ANY NON-
ACCOMMODATIVE DEVIATION REMAINING
PROGNOSIS: SUCCESS OF TREATMENT FAVORABLE
REFERENCES: V-293; LB-325; LJ-307; D-199

NAME: 4--ACCOMMODATIVE ESOTROPIA
REFRACTIVE (ACCOMMODATIONAL CONVERGENT
STRABISMUS)
CAUSE: ANOMALY DUE TO ACCOMMODATION-CONVERGENCE
RELATIONSHIP
ONSET: 2-3 YEARS
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT
NEAR<FAR; VARIABLE DEVIATION; INTERMITTENT
DIPLOPIA; HYPEROPIA, 2-5 DIOPTERS; FUSIONAL
DIVERGENCE LOW; UNILATERAL DEVIATION; ALTERNATING
DEVIATION; DEVIATION CORRECTED BY DISTANCE
SPECTACLE RX; DEVIATION CORRECTED BY NEAR
SPECTACLE RX; DIPLOPIA; SUPPRESSION; ARC; "A"
PATTERN; "V" PATTERN; VERTICAL TROPIA
TREATMENT: CORRECT REFRACTIVE ERROR (GRADUAL TO FULL);
CYCLOPLEGIC REFRACTION; VISUAL TRAINING TO
ELIMINATE SUPPRESSION, BUILD FUSIONAL DIVERGENCE,
RELAX ACCOMMODATION AND CONVERGENCE, AND INCREASE
BINOCULAR VISUAL ACUITY
PROGNOSIS: GRADUAL PROGRESSION FROM INTERMITTENT TO CONSTANT
DEVIATION; SUCCESS OF TREATMENT FAVORABLE
REFERENCES: V-291; HB-324; LJ-306; D-190

NAME: 5--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED ACUTE
CAUSE: ARTIFICIAL INTERRUPTION OF BINOCULAR VISION
(OCCLUSION); OR NO APPARENT CAUSE
ONSET: EARLY INFANCY TO CHILDHOOD; OLDER CHILDREN TO
ADULTS
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; SUDDEN DIPLOPIA
TREATMENT: CORRECT REFRACTIVE ERROR; VISUAL TRAINING;
SURGERY
PROGNOSIS: SUCCESS OF TREATMENT FAVORABLE; MAY SPONTANEOUSLY
RECOVER
REFERENCES: V-395

NAME: 6--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED ACUTE TYPE 3 (FRANCESHETTI)
CAUSE: DEBILITATING ILLNESS; EMOTIONAL OR PHYSICAL
STRESS
ONSET: RAPID AT ANY AGE (CHILDHOOD TO ADULT)
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; HX OF PHYSICAL
TRAUMA; HX OF EMOTIONAL ANOMALIES; DEVIATION
BETWEEN 20-40 PD; REFRACTIVE ERROR FACTOR
INSIGNIFICANT; FUSIONAL AMPLITUDE LOW;
ACCOMMODATIVE AMPLITUDE LOW
PROGNOSIS: WHEN ANGLE IS CORRECTED, GOOD BINOCULAR
COOPERATION IS POSSIBLE
REFERENCES: V-397

NAME: 7--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED BASIC (ESSENTIAL ESOTROPIA OF LATE
ONSET, ACQUIRED TONIC ESOTROPIA)
CAUSE: INNERVATIONAL ANOMALY, OR FROM PREVIOUS DISEASE
ONSET: AFTER 6 MONTHS, DURING CHILDHOOD (ASSOCIATED WITH
ILLNESS, INJURY, OR EMOTIONAL UPSET)
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT
NEAR=FAR; DEVIATION INCREASES WITH AGE; DEVIATION
>40 PD; REFRACTIVE ERROR FACTOR INSIGNIFICANT;
ACCOMMODATIVE AMPLITUDE LOW; FORCED DUCTION TEST
NEGATIVE; EYES STRAIGHTEN DURING ANESTHESIA;
ALTERNATING DEVIATION
TREATMENT: VISUAL TRAINING TO REDUCE AMBLYOPIA; SURGERY
REFERENCES: V-301; M-16, D-213

NAME: 8--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED CONVERGENCE EXCESS
CAUSE: TONIC INNERVATION
ONSET: 2-3 YEARS
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; CONVERGENCE
EXCESS; ORTHOPHORIA AT NEAR; -HYPEROPIA, 0-2
DIOPTERS; DEVIATION AT NEAR>FAR; DEVIATION
BETWEEN 20-40 PD; BIFOCAL CORRECTION HAS NO
EFFECT; MIOTICS HAVE NO EFFECT/ AC/A LOW
TREATMENT: SURGERY
REFERENCES: V-302; D-214

NAME: 9--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED CYCLIC (CYCLIC HETEROTROPIA,
CIRCADIAN, ALTERNATE DAY, CLOCK MECHANISM
ESOTROPIA)
ONSET: EARLY INFANCY
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; CYCLIC BOUTS OF
ESOTROPIA (24,48,76,92 HOURS); DEVIATION >40 PD;
SUPPRESSION
PROGNOSIS: USUALLY PROGRESSES TO CONSTANT ESOTROPIA
REFERENCES: V-392; H-56; D-215

NAME: 10--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED DIVERGENCE INSUFFICIENCY
CAUSE: NO NEUROLOGIC, DISEASE, OR PHYSICAL TRAUMA
ONSET: SUDDEN ESOTROPIA AT DISTANCE
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DIVERGENCE
INSUFFICIENCY; INTERMITTENT DEVIATION; CONSTANT
DEVIATION; INTERMITTENT DIPLOPIA; DEVIATION AT
NEAR<FAR; FUSIONAL DIVERGENCE LOW
REFERENCES: V-409

NAME: 11--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED MYOPIC TYPE 1
ONSET: YOUNG ADULTS; GRADUAL PROGRESSION FROM TROPIA AT
DISTANCE TO NEAR
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; MYOPIA, 1-5
DIOPTERS; MYOPIA, 5-10 DIOPTERS; LOW ABDUCTION;
DIPLOPIA
REFERENCES: V-302

NAME: 12--NON-ACCOMMODATIVE ESOTROPIA
ACQUIRED MYOPIC TYPE 2
CAUSE: MYOSITIS; ENDOCRINE MYOPATHY
ONSET: YOUNG ADULTS; GRADUAL PROGRESSION
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; MYOPIA, >10
DIOPTERS; DIPLOPIA; ADDUCTION EXCESSIVE; LIMITED
OCULAR MOBILITY IN ALL GAZES
REFERENCES: V-302

NAME: 13--NON-ACCOMMODATIVE ESOTROPIA
ALTERNATING (ALTERNATING CONVERGENT
STRABISMUS, ESSENTIAL ALTERNATING
CONVERGENT SQUINT, PARETIC ALTERNATING
CONVERGENT SQUINT)
ONSET: VERY EARLY, TO BIRTH
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DEVIATION
INCREASES WITH AGE; DEVIATION BETWEEN 20-40 PD;
EMMETROPIA; ALTERNATING DEVIATION; LOW ABDUCTION;
DIPLOPIA
REFERENCES: LB-327

NAME: 14--NON-ACCOMMODATIVE ESOTROPIA
CONGENITAL (INFANTILE, CONNATAL)
CAUSE: INNERVATIONAL ANOMALY
ONSET: BIRTH TO 6 MONTHS
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; HX OF
CONGENITAL OCULAR ANOMALY; DEVIATION >40 PD;
DEVIATION AT NEAR=FAR; HYPEROPIA, 0-2 DIOPTERS;
HYPEROPIA, 2-5 DIOPTERS; LOW ABDUCTION; ADDUCTION
EXCESSIVE; AMBLYOPIA; ECCENTRIC FIXATION;
VERTICAL TROPIA; INFERIOR OBLIQUE OVERACTION;
RETINOBLASTOMA; ALTERNATING DEVIATION; CROSS
FIXATION DURING LATERAL GAZE; BLIND SPOT
SYNDROME; ARC; HYPERTROPIA OF NON-FIXATING EYE;
CYCLOTROPIA OF NON-FIXATING EYE; LATENT NYSTAGMUS
DIFFEREN: FROM GENUINE ABDUCENS PARESIS, AND CROSS FIXATOR
PARESIS WITH PSEUDOPARESIS (BILATERAL 6TH NERVE
PARESIS) VIA THE DOLLS HEAD PHENOMENA
TREATMENT: CORRECT REFRACTIVE ERROR (CYCLOPLEGIC REFRACTION)
MIOTICS; VISUAL TRAINING TO ELIMINATE AMBLYOPIA;
SURGERY; ALTERNATING PATCHING

PROGNOSIS: SURGICAL OUTCOME: COSMETIC ALIGNMENT ONLY, LOW STEREOPSIS, PERIPHERAL FUSION, ARC, MONOFIXATION SYNDROME
REFERENCES: V-295; M-151; P-99; H-54; LJ-323; D-200

NAME: 15--NON-ACCOMMODATIVE ESOTROPIA
MICROTROPIA (PARKS SYNDROME, RETINAL SLIP, FIXATION DISPARITY, FUSION DISPARITY, RETINAL FLICKER, MONOFIXATIONAL ESOPHORIA, MONOFIXATIONAL SYNDROME, STRABISMUS SPURIUS, MICROTROPIA UNILATERALIS ANOMALOFUSIONALIS, MINISQUINT, MICROSTRABISMUS)
CAUSE: IATROGENIC; IDIOPATHIC; STRABISMUS
SIGN/SYMPT: CONCOMITANT DEVIATION; AMBLYOPIA; ARC; RELATIVE FOVEAL SCOTOMA; STEREOACUITY DECREASED; DEVIATION BETWEEN 0-5 PD; ESOTROPIA
TREATMENT: VISUAL TRAINING FOR AMBLYOPIA; PRESCRIBE FULL REFRACTIVE CORRECTION; OCCLUSION THERAPY
REFERENCES: V-304; D-207

NAME: 16--NON-ACCOMMODATIVE ESOTROPIA
SECONDARY (SENSORY ESOTROPIA)
CAUSE: ANISOMETROPIA; CONGENITAL OR TRAUMATIC UNILATERAL CATARACTS; INJURIES; MACULAR LESIONS; OPTIC ATROPHY; CORNEAL OPACITIES; ORGANIC AMBLYOPIA
ONSET: VARIABLE, ANY AGE
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; HX OF CONGENITAL OCULAR ANOMALY; HX OF PHYSICAL TRAUMA; VERTICAL TROPIA; AMBLYOPIA
TREATMENT: VISUAL TRAINING; SURGERY
REFERENCES: V-307; M-18; D-216

NAME: 17--NON-ACCOMMODATIVE ESOTROPIA
CONSECUTIVE
CAUSE: SURGERY FOR EXOTROPIA
ONSET: ANY TIME FOLLOWING SURGERY
SIGN/SYMPT: ESOTROPIA; INCOMITANT DEVIATION; HX OF EOM SURGERY
REFERENCES: V-308; D-216

NAME: 18--HYPO-ACCOMMODATIVE ESOTROPIA
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; EMMETROPIA; ACCOMMODATIVE AMPLITUDE LOW; DEVIATION AT NEAR>FAR
TREATMENT: NEAR POINT LENSES
REFERENCES: V-292; CH-207

NAME: 19--ACUTE EXOTROPIA
CAUSE: UNKNOWN
ONSET: ABRUPT, AFTER EARLY CHILDHOOD, SOMETIMES IN ADULTS
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; SUDDEN DIPLOPIA
DIFFEREN: SUDDEN DIPLOPIA WITHOUT A CAUSE
TREATMENT: ORTHOPTICS; SURGERY
PROGNOSIS: VARIABLE
REFERENCES: DE-626

NAME: 20--BASIC EXOTROPIA
CAUSE: UNKNOWN
ONSET: MOST BEFORE AGE 5 (34.5% TO 70% REPORTED TO BEGIN BEFORE AGE 2)
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT NEAR=FAR
TREATMENT: ORTHOPTICS; SURGERY, RESECTION-RESECTION
PROGNOSIS: SURGERY HAS POTENTIAL TO CORRECT NEAR AND FAR DEVIATIONS EQUALLY; REOCCURRENCE IS COMMON
REFERENCES: P-113; DE-620; V-314; M-137

NAME: 21--CONVERGENCE INSUFFICIENCY EXOTROPIA
CAUSE: HYPOKINETIC INNERVATIONAL ANOMALY
ONSET: MOST BEFORE AGE 5 (35.5% TO 70% REPORTED TO BEGIN BEFORE AGE 2)
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT NEAR>FAR; AC/A LOW; NPC RECEDED; ASTHENOPIA; DIPLOPIA; SUPPRESSION
TREATMENT: ORTHOPTICS FOR CONVERGENCE TRAINING; BI PRISM FOR NEAR; POOR SURGICAL RESULTS (POSTOPERATIVE ESOTROPIA AT DISTANCE IS COMMON)
PROGNOSIS: ORTHOPTICS MOST SUCCESSFUL; REOCCURRENCE COMMON
REFERENCES: P-113; DE-620; V-314; M-138; LJ-164; CH-217

NAME: 22--DIVERGENCE EXCESS EXOTROPIA
CAUSE: HYPERKINETIC INNERVATIONAL ANOMALY
ONSET: MOST BEFORE AGE 5 (REPORTS OF 34.5% TO 70% BEGIN BEFORE AGE 2)
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT NEAR<FAR; AC/A HIGH; ASTHENOPIA; AMBLYOPIA; ARC; ABDUCTION EXCESSIVE
DIFFEREN: OCCLUSION OR CONVEX SPHERE TESTS DO NOT SIGNIFICANTLY INCREASE NEAR DEVIATION, AS FOUND IN SIMULATED DIVERGENCE EXCESS EXOTROPIA
TREATMENT: ORTHOPTICS; SURGERY, RESECTION OF BOTH LATERAL RECTI
PROGNOSIS: ORTHOPTICS LESS SUCCESSFUL; REOCCURRENCE COMMON
REFERENCES: DE-618; P-115; V-314; M-135

NAME: 23--ESSENTIAL EXOTROPIA
CAUSE: USUALLY AN ANATOMICAL OR INNERVATIONAL ANOMALY OF
UNCERTAIN ORIGIN
ONSET: AFTER PUBERTY OR IN ADULT LIFE
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; DEVIATION
INCREASES DURING FATIGUE; DEVIATION INCREASES
WITH AGE; UNILATERAL BLINDNESS; DIVERGING
ANATOMICAL CHARACTERISTICS
TREATMENT: ORTHOPTICS; SURGERY IF ORTHOPTICS FAIL
PROGNOSIS: REOCCURRENCE COMMON
REFERENCES: DE-623

NAME: 24--PSYCHOPATHIC EXOTROPIA
CAUSE: INDUCED BY PSYCHO-NEUROSIS
ONSET: OFTEN AFTER HIGH PSYCHOLOGICAL STRESS SITUATIONS
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; HX OF EMOTIONAL
ANOMALIES
DIFFEREN: HX OF MENTAL ILLNESS ASSOCIATED WITH ONSET OF
SQUINT
TREATMENT: PSYCHOLOGICAL COUNSELING
PROGNOSIS: VARIABLE
REFERENCES: DE-626; LJ-217

NAME: 25--SECONDARY EXOTROPIA
CAUSE: SURGICAL OVERCORRECTION OF ESOTROPIA OR UNDER-
CORRECTION OF EXOTROPIA
ONSET: GRADUAL INCREASE POST-SURGICALLY
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; HX OF EOM
SURGERY
DIFFEREN: HX OF OCULAR MUSCLE SURGERY
TREATMENT: SURGERY; ORTHOPTICS
PROGNOSIS: REOCCURRENCE IS COMMON
REFERENCES: DE-626

NAME: 26--SIMULATED DIVERGENCE EXCESS EXOTROPIA
(PSEUDODIVERGENCE EXCESS EXOTROPIA)
ONSET: MOST BEFORE AGE 5 (34.5% TO 70% REPORTED TO BEGIN
BEFORE AGE 2) OCCURS MORE FREQUENTLY THAN
DIVERGENCE EXCESS EXOTROPIA
SIGN/SYMPT: EXOTROPIA; CONCOMITANT DEVIATION; DEVIATION AT
NEAR<FAR; AC/A HIGH; OCCLUSION AND +3.00 DIOPTER
SPHERE TESTS POSITIVE
DIFFEREN: OCCLUSION OR CONVEX SPHERE TEST REVEALS AN
INCREASED NEAR DEVIATION, AS LARGE AS OR LARGER
THAN FAR DEVIATION; AC/A IS NORMAL IF OCCLUSION
TEST IS POSITIVE
TREATMENT: ORTHOPTICS; SURGERY, RECESSIO-RESECTION
PROGNOSIS: ORTHOPTICS LESS SUCCESSFUL; REOCCURRENCE COMMON
REFERENCES: DE-619; P-117; V-314; M-137

NAME: 27--DISSOCIATED VERTICAL DEVIATIONS
 (ALTERNATING SURSUMDUCTION, ANATOPIA,
 ALTERNATING HYPERTROPIA, DOUBLE HYPERTROPIA
 OCCLUSION HYPERTROPIA)
 CAUSE: ABNORMAL INTERMITTENT EXCITATION FROM SUBCORTICAL
 CENTERS
 ONSET: 8 MONTHS TO 2 YEARS
 SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; DEVIATION
 INCREASES DURING FATIGUE; PENDULAR VERTICAL
 MOVEMENTS OF OCCLUDED EYE; EXCYCLODUCTION OF
 NON-FIXATING EYE; LATENT NYSTAGMUS; ALTERNATING
 DEVIATION; HYPERTROPIA IN NON-FIXATING EYE;
 ESOTROPIA; DIPLOPIA; SUPPRESSION; DISSOCIATION
 WITH RED LENS; DEVIATION = DURING LATERAL GAZES;
 BILATERAL DEVIATION; INTERMITTENT DEVIATION
 DIFFEREN: PRIMARY OVERACTION OF THE INFERIOR OBLIQUE
 MUSCLE
 TREATMENT: VISUAL TRAINING TO STRENGTHEN VERTICAL FUSION
 REFERENCES: V-330; P-149; D-239

NAME: 28--INFERIOR OBLIQUE OVERACTION, PRIMARY
 (IDIOPATHIC, STRABISMUS SURSOADDUCTORIUS,
 STRABISMUS DEORSOADDUCTORIUS)
 CAUSE: ISOLATED MOTILITY DISORDER (NEUROPHYSIOLOGIC)
 ONSET: AFTER 1 YEAR OLD (2-3 YEARS)
 SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; UPTURN OF
 EYE DURING ADDUCTION; UNILATERAL DEVIATION;
 BILATERAL DEVIATION; HYPERTROPIA OS DURING
 DEXTROVERSION; HYPERTROPIA OD DURING LEVOVERSION;
 VERTICAL TROPIA RARE DURING PRIMARY GAZE;
 INCREASED FIELD OF FIXATION IN NASAL QUADRANT;
 ESOTROPIA; EXOTROPIA; INTERMITTENT DIPLOPIA;
 DIPLOPIA DURING HORIZONTAL GAZE; COMPENSATORY
 HEAD TURN; "V" PATTERN
 DIFFEREN: DISSOCIATED VERTICAL DEVIATION, MUSCLE PALSY
 TREATMENT: SURGERY, WEAKENING OF EOMS
 REFERENCES: V-333; P-143; D-245

NAME: 29--INFERIOR OBLIQUE OVERACTION, SECONDARY
 CAUSE: PALSY OF SUPERIOR RECTUS IN OPPOSITE EYE, OR
 SUPERIOR OBLIQUE IN SAME EYE; HYPERTROPHY OF IO
 ONSET: USUALLY 6 MONTHS AFTER PALSY (CAN BE ANY AGE);
 USUALLY FOLLOWS A CONTRALATERAL SR PALSY, OR AN
 IPSILATERAL SO PALSY
 SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; DEVIATION
 MAXIMUM DURING ABDUCTION; CYCLOTROPIA;
 EXCYCLOTROPIA; BIELSCHOWSKY'S HEAD TILT TEST
 POSITIVE; INCREASED VERTICAL TROPIA DURING
 VERTICAL GAZE; "V" PATTERN; COMPENSATORY HEAD
 TILT: UNILATERAL DEVIATION

DIFFEREN: OVERACTION OF IO (PRIMARY)
TREATMENT: SURGERY
REFERENCES: P-146; D-245

NAME: 30--SUPERIOR OBLIQUE OVERACTION, PRIMARY
(IDIOPATHIC, STRABISMUS DEORSOADDUCTORIUS)
CAUSE: NEUROPHYSIOLOGIC
SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; DOWNTURN
OF EYE DURING ADDUCTION; INCREASED ROTATION OF
EYE IN FIELD OF ACTION OF SO; ESOTROPIA;
EXOTROPIA; BILATERAL DEVIATION; UNILATERAL
DEVIATION; ASYMMETRIC DEVIATION; 'A' PATTERN
TREATMENT: SURGERY
REFERENCES: D-252

NAME: 31--SUPERIOR OBLIQUE OVERACTION, SECONDARY
CAUSE: WEAKNESS OF CONTRALATERAL IR, OR IPSILATERAL IO
SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; DOWNTURN
OF EYE DURING ADDUCTION; INCREASED ROTATION OF
EYE IN FIELD OF ACTION OF SO; UNILATERAL
DEVIATION; SUBJECTIVE INCYCLOTROPIA; COMPENSATORY
HEAD TILT
TREATMENT: SURGERY
REFERENCES: D-252

NAME: 32--TIGHT LATERAL RECTUS SYNDROME
CAUSE: MECHANICAL
SIGN/SYMPT: VERTICAL TROPIA; INCOMITANT DEVIATION; LOW
ADDUCTION; OVERACTION OF ALL 4 OBLIQUES;
ROTATION OF FOVEOLA; EXOTROPIA
DIFFEREN: USE FORCED DUCION TEST TO DIFFERENTIATE FROM
OBLIQUE OVERACTION
TREATMENT: SURGERY
REFERENCES: D-267

NAME: 33--PURELY CONCOMITANT HYPERDEVIATIONS
SIGN/SYMPT: VERTICAL TROPIA; CONCOMITANT DEVIATION:
DEVIATION = DURING LATERAL GAZES
TREATMENT: PRISM APPLICATION EQUALLY DISTRIBUTED BETWEEN
EYES
REFERENCES: V-329

NAME: 34--AMETROPIC AMBLYOPIA
ONSET: EARLY CHILDHOOD
CAUSE: UNCORRECTED HIGH HYPEROPIA OR EXTREMELY HIGH
MYOPIA
SIGN/SYMPT: AMBLYOPIA; HYPEROPIA; >5 DIOPTERS; MYOPIA,
>10 DIOPTERS
REFERENCES: V-223; CH-157

NAME: 35--ANISOMETROPIC AMBLYOPIA
CAUSE: FORM VISION DEPRIVATION; ABNORMAL BINOCULAR
INTERACTION CAUSED BY UNEQUAL FOVEAL IMAGES
SIGN/SYMPT: AMBLYOPIA; ANISOMETROPIA; MICROTROPIA; HYPEROPIA;
DEVIATION BETWEEN 0-5 PD
REFERENCES: V-222; CH-157

NAME: 36--AMBLYOPIA EXANOPSIA
(VISUAL DEPRIVATION AMBLYOPIA)
CAUSE: DISUSE OR UNDER-STIMULATION OF THE RETINA
SIGN/SYMPT: AMBLYOPIA; MEDIA OPACITIES; HX OF OCCLUSION;
UNILATERAL DEVIATION; BILATERAL DEVIATION;
ESOTROPIA; EXOTROPIA; ANISOMETROPIA; MYOPIA OF
AMBLYOPIC EYE
REFERENCES: V-223

NAME: 37--MERIDIONAL AMBLYOPIA
SIGN/SYMPT: AMBLYOPIA; ASTIGMATISM, HIGH, UNCORRECTED
REFERENCES: V-223

NAME: 38--NYSTAGMOID AMBLYOPIA
SIGN/SYMPT: AMBLYOPIA; NYSTAGMUS
REFERENCES: V-224

NAME: 39--ORGANIC AMBLYOPIA
SIGN/SYMPT: AMBLYOPIA; ECCENTRIC FIXATION; NO DETECTABLE
PATHOLOGY
REFERENCES: V-223

NAME: 40--STRABISMIC AMBLYOPIA
(SUPPRESSION AMBLYOPIA)
CAUSE: ACTIVE INHIBITION WITHIN THE RETINOCORTICAL
PATHWAYS OF VISUAL INPUT, ORIGINATING AT THE
FOVEA OF DEVIATING EYE

SIGN/SYMPT: AMBLYOPIA; SUPPRESSION; UNILATERAL DEVIATION;
ESOTROPIA; EXOTROPIA
REFERENCES: V-221

NAME: 41--CYCLODEVIATIONS
CAUSE: IMBALANCE BETWEEN MUSCLE PAIRS (SO&SR = INTORTION
IO&IR = EXTORTION); UNCORRECTED OR IMPROPER
CORRECTION OF OBLIQUE ASTIGMATISM
SIGN/SYMPT: CYCLOTROPIA; PARETIC CYCLOVERTICAL TROPIA; "A"
PATTERN; INTERMITTENT DIPLOPIA; CYCLOTROPIA
UNCHANGED DURING MONOCULAR/BINOCULAR TRANSITION;
NO SUBJECTIVE CYCLOTROPIA; OBJECTIVE CYCLOTROPIC
DEVIATION
TREATMENT: SURGERY; LENSES
REFERENCES: V-334; D-256

NAME: 42--A, V, X, Y, λ SYNDROME
(NON-PARETIC)
CAUSE: CONGENITAL AND ACQUIRED CYCLO AND VERTICAL
MUSCLE PARESIS
ONSET: BIRTH
SIGN/SYMPT: ESOTROPIA; EXOTROPIA; INCOMITANT DEVIATION; HX OF
CONGENITAL OCULAR ANOMALY; ASTHENOPIA;
INTERMITTENT DIPLOPIA; ARC; COMPENSATORY CHIN
TILT; COMPENSATORY HEAD TILT; AMBLYOPIA
TREATMENT: FULL SPECTACLE CORRECTION; SURGERY
REFERENCES: V-338; D-264

NAME: 43--DIVERGENCE PARALYSIS
SIGN/SYMPT: ESOTROPIA; CONCOMITANT DEVIATION; DEVIATION
OD = OS; DIPLOPIA UNCROSSED AT 2-3 METERS;
FUSION AT 50-60 CM
DIFFEREN: FROM 6TH NERVE PALSY VIA EQUAL DEVIATION OD
AND OS
TREATMENT: BI PRISM THERAPY
PROGNOSIS: USUALLY SELF LIMITING AND DISAPPEARS IN 5-6
MONTHS
REFERENCES: D-215

NAME: 44--DOUBLE DEPRESSOR PALSY
CAUSE: CONGENITAL
ONSET: BIRTH
SIGN/SYMPT: INCOMITANT DEVIATION; HX OF CONGENITAL OCULAR
ANOMALY; DECREASED DUCTION IN FIELD OF IR;
DECREASED DUCTION IN FIELD OF SO
REFERENCES: D-315

NAME: 45--DOUBLE ELEVATOR PALSY
CAUSE: CONGENITAL OR ACQUIRED
ONSET: BIRTH OR LATER
SIGN/SYMPT: INCOMITANT DEVIATION; HX OF CONGENITAL OCULAR ANOMALY; DECREASED DUCTION IN FIELD OF SR; DECREASED DUCTION IN FIELD OF IO; UNILATERAL DEVIATION; DIPLOPIA; COMPENSATORY HEAD TILT; FIXATION WITH UNAFFECTED EYE; AMBLYOPIA
TREATMENT: SURGERY
REFERENCES: D-313

NAME: 46--THIRD NERVE PALSY
(CONGENITAL OR ACQUIRED)
CAUSE: AXONAL GROWTH ANOMALY; MECHANICAL DAMAGE TO NERVE
ONSET: BIRTH OR LATER
SIGN/SYMPT: PSEUDO GRAEFE SIGN; WIDENING OF PALPEBRAL FISSURE DURING ADDUCTION/ NARROWING OF PALPEBRAL FISSURE DURING ABDUCTION; PUPIL FIXED AND DILATED; PUPIL REACTS TO CONVERGENCE AND ADDUCTION; RETRACTION AND ADDUCTION OF GLOBE DURING UP GAZE; PTOSIS; AMBLYOPIA
TREATMENT: PATCHING; SURGERY
REFERENCES: D-292

NAME: 47--FOURTH NERVE PALSY
(CONGENITAL OR ACQUIRED)
CAUSE: AXONAL GROWTH ANOMALY; MECHANICAL DAMAGE TO NERVE
ONSET: BIRTH OR LATER
SIGN/SYMPT: UNILATERAL DEVIATION; BILATERAL DEVIATION; VERTICAL TROPIA; COMPENSATORY HEAD TILT: DIPLOPIA; IO OVERACTION DURING FIXATION WITH NON-PARETIC EYE; OBJECTIVE CYCLOTROPIC DEVIATION; NO SUBJECTIVE CYCLOTROPIA
DIFFEREN: RESEMBLES DOUBLE ELEVATOR PALSY
TREATMENT: PATCHING; SURGERY
REFERENCES: D-307

NAME: 48--SIXTH NERVE PALSY
(CONGENITAL OR ACQUIRED)
CAUSE: AXONAL GROWTH ANOMALY; MECHANICAL DAMAGE TO NERVE
ONSET: BIRTH OR LATER
SIGN/SYMPT: ESOTROPIA; HX OF CONGENITAL OCULAR ANOMALY: BILATERAL DEVIATION; UNILATERAL DEVIATION; DEVIATION AT NEAR>FAR; DIPLOPIA; LOW ADDUCTION; LOW ABDUCTION; PAST POINTING
REFERENCES: H-55; D-310

NAME: 49--PARALYTIC ESOTROPIA
CAUSE: HEAD TRAUMA OR SYSTEMIC DISORDER
ONSET: SUDDEN AT ANY AGE
SIGN/SYMPT: ESOTROPIA; INCOMITANT DEVIATION; HX OF PHYSICAL TRAUMA; SUDDEN DIPLOPIA; COMPENSATORY HEAD TURN; COMPENSATORY HEAD TILT; PAST POINTING
PROGNOSIS: DEVIATION MORE PRONOUNCED IN FIELD OF ACTION OF PARETIC MUSCLE IN BEGINNING STAGES, THEN DEVIATION EQUALIZES IN ALL FIELDS OF GAZE AND BECOMES MORE CONCOMITANT IN LATER STAGES
REFERENCES: V-364

NAME: 50--DUANE'S RETRACTION SYNDROME
CAUSE: PARADOXIC INNERVATION
ONSET: 3-4 MONTHS OF AGE
SIGN/SYMPT: WIDENING OF PALPEBRAL FISSURE DURING ABDUCTION; DOLLS HEAD PHENOMENA ABSENT; ANISOMETROPIA; BILATERAL DEVIATION; LOW ABDUCTION; LOW ADDUCTION; GLOBE RETRACTION DURING ADDUCTION; NARROWING OF PALPEBRAL FISSURE DURING ADDUCTION; ESOTROPIA; EXOTROPIA; SUPPRESSION; AMBLYOPIA; COMPENSATORY HEAD TILT; AMETROPIA GREATER IN AFFECTED EYE; HX OF CONGENITAL OCULAR ANOMALY; PENDULAR VERTICAL MOVEMENTS OF OCCLUDED EYE
TREATMENT: VISUAL TRAINING FOR AMBLYOPIA; SURGERY
PROGNOSIS: POOR RESULTS FROM SURGERY
REFERENCES: M-13; V-379; P-165; H-55; D-326

NAME: 51--INTERMITTENT SUPERIOR-OBLIQUE TENDON-SHEATH SYNDROME (BROWN'S SYNDROME)
CAUSE: HEREDITARY (DOMINANT TRAIT)
ONSET: USUALLY CHILDHOOD
SIGN/SYMPT: UPTURN OF EYE LIMITED DURING ADDUCTION; INCREASED VERTICAL TROPIA DURING ADDUCTION; WIDENING OF PALPEBRAL FISSURE DURING ADDUCTION; FORCED DUCION TEST POSITIVE; VERTICAL TROPIA; COMPENSATORY HEAD TURN; COMPENSATORY HEAD TILT; COMPENSATORY CHIN TILT; ASTHENOPIA; DIPLOPIA DURING ADDUCTION; "V" PATTERN; UNILATERAL DEVIATION
TREATMENT: SURGICAL STRIPPING OF TENDON SHEATH
REFERENCES: N-219; V-384; P-167; M-13; D-315

NAME: 52--MOBIUS' SYNDROME
CAUSE: APLASIA OF ABDUCENS, FACIAL AND GLOSSOPHARYNGEAL NUCLEI
SIGN/SYMPT: LIMITED LATERAL OCULAR MOBILITY; ESOTROPIA; "A" PATTERN; "V" PATTERN; COMPENSATORY HEAD TURN; PTOSIS; TONGUE PALSY; HX OF MENTAL RETARDATION; DEAFNESS; ECTROPION
REFERENCES: P-169; D-330

NAME: 53--NYSTAGMUS BLOCKAGE SYNDROME
CAUSE: INNERVATIONAL ORIGIN
SIGN/SYMPT: ESOTROPIA; CONCOMITTANT DEVIATION; HX OF HYDROCEPHALUS AND INCREASED INTRACRANIAL PRESSURE; DISCORDANT NYSTAGMUS; INCREASED VISUAL ACUITY DURING ADDUCTION; PUPIL CONSTRICTION AS STRABISMUS INCREASES AND NYSTAGMUS DECREASES; VARIABLE DEVIATION; PSEUDOPARALYSIS OF LATERAL RECTI; INCREASED NYSTAGMUS DURING ABDUCTION; FIXATION WITH ADDUCTING EYE; COMPENSATORY HEAD TURN
TREATMENT: SURGERY
REFERENCES: V-415; D-214

NAME: 54--JOHNSON'S ADHERENCE SYNDROME
CAUSE: PSEUDOPARALYSIS OF LATERAL RECTUS OR SUPERIOR RECTUS
SIGN/SYMPT: INCOMITANT DEVIATION; LOW ABDUCTION
REFERENCES: V-387; D-319

NAME: 55--NON-PARALYTIC FIBROSIS
CAUSE: CONGENITAL
ONSET: BIRTH
SIGN/SYMPT: ESOTROPIA; INCOMITANT DEVIATION; HX OF CONGENITAL OCULAR ANOMALY; FIBROSIS OF ALL EOMS; DOWNTURNED FIXATION BILATERALLY; PTOSIS; COMPENSATORY CHIN TILT; DISRUPTED CONVERGENCE DURING SUPERIOR AND LATERAL GAZE; HX OF FAMILIAL OCCURENCE
TREATMENT: SURGERY
REFERENCES: V-388; D-322

NAME: 56--STRABISMUS FIXUS
CAUSE: FIBROUS SUBSTITUTION OF OCULAR MUSCLE; CONGENITAL
ONSET: BIRTH
SIGN/SYMPT: EXOTROPIA; ESOTROPIA; INCOMITANT DEVIATION;
LIMITED OCULAR MOBILITY IN ALL GAZES:
SUPPRESSION; FIXED DEVIATION AT ALL DISTANCES
TREATMENT: SURGERY
PROGNOSIS: BINOCULAR VISION IMPOSSIBLE; OCULAR MOTILITY
REMAINS NIL; HEAD TURNING REQUIRED
REFERENCES: DE-748; V-388; P-172; D-323

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LIST
20 PRINT "STRABISMUS/AMBLYOPIA SEARCH"
40 PRINT "INPUT A (1) FOR LOADING/LISTING OR A (2) FOR SEARCH";
60 INPUT X
80 IF X=2 GOTO 6000
100 IF X<1 OR X>2 GOTO 40
120 DIM D3[300]
140 DIM Y$[335]
160 DIM E$[16],D$[49]
180 DIM X3$[10],X5$[10],X6$[10]
200 LET X3=1,X5=2,X6=3
220 LET X3$="D5:FILE1"
240 LET X5$="D5:FILE1"
260 LET X6$="D5:FILE1"
280 OPEN FILE[X3,360],X3$
300 OPEN FILE[X5,17],X5$
320 OPEN FILE[X6,50],X6$
340 PRINT
360 PRINT
380 PRINT "MENU:"
400 PRINT "1] LOAD SIGN/SYMPATOM LIST           2] LOAD DATA"
420 PRINT "3] LOAD ARRAY DIMS/HOUSEKEEPING     4] LOAD DYSFUNCTION DESCRIPTIONS"
440 PRINT "5] PRINT OUT S/S LIST                   6] PRINT OUT DATA"
460 PRINT "7] PRINT OUT HOUSEKEEPING           8] PRINT OUT DESCRIPTIONS"
480 PRINT
500 PRINT "  PICK A NUMBER:";
520 INPUT X
540 IF X=1 GOTO 3000
560 IF X=2 GOTO 1620
580 IF X=3 GOTO 740
600 IF X=4 GOTO 3200
620 IF X=5 GOTO 3400
640 IF X=6 GOTO 4760
660 IF X=7 GOTO 5740
680 IF X=8 GOTO 3720
700 PRINT "  PLEASE PICK ONE OF THE NUMBERS LISTED ABOVE"
720 GOTO 500
740 PRINT "WHAT IS THE NUMBER OF THE HIGHEST DYSFUNCTION?";
760 INPUT M5
780 PRINT "WHAT IS THE TOTAL NUMBER OF SIGNS & SYMPTOMS?";
800 INPUT X
820 IF X>=2000 GOTO 880
840 LET F=X,F1=X
860 GOTO 920
880 LET F=2000,F1=2000
900 PRINT
920 PRINT "TOTAL NO. OF SIGNS/SYMPATOMS THAT CAN BE INPUTTED BY THE USER"
940 PRINT "IS [DO NOT INCLUDE THE SENTINAL VALUE]?";
960 INPUT F2
980 LET F2=F2+1
1000 LET F=INT(F2/3*M5)
1020 LET F1=F,F4=F,F5=F
1040 PRINT
1060 PRINT "WHAT IS THE MAXIMUM NUMBER OF S/S DATA VALUES THAT CAN BE READ"
1080 PRINT "FROM THE DATA FILE [INCLUDES HEADING VALUES AND SENTINAL"
1100 PRINT "VALUE]?";
1120 INPUT F3
1140 LET A4=5
1160 LET A5=M5
1180 PRINT "THE DATA FOR DYSFUNCTION NO.;"A5;"WILL BE FOUND AT RECORD"
1200 PRINT "NO.;"A5+4
1220 LET A5=A5+4

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1260 PRINT "WHAT IS THE 1ST RECORD NO. FOR THE S/S FILE?";
1280 INPUT A6
1300 PRINT "LAST RECORD NO. OF S/S FILE?";
1320 INPUT A7
1340 PRINT "1ST RECORD NO. OF DYSFUNCTION DESCRIPTION FILE?";
1360 INPUT A8
1380 PRINT "LAST RECORD NO. OF DYSFUNCTION DESCRIPTION FILE?";
1400 INPUT A9
1420 PRINT
1440 PRINT
1460 PRINT "NEED TO MAKE ANY CHANGES?"
1480 PRINT " 1] EVERYTHINGS OK"
1500 PRINT " 2] HAVE TO START OVER"
1520 INPUT X
1540 IF X<>1 GOTO 740
1560 WRITE FILE[X3,1],M5,F,F1,F2,F3,F4,F5
1580 WRITE FILE[X3,2],A4,A5,A6,A7,A8,A9
1600 GOTO 340
1620 PRINT
1640 PRINT "NOW WE WILL LOAD FILE[";X3;"",360]"
1660 PRINT "DYSFUNCTION#?";
1680 INPUT D
1700 LET X=D+4
1720 GOTO 1880
1740 PRINT "LOWEST SIGN/SYMPT#?";
1760 INPUT M1
1780 PRINT "HIGHEST SIGN/SYMPT#?";
1800 INPUT M2
1820 PRINT "TOTAL NO. OF SIGN/SYMPT NUMBERS IN DATA LINE"
1840 PRINT "INCLUDING THE SENTINAL VALUE IS?";
1860 INPUT M3
1880 PRINT "DESCRIPTION FOR DYSFUNCTION NO. ";D;"STARTS WITH RECORD NO. ";
1900 INPUT D1
1920 GOTO 2000
1940 PRINT "NOW INPUT THE LINE/RECORD NUMBERS THAT CORRESPOND TO THESE"
1960 PRINT "DESCRIPTION HEADINGS. IF YOU DO NOT WANT A HEADING TO"
1980 PRINT "APPEAR, INPUT A '0'"
2000 PRINT "CAUSE#";
2020 INPUT D3[1]
2040 PRINT "ONSET#";
2060 INPUT D3[2]
2080 PRINT "SIGN/SYMPT#";
2100 INPUT D3[3]
2120 PRINT "DIFFEREN#";
2140 INPUT D3[4]
2160 PRINT "TREATMENT#";
2180 INPUT D3[5]
2200 PRINT "PROGNOSIS#";
2220 INPUT D3[6]
2240 PRINT "REFERENCE# [LAST LINE#1]";
2260 INPUT D2
2280 LET J=-4
2300 PRINT
2320 PRINT "S/S DATA"
2340 PRINT
2360 FOR I=7 TO F3
2380 PRINT I-6;
2400 INPUT D3[I]
2420 IF D3[I]<0 GOTO 2520
2440 NEXT I
2460 PRINT "****YOU HAVE REACHED THE LAST INPUT WITHOUT ENTERING A"
2480 PRINT "MINUS NUMBER. PLEASE START OVER, AND REMEMBER THIS TIME."
2500 GOTO 2360
2520 FOR L2=1 TO I-1
2540 FOR N2=7 TO I-1-L2
```

```

2580 LET T2=D3[N2]
2600 LET D3[N2]=D3[N2+1]
2620 LET D3[N2+1]=T2
2640 NEXT N2
2660 NEXT L2
2680 FOR L2=1 TO 6
2700 PRINT D3[L2];
2720 NEXT L2
2740 PRINT
2760 FOR L2=7 TO I
2780 PRINT D3[L2];
2800 NEXT L2
2820 LET M3=I-6,M1=D3[7],M2=D3[I-1]
2840 FOR L2=1 TO I
2860 LET J=J+5
2880 DECODE Y*[J,J+4],D3[L2],USING "#####"
2900 NEXT L2
2920 WRITE FILE[X3,X],D,M1,M2,M3,D1,D2,Y$
2940 PRINT
2960 PRINT
2980 GOTO 1660
3000 DIM E*[16]
3020 PRINT "BE SURE TO TYPE 'CLOSE' WHEN FINISHED."
3040 PRINT "RECORD NO.";
3060 INPUT X
3080 PRINT " -----"
3100 INPUT E$
3120 WRITE FILE[X5,X],E$
3140 PRINT
3160 PRINT
3180 GOTO 3040
3200 DIM D*[49]
3220 PRINT "RECORD NO.";
3240 INPUT X
3260 PRINT " -----"
3280 INPUT D$;
3300 WRITE FILE[X6,X],D$
3320 PRINT
3340 PRINT
3360 GOTO 3220
3380 STOP
3400 READ FILE[X3,2],A4,A5,A6,A7,A8,A9
3420 PRINT "FIRST RECORD STARTS AT";A6;" , LAST RECORD ENDS WITH NO.";A7
3440 PRINT "YOU WISH TO PRINT OUT FILE STARTING WITH RECORD NO.";
3460 INPUT J1
3480 PRINT "AND ENDING WITH RECORD NO.";
3500 INPUT J2
3520 IF J1<1 GOTO 3420
3540 IF J2>A7 GOTO 3420
3560 PRINT "NO."
3580 FOR I=J1 TO J2
3600 READ FILE[X5,I],E$
3620 PRINT I,E$
3640 NEXT I
3660 PRINT
3680 PRINT
3700 GOTO 380
3720 READ FILE[X3,2],A4,A5,A6,A7,A8,A9
3740 PRINT
3760 PRINT "THE NUMBER OF THE LAST [THE HIGHEST] DYSFUNCTION NO. IS";A5-4
3780 PRINT "YOU WISH TO PRINT THE FILE STARTING WITH DYSFUNCTION NO.";
3800 INPUT J1
3820 PRINT "AND ENDING WITH DYSFUNCTION NO.";
3840 INPUT J2
3860 IF J2<1 GOTO 3740

```

```

3900 FOR I=J1 TO J2
3920 READ FILE(X3,I+4),D,M1,M2,M3,D1,D2,Y$
3940 LET B2=-4
3960 FOR I2=1 TO 6
3980 LET B2=B2+5
4000 ENCODE Y$[B2,B2+4],D3[I2]
4020 NEXT I2
4040 PRINT
4060 PRINT
4080 FOR H=D1 TO D2
4100 READ FILE(X6,H),D$
4120 IF H=D1 GOTO 4300
4140 IF H=D3[1] GOTO 4340
4160 IF H=D3[2] GOTO 4420
4180 IF H=D3[3] GOTO 4380
4200 IF H=D3[4] GOTO 4460
4220 IF H=D3[5] GOTO 4500
4240 IF H=D3[6] GOTO 4540
4260 IF H=D2 GOTO 4580
4280 GOTO 4600
4300 PRINT "NAME:";
4320 GOTO 4600
4340 PRINT "CAUSE:";
4360 GOTO 4600
4380 PRINT "SIGN/SYMP:";
4400 GOTO 4600
4420 PRINT "ONSET:";
4440 GOTO 4600
4460 PRINT "DIFFEREN:";
4480 GOTO 4600
4500 PRINT "TREATMENT:";
4520 GOTO 4600
4540 PRINT "PROGNOSIS:";
4560 GOTO 4600
4580 PRINT "REFERENCES:";
4600 PRINT TAB(15);D$
4620 NEXT H
4640 PRINT
4660 PRINT
4680 NEXT I
4700 PRINT
4720 PRINT
4740 GOTO 380
4760 READ FILE(X3,2),A4,A5,A6,A7,A8,A9
4780 PRINT "THE LAST DYSFUNCTION NO. ON FILE IS NO.":A5-4
4800 PRINT "YOU WISH TO PRINT OUT THE DATA FOR THE DYSFUNCTION NUMBERS STARTING"
4820 PRINT "WITH DYSFUNCTION NO.":
4840 INPUT J1
4860 PRINT "AND ENDING WITH DYSFUNCTION NO.":
4880 INPUT J2
4900 PRINT
4920 PRINT
4940 IF J1<1 GOTO 4800
4960 IF J2>A5-4 GOTO 4780
4980 PRINT "THE PRINT OUT FORMAT WILL BE:"
5000 PRINT "DYSFUNCTION NO. ---- D,M1,M2,M3,D1,D2"
5020 PRINT " Y$,[SECTIONED TO FIT THE PAGE]"
5040 PRINT
5060 FOR I=J1 TO J2
5080 PRINT
5100 PRINT
5120 READ FILE(X3,I+4),D,M1,M2,M3,D1,D2,Y$
5140 LET B=(M3+6)*5
5160 PRINT I;"----":D;M1;M2;M3;D1;D2
5180 IF B<=75 GOTO 5280

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```
5220 IF B<=225 GOTO 5380
5240 IF B<=300 GOTO 5460
5260 IF B<=375 GOTO 5560
5280 PRINT Y$
5300 GOTO 5660
5320 PRINT Y$[1,75]
5340 PRINT Y$[76,B]
5360 GOTO 5660
5380 PRINT Y$[1,75]
5400 PRINT Y$[76,150]
5420 PRINT Y$[151,B]
5440 GOTO 5660
5460 PRINT Y$[1,75]
5480 PRINT Y$[76,150]
5500 PRINT Y$[151,225]
5520 PRINT Y$[226,B]
5540 GOTO 5660
5560 PRINT Y$[1,75]
5580 PRINT Y$[76,150]
5600 PRINT Y$[151,225]
5620 PRINT Y$[226,300]
5640 PRINT Y$[301,B]
5660 NEXT I
5680 PRINT
5700 PRINT
5720 GOTO 380
5740 PRINT "YOU WISH TO PRINT OUT THE HOUSEKEEPING NUMBERS FILE"
5760 PRINT "THEY WILL BE LISTED AS FOLLOWS:"
5780 PRINT
5800 PRINT "M5,F,F1,F2,F3,F4,F5"
5820 PRINT "A4,A5,A6,A7,A8,A9"
5840 PRINT
5860 READ FILE[X3,1],M5,F,F1,F2,F3,F4,F5
5880 READ FILE[X3,2],A4,A5,A6,A7,A8,A9
5900 PRINT M5;F;F1;F2;F3;F4;F5
5920 PRINT A4;A5;A6;A7;A8;A9
5940 PRINT
5960 PRINT
5980 GOTO 380
6000 DIM X1$[10],X5$[10],X6$[10]
6020 LET X1=1,X5=2,X6=3
6040 LET X1$="D5:FILE1"
6060 LET X5$="D5:FILE1"
6080 LET X6$="D5:FILE1"
6100 OPEN FILE[X1,360],X1$
6120 OPEN FILE[X5,17],X5$
6140 OPEN FILE[X6,50],X6$
6160 READ FILE[X1,1],M5,F,F1,F2,F3,F4,F5
6180 READ FILE[X1,2],A4,A5,A6,A7,A8,A9
6200 DIM B[F],C[F1],P[F2],L[F3],G[F4],H[F5]
6220 DIM D$[49],C$[47],E$[16],A$[30]
6240 DIM A$[30]
6260 DIM D3[10]
6280 DIM Y$[335]
6300 PRINT
6320 PRINT
6340 PRINT "PLEASE INDICATE WHICH PART OF THE PROGRAM"
6360 PRINT "YOU WISH TO START WITH"
6380 PRINT " 1--SYMPTOM SEARCH"
6400 PRINT " 2--LISTING OF A SPECIFIC DYSFUNCTION"
6420 PRINT "(TYPE IN A 1 OR 2)";
6440 INPUT X
6460 IF X=2 GOTO 10420
6480 PRINT
6500 PRINT
```

```

6540 INPUT A$
6560 PRINT "AGE OF PATIENT";
6580 INPUT A
6600 PRINT
6620 PRINT
6640 PRINT "YOU HAVE ROOM TO INPUT UP TO";F2-1;"DIFFERENT SIGNS/SYMPTOMS."
6660 PRINT "TYPE IN ONLY ONE SYMPTOM NUMBER PER REQUEST."
6680 PRINT "   ***AFTER THE LAST SYMPTOM HAS BEEN ENTERED, TYPE IN A '0'"
6700 PRINT "   INSTEAD OF A SYMPTOM NUMBER."
6720 PRINT "   ***TO MAKE A CORRECTION, TYPE -99 INSTEAD OF A SIGN/SYMPTOM NO."
6740 PRINT "-----"
6760 PRINT "PATIENT: ";A$;"      AGE: ";A;"      DATE: ";
6780 PRINT SYS(1);"-";SYS(2);"-";SYS(3)
6800 LET W=0,M=0,M1=0,M2=0,I=0,X=0,X2=0,X3=0,A=0,A1=0,S=0,Z=0,Q=0
6820 PRINT
6840 PRINT
6860 PRINT "          SIGN OR"
6880 IF K=F2 GOTO 8400
6900 PRINT "NUMBER          NUMBER          DESCRIPTION"
6920 PRINT
6940 FOR K=1 TO F2
6960   LET S=S+1
7000   PRINT S,
7020   INPUT P[K];
7040   IF P[K]<0 GOTO 7580
7060   IF P[K]=0 GOTO 8180
7080   IF P[K]>A7 GOTO 7860
7100   IF S=1 GOTO 7180
7120   FOR B=1 TO S-1
7140     IF P[B]=P[K] GOTO 7900
7160   NEXT B
7180   GOSUB 7260
7200   READ FILE[X5,P[K]],E$
7220   PRINT E$
7240   GOTO 7960
7260   LET I=P[K]
7280   GOTO 7340
7300   LET I=P[X]
7320   GOTO 7780
7340   IF I>999 GOTO 7520
7360   IF I>99 GOTO 7480
7380   IF I>9 GOTO 7440
7400   PRINT "          ";
7420   RETURN
7440   PRINT "          ";
7460   RETURN
7480   PRINT "          ";
7500   RETURN
7520   PRINT "          ";
7540   PRINT "APPEAR, INPUT A '0'"
7560   RETURN
7580   PRINT
7600   PRINT
7620   PRINT "WHICH LINE NUMBER CONTAINS THE ERROR";
7640   INPUT X
7660   PRINT "WHAT IS THE CORRECT SIGN/SYMPTOM NUMBER";
7680   INPUT P[X]
7700   PRINT
7720   PRINT X,P[X];
7740   IF P[X]>F GOTO 7860
7760   GOTO 7300
7780   GOSUB 7340
7800   READ FILE[X5,I],E$
7820   PRINT E$
7840   GOTO 7000

```

```

7880 GOTO 7000
7900 PRINT " ****THIS NO. HAS ALREADY BEEN INPUTTED****"
7920 PRINT " PLEASE CHOOSE ANOTHER"
7940 GOTO 7000
7960 NEXT K
7980 PRINT
8000 PRINT "YOU HAVE NO MORE ROOM LEFT TO INPUT SIGNS. DO YOU WANT TO:"
8020 PRINT " 1) CONTINUE 2) START OVER"
8040 PRINT "[TYPE IN A 1 OR 2]";
8060 INPUT X
8080 PRINT
8100 PRINT
8120 IF X=2 GOTO 6740
8140 LET P[F2]=0
8160 PRINT
8180 FOR L=1 TO S-1
8200 FOR N=1 TO S-L
8220 IF P[N]<P[N+1] GOTO 8300
8240 LET T=P[N]
8260 LET P[N]=P[N+1]
8280 LET P[N+1]=T
8300 NEXT N
8320 NEXT L
8340 LET X2=P[2]
8360 LET X3=P[S]
8380 PRINT
8400 PRINT
8420 PRINT " MIN. NO. OF SIGNS TO IDENTIFY";
8440 INPUT N
8460 PRINT "-----"
8480 LET R3=4
8500 LET R=0
8520 LET Z=0
8540 LET W=W+1
8560 LET R3=R3+1
8580 IF R3>(M5+4) GOTO 9220
8600 READ FILE[X1,R3],D,M1,M2,M3,D1,D2,Y$
8620 IF X3<M1 GOTO 8520
8640 IF X2>M2 GOTO 8520
8660 LET B2=26
8680 FOR J=1 TO M3
8700 LET B2=B2+5
8720 ENCODE Y$[B2,B2+4],L[J]
8740 NEXT J
8760 LET J=1
8780 LET K=2
8800 IF P[K]=0 GOTO 9120
8820 IF L[J]<1 GOTO 9120
8840 IF P[K]=L[J] GOTO 8980
8860 IF P[K]<L[J] GOTO 8900
8880 IF P[K]>L[J] GOTO 8940
8900 LET K=K+1
8920 GOTO 8800
8940 LET J=J+1
8960 GOTO 8800
8980 LET K=K+1
9000 LET R=R+1
9020 LET B[R]=D
9040 LET C[R]=L[J]
9060 LET J=J+1
9080 LET Z=Z+1
9100 IF P[K]>0 GOTO 8820
9120 IF Z=0 GOTO 8540
9140 IF Z<N GOTO 8520
9160 LET Q=Q+1

```



```

9200 GOTO 8520
9220 IF Q=0 GOTO 11700
9240 FOR L=1 TO W-1
9260   FOR Q=1 TO W-L
9280     IF G[Q]>=G[Q+1] GOTO 9360
9300     LET T=G[Q],T1=H[Q]
9320     LET G[Q]=G[Q+1],H[Q]=H[Q+1]
9340     LET G[Q+1]=T,H[Q+1]=T1
9360   NEXT Q
9380 NEXT L
9400 FOR R7=1 TO R
9420   LET T2=0
9440   LET X=C[R7]
9460   IF X=0 GOTO 9620
9480   FOR R2=R7+1 TO R
9500     IF X=C[R2] GOTO 9540
9520     GOTO 9580
9540     LET C[R2]=0
9560     LET T2=T2+1
9580   NEXT R2
9600   IF T2>0 THEN LET C[R7]=0
9620 NEXT R7
9640 PRINT
9660 PRINT
9680 PRINT "SIGNS"
9700 PRINT "TAGGED          DYSFUNCTION NUMBER & NAME"
9720 PRINT
9740 FOR Q=1 TO W-1
9760   IF G[Q]=0 GOTO 10020
9780   IF G[Q]<N GOTO 10000
9800   IF H[Q]=0 GOTO 10020
9820   READ FILE[X1,H[Q]+4],D,M1,M2,M3,D1
9840   READ FILE[X6,D1],D$
9860   PRINT G[Q],D$
9880   FOR R8=1 TO R
9900     IF D=B[R8] GOTO 9940
9920     GOTO 9980
9940     IF C[R8]=0 GOTO 9980
9960     READ FILE[X5,C[R8]],E$
9980   NEXT R8
10000 NEXT Q
10020 PRINT
10040 PRINT
10060 PRINT "-----***END OF SEARCH***-----"
10080 PRINT
10100 PRINT
10120 PRINT "DO YOU WISH TO:"
10140 PRINT "  1--CONTINUE WITH DYSFUNCTION DESCRIPTIONS"
10160 PRINT "  2--CHANGE THE VALUE OF THE MIN. NO. OF SIGNS TO IDENTIFY"
10180 PRINT "  3--OBTAIN ANOTHER PRINT-OUT OF THE SEARCH"
10200 PRINT "  4--END PROGRAM"
10220 PRINT "[INPUT A 1,2,3, OR 4]"
10240 INPUT X
10260 IF X=4 GOTO 11560
10280 IF X=3 GOTO 9640
10300 IF X=2 GOTO 10380
10320 PRINT
10340 PRINT
10360 GOTO 10420
10380 LET W=0,M=0,I=0,X=0,A1=0,Z=0,Q=0
10400 GOTO 8340
10420 PRINT
10440 PRINT "AT THIS TIME, TYPE IN THE NUMBER OF THE DYSFUNCTION YOU WOULD LIKE"
10460 PRINT "TO SEE A DESCRIPTION OF. TO END THE LOOP, TYPE IN A '0'"
10480 PRINT "INSTEAD OF A DYSFUNCTION NUMBER."

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```
10520 PRINT
10540 PRINT " DYSFUNCTION NUMBER";
10560 INPUT X
10580 IF X<1 GOTO 11360
10600 IF X>M5 GOTO 11320
10620 READ FILE[X1,X+4],D,M1,M2,M3,D1,D2,Y$
10640 LET B2=-4
10660 FOR I=1 TO 6
10680 LET B2=B2+5
10700 ENCODE Y$[B2,B2+4],D3[I]
10720 NEXT I
10740 FOR H=D1 TO D2
10760 READ FILE[X6,H],D$
10780 IF H=D1 GOTO 10960
10800 IF H=D3[1] GOTO 11000
10820 IF H=D3[2] GOTO 11080
10840 IF H=D3[3] GOTO 11040
10860 IF H=D3[4] GOTO 11120
10880 IF H=D3[5] GOTO 11160
10900 IF H=D3[6] GOTO 11200
10920 IF H=D2 GOTO 11240
10940 GOTO 11260
10960 PRINT "NAME:";
10980 GOTO 11260
11000 PRINT "CAUSE:";
11020 GOTO 11260
11040 PRINT "SIGN/SYMPT:";
11060 GOTO 11260
11080 PRINT "ONSET:";
11100 GOTO 11260
11120 PRINT "DIFFEREN:";
11140 GOTO 11260
11160 PRINT "TREATMENT:";
11180 GOTO 11260
11200 PRINT "PROGONSIS:";
11220 GOTO 11260
11240 PRINT "REFERENCES:";
11260 PRINT TAB(15);D$
11280 NEXT H
11300 GOTO 10500
11320 PRINT " *****NO SUCH NUMBER ON FILE*****"
11340 GOTO 10540
11360 PRINT
11380 PRINT "OPTIONS:"
11400 PRINT " 1--START OVER"
11420 PRINT " 2--END PROGRAM"
11440 PRINT "[TYPE IN A 1 OR 2]";
11460 INPUT X
11480 IF X=1 GOTO 6200
11500 IF X=2 GOTO 11560
11520 PRINT " PLEASE TYPE IN THE CORRECT NUMBER"
11540 GOTO 11440
11560 CLOSE
11580 PRINT
11600 PRINT
11620 PRINT
11640 PRINT "*****PLEASE SIGN OFF THE COMPUTER BY"
11660 PRINT "TYPING IN THE WORD 'BYE' AT THIS TIME. THANK YOU."
11680 GOTO 11800
11700 PRINT " THE COMPUTER HAS FOUND NO DYSFUNCTIONS THAT MEET THE SEARCH"
11720 PRINT "CRITERIA AS SPECIFIED ABOVE. IN ORDER TO OBTAIN A PRINT-"
11740 PRINT "OUT, SET THE 'MIN. NO. OF SIGNS TO IDENTIFY' AT A LOWER"
11760 PRINT "VALUE AND RUN THE PROGRAM AGAIN."
11780 GOTO 10080
11800 STOP
```

CONCLUSION

Due to a lack of disc space at the Optometry department computer center, we were unable to enter the three files onto discs. Therefore, the program has not been run and debugged. Also, it was necessary to use false file names when referring to the files on lines 220, 240, 260, 6040, 6060, and 6080 of the program. This can be changed by substituting the proper file names instead of "D5:FILE1" when disc space becomes available.

Loading the three files can be accomplished by following the loading/listing instructions given in the program description and the program itself. Any changes made in the dysfunction description file must be reflected in the dysfunction data file. New dysfunctions are added at the end of the file, and also need to be included in the index and reference pages. New signs/symptoms must be abbreviated to 16 or less characters before entering the s/s file. Access to the program is accomplished using account number 5293, password JOHN, followed by a LOAD D5:FILE1 command.

With the increased availability of personal computers, it would be useful to adapt the program for this type of computer. Due to the program's large storage requirements, a program language which uses less space and time than BASIC would work the best. If the present computer is utilized, a machine language version of the program would decrease the running time and storage requirements. The decreased time would be a benefit to anyone using the system via a telephone modem.