Name		MOBILITY	MOBILITY	MOBILITY	ACTIVITY	K(M) G 6	K(M) NAD	UTIL. 2-	UTIL. DE	HEAT LAB	PH OPTIM	K(I) NAD	MUTATION
CLASS 1 VARIANTS													
ELECTROPHORETICALLY FAST VARIANTS													
Puerto Limon (1)	Costa Rican-Spanish	---	---	150	<.1	32.5	---	11.3	86.3	v.dec	Bimod	---	1192A (2)
Saint-Louis (paris) (3)	French	125	---	130	<.1	130	---	14	50	v.dec	Norm	---	
Nagano (4)	Japanese	123	121	132	5.5	28	9.1	<4	65	sl.dec	Norm	3	
Baudelocque (5)	French	---	113	---	15	38	---	5	43	v.dec	Norm	---	
Heian (6)	Japanese	---	103	116	8.5	130	5.5	18	76	---	Bimod	---	
Fukuoka (7)	Japanese	109	105	113	3.4	91.6	6	<4	78.8	v.dec	Bimod	7.9	
Hotel Dieu (8)	African	107	---	108	<.1	26	11.4	7.5	122.5	sl.dec	Bimod	30	
Linda Vista (9)	Laotian	106	107	110	<.1	33	7	176.3	406	v.dec	Bimod	7.1	
Lincoln Park (10)	Puerto Rican	112	106	104	6.5	33	8.1	7.3	13.4	sl.dec	>8	21.7	Sharp pH opt. 8.5
Wayne (11)	German	107	107	106	6	78.1	11.5	5	30.8	v.dec	>8	20.2	769G (12)
Charleston (13)	USA-Black	103	106	107	14	35	9.2	6.1	83.5	v.dec	Bimod	---	
Lawndale (14)	USA-Black	104	---	---	<.1	188	17.5	<4	---	v.dec	Norm	---	
Birmingham (15)	Pakistani	100	100	112	<.1	12	22	<4	256	Norm	Bimod	10.9	563T(16). <5% Activity
Varadero (17)	Cuban-mulatto	---	---	104	18.5	37.9	---	7.3	57.2	v.dec	Bimod	---	
East Harlem (18)	USA-Black	102	104	102	10	107	8.2	<4	34.5	sl.dec	>8	---	
Torrance (19)	USA-White	---	---	103	2.4	54	6	<4	---	v.dec	>8	3	[1]

San Diego (20)	USA-Black	103	---	---	30	45	---	<4	---	Norm	Norm	---	
Barcelona (21)	Spanish	---	105	100	<.1	40	6	5	60	Norm	Norm	---	
Guadalajara (22)	Mexican	100	100	109	14.2	36.4	5.3	4.5	68.8	Norm	Norm	22	1159T (23)
West Virginia (24)	White American	100	98	110	1	25.9	6.6	7.8	67	v.dec	Bimod	---	910T (24)
Jackson (25)	USA-Black	100	102	104	20	33	6.1	<4	66.7	Norm	Norm	---	
Pea Ridge (26)	USA-North European	100	100	106	15	51.5	5	<4	40.3	v.dec	Norm	103	
Galveston (27)	USA-Black	---	102	100	3.2	21	5.2	10	105	Norm	>8	---	
Kilgore (27)	Hungarian-Jewish	---	102	100	2	10	4.1	<4	116	sl.dec	Bimod	---	
Anaheim (28)		101	101	100	3	112	12	<4	37	v.dec	>8	---	1178A (29)
ELECTROPHORETICALLY NORMAL VARIANTS													
Chinese (30)	Chinese	---	100	100	7	56.5	---	<4	60	Norm	Norm	---	
Bat-Yam (31)	Iraqi-Jewish	---	100	---	<.1	27	---	42.5	---	v.dec	Bimod	---	
Albuquerque (32)	USA-White	100	100	100	1	115	11	<4	---	v.dec	>8	---	
Bangkok (33)	Thai	100	100	100	5	60	5.3	8.4	---	v.dec	>8	---	
Oklahoma (34)	West.European	100	---	---	7	163.5	20	<4	---	sl.dec	>8	---	
Duarte (32)	USA-White	100	100	100	8.5	58	5	5.4	---	v.dec	<8	---	
Hong Kong (35)	Chinese	---	100	100	7.5	25	5	7	---	Norm	Norm	---	
Boston (36)	Polish-Jewish	---	100	---	5	19.5	1.9	12	200	sl.dec	<8	---	Sharp pH opt. at 8.5

Englewood (37)	Italian	100	---	---	0.5	56	0.5	29.6	---	sl.dec	Bimod	---	
New York (37)	Italian/Black	100	---	---	0.6	51	3	15.7	---	sl.dec	<8	---	
Hawaii (38)	USA-White	100	100	---	23	39	9.7	<4	37.9	v.dec	Bimod	28.6	
Cornell (39)	USA-White	---	100	100	5	55	11.8	<4	51	v.dec	<8	---	Same family as G6PD Chicago
Tokushima (40)	Japanese	---	100	100	3	50	27	<4	52	v.dec	Norm	6	
Hayem (3)	French	100	---	100	<.1	32	---	58	110	sl.dec	Norm	26	
Missoula (41)	USA-White	---	---	100	5	37	4.3	<4	36.5	v.dec	<8	55	
Aarau (42)	Swiss	---	100	100	7	37.9	6.5	7.1	80.1	v.dec	Bimod	290	
Helsinki (43)	Finnish	100	100	100	15	38.7	3.7	<4	57.5	Norm	Norm	---	? = G6PD Mahidol
Kaluga (44)	Russian	---	100	---	20	40	1.7	<4	---	Norm	Bimod	---	
Kremenchug (45)	Russian	---	100	---	<.1	26	1.8	23	350	sl.dec	Bimod	---	
Ogikubo (46)	Japanese	100	100	100	3	47	3	7.5	52	v.dec	Norm	11.5	
Yokohama (46)	Japanese	100	100	100	1.9	70	6.1	<4	63	sl.dec	Norm	2.9	
Akita (46)	Japanese	100	100	100	<.1	33	3.3	<4	59	sl.dec	Norm	7.9	
Dothan (47)	English/Scottish	100	100	100	<.1	60	5.2	<4	18	v.dec	Norm	5.6	
Dublin (48)	Irish	100	---	---	10	66	2.7	26	---	inc	Norm	---	
Hamburg (49)	German	100	---	---	<.1	2000	3.8	133	---	v.dec	<8	---	
Kyoto (50)	Japanese	100	100	---	5	95	15	<4	---	v.dec	<8	---	
Sapporo (51)	Japanese	100	100	100	3.6	51	3.3	6.6	75	sl.dec	Norm	---	1388A (52)

Nancy (53)	French	100	---	100	8	80	---	5.5	---	Norm	>8	---	
Kanazawa (54)	Japanese	---	100	100	7	43	6	<4	68	sl.dec	Bimod	5.1	
Russian-Moscow (55)	Russian	---	100	100	14	23	3	22	60	sl.dec	Bimod	---	
Regensburg (56)	German	---	100	---	5.5	14	15	8.6	126	v.dec	<8	40	
Iowa City (57)		100	100	100	1.3	48	6.9	<4	46	sl.dec	Norm	11.6	1156G (58)
Springfield (59)	U.S.-White	100	100	100	11	33	4	<4	41	v.dec	Norm	4	[1] 1156G (58)
Clinic (60)	Spanish	100	100	100	0.5	52	8	7	29	sl.dec	Norm	---	1215A (61) Very strange pH optimum curve
Marion (62)	U.S. White	100	100	100	3	51	7	<4	37	v.dec	Norm	10	637T (29)
Nashville (63)	White American	100	100	99	16	87	16	5	37	v.dec	>8	---	[1] 1178A (29)
Harilaou (64)	Greek	---	100	---	<.1	90	---	<4	---	---	---	---	648G (65)
Morioka (66)	Japanese	100	---	---	4.5	30	3.4	6.1	81	sl.dec	Norm	19.4	1339A(67)
ELECTROPHORETICALLY SLOW VARIANTS													
Long Prairie (68)	USA-White	99	99	99	5	26.5	3.9	8.7	109	v.dec	>8	---	
Indianapolis (69)	N.European	100	102	96	5	56.7	5.6	<4	40	v.dec	Norm	21.2	
Gastonia (70)	German/Dutch	99	100	98	4	66	7	<4	41	v.dec	Norm	18	637T (29)
Grand Prairie (71)	USA-White	100	105	88	17	48	3.9	<4	72.1	v.dec	Norm	---	
Johannesburg (72)	W.European	---	---	98	17	80	1.7	<4	51	sl.dec	Norm	---	
Pompton Plains (73)	USA-White	98	97	100	0.5	10.8	4	34	282.8	sl.dec	Bimod	25.7	

Iowa (57)		97	99	100	12.5	65	4.4	4.1	47.4	v.dec	Norm	15.8	1156G (58)
Chicago (74)	West.European	100	100	92	17.5	67	3.4	<4	---	v.dec	Norm	---	(26)
Panama (75)	Jewish	99	98	95	6	34	2.5	30	266	sl.dec	Bimod	---	563T(69)
Waterloo (76)	USA-White	92	100	100	5.8	19.7	6.9	<4	52	v.dec	<8	4	
Minnesota (77)	Scottish/N.Europ.	99	95	98	9	88	4	<4	46	v.dec	Norm	22	637T (29)
Murcia (61)	Spanish	---	98	96	4	54	10	<4	50	v.dec	>8	---	209G (61)
Arlington Heights (10)	German	99	100	88	8	179	5.1	<4	15.2	v.dec	>8	---	
Minneapolis (78)	Norwegian	95	95	97	5.4	83.8	9.3	4.1	37.2	v.dec	>8	---	
Loma Linda (79)	USA-Mexican	94	98	95	0.8	69.6	7.9	<4	60.4	v.dec	Norm	9.5	1089A (29)
Walter Reed (80)	Dutch/English	93	100	95	5	40	5.4	<4	44.7	v.dec	Norm	12.8	1156G (58)
Durham (81)	U.S.White	96	97	95	18	31	7	7	67	v.dec	Norm	10	713G(81)
Tripler (82)	USA-White	97	97	90	35	30	---	<4	62.4	v.dec	Bimod	2.6	
Rotterdam (37)	Dutch	95	---	---	1.9	23	3.3	6	---	Norm	Bimod	---	
Tomah (83)	U.S. White	92	96	97	1.1	41.5	7.8	<4	40	sl.dec	Norm	---	[1] 1153C (58)
Riverside (79)	German/English	95	100	88	0.6	102	14.7	30	50	v.dec	---	---	1228T (58)
Santa Barbara (84)	N.European	91	93	94	6.5	51.3	10.6	<4	38.9	v.dec	<8	32.2	
Sendagi (85)	Japanese	97	98	84	8.3	11.1	4.4	8.3	141.6	v.dec	>8	15.3	1466C->T (86)
Beverly Hills (87)	Italian	95	95	89	<.1	41	15	<4	61	v.dec	Bimod	---	[1] 1160A (58)
Portici (88)	Italian	---	93	---	1	164	11	<4	33	v.dec	>8	4	1178A (88)
Alhambra (89)	Finish/Swedish	95	96	85	14.5	55	2.6	<4	---	sl.dec	>8	3.3	1180C(23)

Hong Kong Pokfulam (30)	Chinese	---	92	---	1.5	64	---	<4	72	Norm	Norm	---	
Milwaukee (90)	Puerto Rican	92	---	---	0.5	224	---	<4	---	---	<8	---	
Ashdod (31)	N.Afr.-Jewish	---	91	---	10	100	---	40	---	sl.dec	Bimod	---	
Ramat-Gan (31)	Iraqi-Jewish	---	91	---	<.1	35	---	40	---	v.dec	Bimod	---	
West Town (10)	Mexican	93	90	87	6.7	59.3	8	7	66.5	v.dec	Norm	21.6	
Rennes (91)	French	---	---	90	<.1	110	---	4.9	10	v.dec	<8	---	
Atlanta (92)	USA-Black	87	93	83	25	63	4.5	<4	44.5	v.dec	Norm	5.5	
Freiburg (93)	German	---	85	90	15	102.5	4	<4	---	---	Bimod	---	
San Francisco (94)	Norwegian	90	82	88	<.1	77	8.4	<4	62	v.dec	Norm	2.7	
Worcester (95)	USA-White	---	86	---	<.1	11.2	61	<4	21	v.dec	<8	---	1160A(96)
Huron (11)	English/Scottish/Irish	84	91	82	3.7	18.2	21	<4	76.6	v.dec	Bimod	---	
Tsukui (97)	Japanese	89	92	74	2	100	4	<4	13	v.dec	Norm	13	561CTCCTC->CTCC(98)
Genova (99)	Northern Italian	---	84	83	1.7	180	3	11	14	sl.dec	Bimod	---	1160A (100)
Tokyo (40)	Japanese	90	90	70	4.4	65	5.5	<4	55.2	v.dec	Norm	6.2	1246A (101)
Santiago De Cuba (102)	Cuban	---	80	---	5	50	43	<4	---	sl.dec	---	---	1339A (102)
Kobe (51)	Japanese	82	89	61	21.7	143	4.7	4.6	80	v.dec	<8	---	1318T (103)
Iwate (104)	Japanese	75	86	71	2	37	40	<4	51	v.dec	Norm	3	1160A (67)
Moosburg (105)	German	---	77	---	4	32	5	<4	56	v.dec	Norm	100	
Manchester (106)	English	---	90	37	22.5	64	6	<4	79	sl.dec	Bimod	---	
Niigata (107)	Japanese	38	48	54	2	47	7	33	38	sl.dec	<8	2	1160A (67)

CLASS 2 VARIANTS

ELECTROPHORETICALLY FAST VARIANTS

Hualien-Chi (108)	Taiwanese	110	---	120	1	10.1	---	42	---	Norm	Bimod	---	
Boluo (109)	Chinese (Guangdong)	---	113	---	4.6	48	---	6.8	90.1	inc	---	---	
San Jose (110)	Costa Rican-White	---	112	---	<.1	60	3.6	10	53.5	Norm	Norm	30	
Union (111)	Filipino	---	107	115	2	10	4.4	180	370	sl.dec	Bimod	37	1360T (112)
Betica (113)	Spanish	111	112	111	7.5	59.2	7.8	<4	50	Norm	Norm	---	202A/376G OR 376G/968C(114)
N-Sawan (115)	Thai	---	110	---	3.6	9	1.5	<4	141	v.dec	Bimod	---	
Ferrara III (116)	Italian	---	---	110	7	62	38	10	34	v.dec	---	---	
Baku (117)	Russian (Azerbaijan)	---	110	110	5	41.3	1.3	<4	---	Norm	>8	---	2dG6PD N.D.
Amman-1 (118)	Arab (Jordan)	107	108	114	6.8	64	6.5	7	62.5	Norm	Norm	---	
Ankara (119)	Turkish	109	---	---	8	52	15	<4	69	sl.dec	Bimod	42	
Ferrara (120)	N.Italian	106	105	117	5	28.5	3.3	17.5	75	v.dec	>8	---	202A/376G (121)
Padrew (115)	Thai	---	109	---	1.9	27	5.3	19	132	sl.dec	Bimod	---	
Lublin (122)	Polish	108	---	---	2	26	19	<4	---	Norm	---	---	
Taiwan-Hakka (123)	Hakka-Chinese	105	---	110	5.5	11.4	---	15.4	---	Norm	Bimod	---	1376T(52)
Taipei-Hakka (123)	Hakka Chinese	105	---	110	7.5	35	4.3	4.3	---	sl.dec	Bimod	---	
Markham (124)	New Guinean	107	---	---	5.7	5.3	---	192	315	sl.dec	Bimod	16	Common in group

Ferrandina (125)	S.Italy	107	---	---	9	29	---	13	111	---	---	---	
Haad Yai (115)	Chinese	---	106	---	9	73	---	17.9	81.9	sl.dec	Norm	---	
Long Xuyen (126)	Vietnamese	---	106	---	3.2	12	---	109	389	sl.dec	Bimod	---	
Huazhou (109)	Chinese (Guangdong)	---	106	---	8.5	80	15.3	<4	49.2	sl.dec	<8	---	
Huiyang (109)	Chinese	---	106	---	7.9	46	4.5	5.6	62.8	Norm	Bimod	---	
Hualien (108)	Taiwanese	105	---	---	<.1	8.7	---	72.2	---	v.dec	Bimod	---	
Teheran (108)	Persian	100	---	110	1	46.8	---	<4	---	Norm	Bimod	---	
Dhon (127)	Chinese	105	105	105	9.5	33.7	---	<4	76.9	Norm	Norm	---	1388A (52)
Taiwan-Ami 5 (123)	Taiwan Aboriginals	105	---	---	<.1	35.3	---	52.8	---	---	Bimod	---	
Castilla-Like (128)	Papuan	---	105	105	8.8	31.3	5.9	10.6	87.9	v.dec	Norm	---	
Maewo (129)	S.Italy	---	105	---	6	8	15	150	200	---	---	---	1360T (129)
Pawnee (130)	USA-N.European	100	103	110	6.8	50	20	<4	101	Norm	Norm	18.6	1316C (23)
Matam (131)	African (Senegal)	106	100	---	0.5	17	2.6	23	170	sl.dec	Bimod	---	
Amboin (128)	Papuan	104	103	---	4.6	29.8	10.6	9.8	73.6	v.dec	Norm	---	
Azerbaidzhan (117)	Russian (Azerbaidjan)	---	105	100	<.1	7.2	1.3	<4	---	v.dec	>8	---	
Menorca (113)	Spanish	94	112	---	2.4	14.5	1	26	261	v.dec	Bimod	118	
Union-Markham (132)	Greek	103	103	103	2	7	1.6	200.3	397.2	---	Bimod	---	
Naone (133)	Polynesian	---	103	---	<.1	---	---	<4	49	---	---	---	497A(133)
Andalus (134)		105	100	102	<.1	14	1	44	311	v.dec	Bimod	---	1361A (134)
Goodenough (128)	Papuan	---	101	100	2	7.8	7	68.5	365	v.dec	Bimod	---	

ELECTROPHORETICALLY NORMAL VARIANTS													
Indonesia (135)	Indonesian	100	---	---	2.5	38.5	---	5.8	---	sl.dec	Bimod	---	
Campbellpur (136)	Pakistani	100	100	100	4.5	12.6	---	11	---	v.dec	Bimod	---	Common
Mediterranean (137)	Mediterranean/India	100	100	100	3.5	22.5	1.4	25	350	sl.dec	Bimod	16	Very common. 563T (102)
Corinth (138)	Greek & SE Asian	100	100	100	3.5	22.5	1.4	25	57.5	sl.dec	Bimod	---	May be common
El Fayoum (139)	Egyptian	---	100	100	6	41.4	---	26.3	229	sl.dec	Bimod	---	
Bagdad (140)	Iraqi-Jewish	100	---	100	4	73.5	22.5	45	---	inc	Bimod	---	
Abrami (141)	French	---	100	---	4	20	6	4.6	230	sl.dec	Bimod	---	Woman w/ myelofibrosis
Hamm (142)	German	---	100	100	1.4	38.2	4.8	46.4	230	v.dec	>8	---	
Tarsus (142)	Turkish	---	100	100	5.2	27.9	11	33.2	261	sl.dec	>8	---	
Ogori (143)	Japanese	100	100	100	3.5	40	5	<4	67.7	Norm	Norm	---	
Jammu (144)	Indian (Kashmir)	99	99	101	5	53	9	<4	57	Norm	Norm	---	871A (12). ?= Chinese
Bielefeld (145)	German	---	100	100	2.7	21.7	7	76.4	485	Norm	---	170	
Blida (146)	Arab (Berber)	---	100	---	7	15	---	25	45	sl.dec	<8	---	
Petrich (138)	Bulgarian	---	100	---	4.7	17	---	6.2	75	sl.dec	Bimod	---	1388A (52)
Gotze Delchev (138)	Bulgarian	---	100	---	1.8	16	---	14	96	inc	Bimod	---	
Sassari (147)	Sardinia	100	---	---	<.1	24	---	16	---	---	---	---	563T/1311T (148)

Dakar (149)	African (Senegalese)	---	---	100	2.8	15	4	6	---	sl.dec	---	---	
Mali (149)	African	---	---	100	2.6	14	4.4	<4	---	sl.dec	>8	---	
Bodensee (150)	German	---	100	100	1.8	28	11	<4	---	sl.dec	Norm	---	
Nucus (151)	Russian (Uzbek)	---	100	---	0.5	127.4	0.3	<4	15	Norm	<8	45	
Tashkent (151)	Russian (Uzbek)	---	100	---	1.5	32.3	0.2	<4	---	Norm	Norm	11.2	
Fort Worth (152)	English/Irish	100	---	---	6.1	25	5.1	5.5	86	Norm	<8	---	
Selim (117)	Russian (Azerbaijan)	---	100	100	6	19	3	<4	---	v.dec	<8	---	
Moscow (153)	Russian	---	100	---	<.1	16.4	2.4	70	350	sl.dec	>8	---	Sharp peak at pH 8
Gifu (7)	Japanese	100	100	100	1.2	48	3	4.8	120.5	sl.dec	Norm	7	1376T (52)
Espoo (154)	Finnish	100	---	---	1	15.5	1.3	5	50	v.dec	Norm	---	
Dushanba II (55)		---	100	---	6.4	68.9	5	42	---	sl.dec	Norm	---	
Cagliari I (155)	Sardinian	---	100	100	5	54	4.8	5.8	44	sl.dec	Norm	10	
Rudosem (156)	Bulgarian	---	100	---	6.3	6.9	---	136.6	147	Norm	Bimod	---	
Songkhla (115)	Thai	---	100	---	1.6	13.8	---	48.7	297.7	v.dec	Bimod	---	
Iserlohn (56)	German	---	100	---	6.5	22	5.1	6	64.6	sl.dec	<8	105	
Miaozu-Baisha (157)	Chinese	100	---	---	6	24	---	9.3	135.2	sl.dec	---	---	
Gaomin (109)	Chinese (Guangdong)	---	100	---	7	19	2.7	11.8	72.5	sl.dec	Bimod	---	
Kaiping (109)	Chinese (Guangdong)	---	100	---	3.8	40	3	10	71.3	v.dec	Bimod	---	1388A (52)
Viangchan (158)	Laotian	100	100	100	3	105	12	27	45	Norm	>8	19	871A (12)

Thessaloniki (159)	Greek	100	100	---	5	20	10	7	---	sl.dec	Norm	29	A woman with myelofibrosis
Cagliari (160)	Sardinia	---	---	100	3	19	---	11	49	---	---	---	563T/1311T (148)
Coimbra (161)	Portugese	---	100	---	2	7	2	110	272	---	---	---	592T (161)
Consenza (129)	S.Italy	---	100	---	2.2	8.1	---	6.8	62	---	---	---	1376C (129)
Fushan (24)	Chinese	---	---	100	1	49	---	<4	78	Norm	Norm	---	1004A (24)
ELECTROPHORETICALLY SLOW VARIANTS													
Kirovograd (162)	Russian	100	100	98	<.1	6.5	3.1	<4	---	sl.dec	>8	---	
Kirovograd (55)	Russian	---	100	98	<.1	7.4	2.2	60	300	v.dec	>8	---	
Athens-Like (132)	Greek	99	99	99	5.5	17.1	3.3	15.4	152	---	---	---	
Orchomenos (132)	Greek	100	100	93	3.5	11	2.1	105	350	---	Bimod	---	
Toulouse (163)	French/Italian	100	97	96	3	55	2.1	13	220	v.dec	Bimod	---	
Chainat (115)	Thai	---	98	---	0.6	67.5	5	<4	72	inc	Norm	---	
Laos (9)	Laotian	97	97	99	1.4	68.1	7.2	<4	55.7	Norm	Norm	115.6	
Santamaria (164)	Puerto Rican-White	---	98	98	2	15.5	2.4	22.5	183	sl.dec	Norm	---	376G/542T (2). A double banded pattern on electrophoresis
Zakataly (165)	Russian (Azerbaijan)	---	97	---	2.5	14.2	3.7	200	400	sl.dec	Bimod	---	
Dallas (166)	Yugoslavian	96	98	97	<.1	13.8	2.9	37.7	338.7	v.dec	Bimod	24.2	563T/1311T (16)
Panay (167)	Filipino	96	---	96	3	30	4.7	<4	---	sl.dec	Bimod	---	May be common

Manus (128)	Papuan	96	97	95	4.3	16.7	1.2	12.1	79	v.dec	Bimod	---	
Vanua Lava (133)	Polynesian	---	96	---	<.1	---	---	18	63	---	---	---	383C(133)
Swit (128)	Papuan	86	101	98	2	5.5	0.8	106	344	v.dec	Bimod	---	Act <2%
Bash-Kungut (168)	Russian (Azerbaijan)	---	95	---	4	---	---	70	310	---	---	---	
Madang (128)	Papuan	95	95	96	2	45	3.9	52.7	62.2	v.dec	Norm	---	Act <2%
Asahikawa (169)	Japanese	98	94	94	3.7	29.8	18.2	7	109.3	sl.dec	Bimod	2	695A (67)
Poznan (170)	Polish	94	---	---	<.1	16.5	0.8	30.5	---	sl.dec	Bimod	---	
Okhut I (165)	Russian (Azerbaijan)	---	94	---	6	24.2	3	25	145	sl.dec	Bimod	---	
Wewak (128)	Papuan	91	97	95	2	35	1	23.8	83.5	v.dec	Norm	---	
Palakau (128)	Papuan	88	100	95	3.5	51.4	8	18.8	46.7	v.dec	Norm	---	
Amman-2 (118)	Arab (N.Yemen)	96	94	91	1.2	20	5	30	179	sl.dec	Norm	---	
Onoda (171)	Japanese	93	95	94	4	20	3	13	180	sl.dec	Bimod	---	
Aachen (172)	German	93	---	---	3	65	22.5	<4	50	v.dec	Norm	7	
Shirin-Bulakh (165)	Russian (Azerbaijan)	---	93	---	1.8	30.6	2	80	330	v.dec	>8	---	
Cassano (129)	S.Italy	---	93	---	2.2	14	---	51	170	---	---	---	1347C (129)
Kurume (173)	Japanese	96	92	87	0.8	43	5.7	5	68	v.dec	Bimod	1.9	
Angoram (128)	Papuan	87	96	---	7.6	15.3	3.2	9.7	71.6	Norm	Norm	---	
Mainoki (128)	Papuan	89	96	93	2	25.8	3.5	4.3	85.3	sl.dec	Norm	---	Act <2%
Stella (174)	Italian (Naples)	93	93	91	8.5	70	---	9.4	71	---	---	---	
Namouru (133)	Polynesia	---	92	---	<.1	---	---	30	48	---	---	---	208C(133)

Kar Kar (128)	Papuan	87	94	92	2	24.3	1	19	83	Norm	Norm	---	Act <2%
Salata (175)	Papuan	---	97	83	5	75.5	8.5	8.5	58	Norm	Norm	---	
Lifta (31)	Iraqi-Jewish	---	89	---	<.1	25	---	60	---	v.dec	---	---	
Ciudad De La Habana (176)	Cuban	---	86	92	9.5	26.7	3.1	22	83.3	sl.dec	Bimod	---	
Posillipo (174)	Italian (Naples)	90	90	88	6	69	---	7.5	63	---	---	---	
Zhitomir (162)	Russian (Ukraine)	---	94	81	<.1	6.8	2.3	53	350	sl.dec	Bimod	---	
Avenches (105)	Swiss	---	87	---	9	31	3	17	68	v.dec	<8	180	
West Bengal (177)	Asiatic Indian	82	90	---	9	31	6.6	<4	---	Norm	Norm	---	
Alger (146)	Arab	---	85	---	<.1	45	---	12	40	v.dec	Bimod	---	
Bideiz (165)	Russian (Azerbaijan)	---	95	75	5.2	2.1	3	50	330	v.dec	Bimod	---	
Dushanba I (55)	Russian	---	90	80	<.1	12.2	2.7	<4	160	v.dec	Bimod	---	
Fukushima (173)	Japanese	86	88	74	2.8	31	5	<4	37	sl.dec	Norm	4.4	1246A (67)
Wakayama (173)	Japanese	89	81	78	4.5	46	6.5	<4	66	v.dec	Norm	3.2	
Popondetta (128)	Papuan	67	95	87	2	5	1	66.6	295.2	v.dec	Bimod	---	Act <2%
Shekii (165)	Russian (Azerbaijan)	---	91	72	5.1	29	1.2	56	303	v.dec	Bimod	---	
Ensley (178)	USA-Black	76	---	---	6	14	3	<4	---	Norm	---	---	
Wroclaw (179)	Polish	75	---	---	8.5	110	5.6	<4	---	v.dec	Bimod	---	
Samandag (180)	Turkish	---	57	67	<.1	25	18	5	---	sl.dec	Bimod	---	
Yamaguchi (173)	Japanese	57	73	48	3.5	37	15.2	4.1	94	v.dec	>8	7.6	1160A (67)

Adana (180)	Turkish	---	44	67	<.1	210	13	38	---	v.dec	Bimod	---	

CLASS 3 VARIANTS													
ELECTROPHORETICALLY FAST VARIANTS													
Barbieri (181)	Italian	135	---	---	32	80	30	<4	---	Norm	---	---	
Central City (182)	USA-Black	126	120	104	14	43	3.5	<4	30	Norm	Bimod	4.5	
Selma (114)	Afro-American	117	114	118	9	40	3	<4	86	sl.dec	>8	14	376G/968C (183)
Nanhai (109)	Chinese (Guangdong)	---	116	---	12	6	---	14	101	Norm	Bimod	---	
Junut (55)		---	114	---	15	24.6	---	6.5	59	v.dec	Norm	---	
Tepic (184)	Mexican-Japanese	---	106	122	11.3	48.2	9.1	<4	62.2	Norm	Norm	20.1	202A/376G (185)
N-Pathom (186)	Thai	---	110	115	18	59	3.4	<4	57	Norm	Norm	---	
Puerto Rico (187)	Puerto Rican	112	---	---	38	17.8	---	<4	---	sl.dec	>8	---	
A- (188)	African	110	110	115	14	60	3.6	<4	55	Norm	Norm	13	202A/376G OR 376G/968C OR 376G/680T (183) OR 95G (189)
Alabama (190)	USA-Black	111	115	109	14	71	11.6	<4	72	Norm	<8	6.8	202A/376G (191). Two bands on electrophoresis
Nagasaki-2 (192)	Japanese	110	111	111	52	32	10	<4	38	Norm	Norm	30	
Debrousse (193)	Arab	110	---	---	20	24	2.6	7.5	---	Norm	Norm	---	Formerly Constantine

Toronto (194)	N.European	---	105	115	15	40	5.5	8	63	sl.dec	Norm	---	
Ube (195)	Japanese	108	108	114	39	52.5	5.5	<4	55	Norm	Norm	47	241T (196)
Kephalonia (197)	Greek	---	110	---	21.6	34.2	3.8	<4	---	---	Norm	---	
Attica (197)	Greek	---	110	---	50	40.7	4.7	<4	---	Norm	Norm	---	
East African (198)	East African	---	110	---	12	92	---	<4	---	---	---	---	
Muret (199)	French	111	106	114	19	42	1	7	64	Norm	>8	---	
Palmi I (116)	Italian	---	---	110	10	62	36	6	56	sl.dec	---	---	
Galliera (116)	Italian	---	---	110	17	53	3.4	11	50	sl.dec	---	---	
Palmi II (116)	Italian	---	---	110	40	57	5.3	12	20	sl.dec	---	---	
S.Dona (116)	Italian	---	---	110	50	125	18	6	33	v.dec	---	---	
Matera (102)	Italian	---	110	---	17	47	2	7	---	Norm	---	13	202A/376G (102)
Lozere (200)	French	107	108	112	55	48	5.3	<4	45	sl.dec	Bimod	---	
Chibuto (201)	Bantu	---	108	109	20	30	8.2	<4	---	sl.dec	Norm	---	
Castilla (185,202)	Spanish	111	109	121	6	51	5	<4	61	Norm	Norm	16	202A/376G (185)
Chiapas (203)	White	---	108	109	15	25	2.6	<4	60	sl.dec	<8	23	
Konan (204)	Japanese	108	107	112	44.9	39.6	5.7	<4	57	Norm	Norm	9	241T (196)
Hiroshima-1 (192)	Japanese	108	109	109	52	39	5	<4	46	Norm	Bimod	47	
Nagasaki-3 (192)	Japanese	108	107	112	52	68	8	<4	42	Norm	Norm	65	
Distrito Federal (205)	Mexican	---	107	110	16	23	5	<4	53	Norm	Norm	---	202A/376T (185)
San Juan (187)	Puerto Rican	110	---	105	10	16.2	---	21.6	---	v.dec	Bimod	---	

Hammersmith (206)	Indian (Punjabi)	108	---	---	18	---	---	<4	---	---	---	---	323A(206)
Kabyle (207)	Algerian	---	104	110	25	68	---	<4	---	Norm	Norm	---	
Laghouat (146)	N.African (Sahara)	---	107	---	12.5	47.5	---	15.5	45	Norm	Norm	---	
Caujeri (208)	Cuban-Black	104	109	107	22	60	---	9	---	sl.dec	<8	---	
Melissa (209)	Greek	105	107	105	25	20	3.4	<4	62	---	Norm	---	
Tel-Hashomer (210)	Tunisian-Jewish	---	106	---	32.5	35	---	<4	---	Norm	Bimod	---	An electrophoretically slow band forms on ageing
Guangzhou (109)	Chinese (Guangdong)	---	106	---	33.5	116	6.6	4.4	32.5	Norm	Norm	---	
Hiroshima-3 (192)	Japanese	107	103	108	33	35	7	<4	58	Norm	>8	31	
Canton (211)	S.Chinese	105	---	105	14	28	---	9.5	---	sl.dec	Bimod	---	1376T (212)
Guantanamo (208)	Cuban-Black	104	108	104	31	20	---	<4	---	sl.dec	Bimod	---	
Lagosanto (213)		105	---	---	45	---	---	<4	51	Norm	Norm	---	242A (213)
Jalisco (214)	Mexican	104	103	106	55.7	32.9	5.1	<4	79.5	Norm	Norm	15.8	
Tahta (139)	Egyptian	103	---	103	27	39.1	---	5.9	77.6	sl.dec	Bimod	---	
Velletri (215)	Italian	103	102	103	21	140	4.4	33	330	v.dec	Bimod	30	
Kan (216)	Thai	---	102	---	10.4	---	---	35.8	148.5	v.dec	---	---	
Gallura (217)	Italian	---	100	103	15	40	4.5	<4	90	sl.dec	Norm	72	
Bukitu (175)	Papuan	---	103	100	10	74.7	11	12	64.6	sl.dec	Norm	---	
Qing-Baijiang (109)	Chinese (Guangdong)	---	101	---	24	21	3.2	11.3	87	sl.dec	Norm	---	

ELECTROPHORETICALLY NORMAL VARIANTS

Mahidol (218)	Thai/Cambodian	100	---	100	17.2	40	---	<4	59.5	Norm	Norm	---	487A (219). [2]
El Morro (187)	African	100	100	---	10	35.6	---	11	90	sl.dec	Bimod	---	
Siriraj (220)	Thai	100	---	100	10.5	23	---	14.5	150.5	sl.dec	Bimod	---	
Columbus (221)	USA-Black	100	---	---	36	60	3.6	<4	---	---	---	---	
Hofu (143)	Japanese	100	100	---	12	25	5	5.2	105	Norm	Norm	13	
El Kharga (139)	Egyptian	100	---	100	21	60.5	---	6.1	50.7	sl.dec	>8	---	
Anant (216)	Thai	---	100	---	18	41.7	18.9	<4	97.3	Norm	Norm	---	1388A (52)
Kamiube (204)	Japanese	100	100	100	46	36	3.8	<4	52.5	Norm	Norm	7.9	1387T (67)
Martinique (222)	African	---	---	100	64	54	5.9	5.4	---	v.dec	Norm	---	
Hillbrow (223)	White	---	---	100	12	8.5	1.1	125	304	Norm	Bimod	---	
Trapani (116)	Italian	---	---	100	38	58	7	25	69	Norm	---	---	
Nedelino (156)	Bulgarian	---	100	---	43	57.1	---	11.8	55.9	Norm	Bimod	---	
Hanoi (224)	Vietnamese	---	100	---	13	31.6	---	34	134	---	---	---	
Chatham (102)		---	100	---	17	60	---	14	---	v.dec	---	---	1003A (102)
Villa Clara (225)	Cuban	100	---	100	46	49	8	<4	---	Norm	Bimod	268	
Sibari (129)	S.Italy	---	100	---	20.4	31	16	16	110	Norm	Norm	---	634G (129)
Orissa (226)	Indian	100	---	---	20.5	135	59	9	85	inc	---	44	131G(226)

ELECTROPHORETICALLY SLOW VARIANTS													
Siwa (139)	Egyptian	99	98	99	12	16.9	---	26	200	v.dec	Bimod	---	
Intanon (227)	Thai	---	98	---	10.4	70	2.1	<4	40.7	Norm	Bimod	---	
Athens (228)	Greek	---	98	---	22.5	17.5	4.5	12.5	125	sl.dec	Bimod	---	Common
Kaluan (175)	Papuan	---	98	97	10	161.4	11.4	4.4	20	v.dec	Norm	---	
Great Lakes (229)	USA-White/Am Indian	99	98	99	11.5	61.4	9.1	4.5	39	v.dec	>8	4	
Vientiane (230)	Laotian	99	---	94	56	39	10.5	9	105	inc	>8	85	
Bogia (175)	Papuan	---	96	95	10	55.5	7	8.6	63.3	Norm	Norm	---	
Gaohe (231)	Chinese	96	---	---	12	31.5	---	<4	58.5	Norm	Norm	---	95G (189)
Washington (108)	USA-Black	95	---	---	24.5	53.2	---	<4	---	Norm	Norm	---	
Colomiers (199)	Sicilian	99	97	90	15.4	28	2.5	16	182	Norm	<8	---	
Alessandria (116)	Italian	---	---	95	50	32	5	19	94	sl.dec	---	---	
Bash-Kungut lv (168)	Russian (Azerbaijan)	---	95	---	16	---	---	50	83	---	---	---	
Gaozhou (109)	Chinese (Guangdong)	---	94	---	34	33	1	12.7	84	Norm	---	---	95G(189)
Los Angeles (232)	USA-White	95	98	86	34	16.7	11.1	6.1	11	Norm	Bimod	9.3	
Benevento (187)	Italian	93	---	---	13	4.6	---	245	---	sl.dec	Bimod	---	
Agrigento (217)	Italian	---	100	85	25	30	3	<4	90	sl.dec	Norm	40	1376T (52)
Yangoru (128)	Papuan	96	94	90	11.3	19.6	5.9	15.1	73	v.dec	Bimod	---	
Vin Fu (224)	Vietnamese	---	93	---	22	41	---	15	35	---	---	---	
Montalbano (233)	Matera (S.Italy)	---	---	93	21	50	4	11	77	Norm	Bimod	20	854A (233)

Tursi (233)	Matera (S.Italy)	---	93	---	17	51	---	<4	69	sl.dec	Bimod	---	Broad flat pH curve
Trinacria (234)	Sicilian	---	93	90	22.5	23	2.5	6.5	135	sl.dec	Bimod	---	
Titteri (146)	Arab	---	92	---	10	34	---	7	50	Norm	>8	---	
Okhut II (165)	Russian (Azerbaijan)	---	95	88	14.6	43.2	7	5	87	sl.dec	Norm	---	
Napoli (235)	Italian	---	92	---	21	24	1.7	5.6	113	Norm	Bimod	---	
Ferrara II (235)	Italian	---	95	89	18	28	2.3	10	121	Norm	Bimod	---	
Pordenone (236)	Italian/Sicilian	92	---	---	12.5	15	20	<4	67	Norm	---	---	
Pallonetto (174)	Italian (Naples)	93	93	91	21	58	---	<4	87	---	---	---	
Gabrovizza (237)	Italian	---	92	---	11	11	6	11	43	sl.dec	---	18	Concurrent CDA Type II
Modena (238)	Italian	89	93	95	21	48	19.5	8.9	---	Norm	Bimod	---	844C (238)
Camperdown (239)	Maltese	---	92	89	15	17.5	2.6	18	150	Norm	Bimod	---	
Thenia (146)	Arab (Berber)	---	90	---	25	60	---	<4	18	Norm	Bimod	---	
Madison (240)	German/Irish	---	90	---	12	---	---	<4	---	---	---	---	
Palepoli (174)	Italian (Naples)	---	---	90	28	69	---	6.7	62	---	---	---	
Camaldoli (174)	Italian (Naples)	91	90	88	23	74.5	---	7.4	66	---	---	---	
Avvocata (174)	Italian (Naples)	91	90	88	34	116	---	8.6	76.5	---	---	---	
Musashino (241)	Japanese	90	92	88	18	32	2	5	80	Norm	Norm	8	185T(67)
Frankfurt (242)	Middle European	90	---	---	16	60	4	17	---	v.dec	Bimod	---	
Metaponto (233)	Southern Italy	---	90	---	20	47.5	3.3	5.3	44.7	Norm	---	13	172A (102)

Pisticci (125)	Matera (S. Italy)	---	90	---	69	47	6	6	58	Norm	Norm	18	
Lodi (243)	Italian	90	---	---	15	46	3	20	70	sl.dec	Norm	---	844C (243)
Mexico (244)	Mestizo (Mexican)	91	85	90	10	36	2	30	145	---	Norm	---	844C (245)
Mercury (246)	USA-White	89	92	83	25.2	8.1	7.1	21.6	100.9	Norm	Bimod	27.4	
Fort Pierce (247)	Italian	90	87	86	31.2	54.7	7.9	<4	57	Norm	>8	5.4	
Seattle (248)	Welsch/Scottish	90	80	---	14.5	20	2.6	9	---	Norm	Bimod	---	844C (148)
Caltanissetta (116)	Italian	---	---	85	12	36	4.3	50	150	v.dec	---	---	
Pozzallo (116)	Italian	---	---	85	50	90	21	10	66	Norm	---	---	
Neapolis (249)		85	---	---	30	55	---	<4	---	Norm	---	---	1400G (249). Km NADP is given as 22 with a normal range of 25-30
Kerala (177)	Asiatic Indian	90	75	---	50	23	1.5	7.4	---	Norm	Bimod	---	949A(250)
Lizu-Baisha (251)	Chinese	83	---	---	15	56.5	---	<4	59.1	Norm	Norm	---	
Petilia (236)	Italian	80	---	---	25	52	9.5	5	62	sl.dec	---	---	
Tenganan (252)	Indonesian	64	99	75	12.6	11.3	6.9	18.2	109	v.dec	Norm	---	
Ilesha (253)	W.African	---	75	---	25	83	---	<4	---	---	---	---	466A (102)
Kalyan (254)	Asian Indian (Koli)	85	75	63	30	20	---	16.5	113	sl.dec	Norm	---	949A (250)
Carswell (255)	Irish	92	48	78	10	44	6.4	<4	---	Norm	Norm	---	
Rohini (256)	Indian (Bombay)	77	63	67	35	130	---	<4	---	sl.dec	Bimod	---	
Santa Clara (225)	Cuban	60	---	67	46	34	21	44	---	sl.dec	<8	9	pH optimum at 8

CLASS 4 VARIANTS

ELECTROPHORETICALLY FAST VARIANTS

Bali (252)	Indonesian	---	105	126	100	60.2	16.6	<4	47.5	sl.dec	Norm	---	
Mammola (116)	Italian	---	---	115	80	42	5	7	22	v.dec	---	---	
Inhambane (201)	Bantu	---	112	115	100	38	4.7	<4	50	Norm	Bimod	---	
Luz-Saint-Sauveur (257)	French	118	109	114	65	40	3.1	<4	95	Norm	Norm	---	
A (258)	USA-Black	110	110	115	90	60	3.6	<4	55	Norm	Norm	6.7	376G (259)
Titusville (260)	USA-Black	110	110	112	65	48	12	<4	78	sl.dec	Norm	16	
Steilacoom (261)	USA-Black	---	110	107	100	62	3	<4	---	Norm	Norm	---	
Hiroshima-2 (192)	Japanese	109	108	111	63	63	8.1	<4	28	---	---	23	
Miseno (174)	Italian (Naples)	108	108	108	71	70	---	9.4	151	---	---	---	
S-Sakorn (262)	Thai	---	107	---	68	236	5	<4	40.7	Norm	Norm	---	
Nagasaki-1 (192)	Japanese	108	105	109	79	66	10	<4	48	Norm	>8	24	
Levadia (263)	Greek	104	107	108	100	40.6	3.5	<4	60	---	Norm	---	
Lourenzo Marques (201)	Bantu	---	106	106	100	66	4.3	<4	---	Norm	Norm	---	
King County (264)	USA-Black	---	105	---	100	61	4	6	---	---	Norm	---	
Kiwa (204)	Japanese	102	103	105	64	42	6.1	5.7	68	Norm	Norm	8.6	
Lynn (265)	Russian/Polish	102	102	100	69	54	8.3	<4	50	Norm	Norm	6.5	

ELECTROPHORETICALLY NORMAL VARIANTS													
B (266)	Worldwide	100	100	100	100	60	3.6	<4	57.5	Norm	Norm	9	The most common G6PD
Thessaly (267)	Greek	105	98	98	105	28.5	12.3	9.7	70	---	Norm	---	
Martinique-Like (165)	Russian (Azerbaijan)	---	100	100	66.4	43.2	6	<4	60	sl.dec	Norm	---	
Huntsville (268)	USA-White	100	100	100	77	43	3	<4	38	sl.dec	Bimod	6	
Cuiaba (269)	Brazilian-Portuguese	---	100	100	83	138	5	<4	55	sl.dec	Norm	120	
Butantan (270)	White--Brazilian	100	100	100	103	127	9	6	60	Norm	Norm	---	Rounded pH curve
ELECTROPHORETICALLY SLOW VARIANTS													
Adame (253)	W.African	---	96	---	100	46	19	<4	---	Norm	---	10	
Western (261)	Greek	---	95	95	60	38	2.2	<4	42	---	Norm	---	
Khartoum (271)	African (Sudanese)	---	90	100	123	130	0.8	<4	---	sl.dec	<8	---	
Ayutthaya (262)	Thai	---	95	---	70	28.3	2.5	12.3	118.1	Norm	Bimod	---	
Nukha (55)	Russian (Azerbaijan)	---	95	---	100	51.7	---	<4	39	sl.dec	Norm	---	
Kardhitsa (209)	Greek	95	95	92	85	24.7	6.5	6.5	52.4	---	Norm	---	
Dushanba III (55)		---	97	90	100	75.1	9.1	4.5	---	Norm	Norm	---	
Laguna (272)	Brazilian-Portugese	93	96	87	64	20.7	7.6	9.8	116.3	Norm	Bimod	43	
Regar (273)	Russian (Tadjik)	92	---	---	62.2	29.2	6.3	17.7	63.7	Norm	Bimod	40	

Abeokuta (253)	African (Nigeria)	---	91	---	100	81	7.7	<4	---	Norm	---	35	
Lanlate (253)	W.African	---	91	---	100	40	20.6	<4	---	---	---	---	
Alexandra (239)	Italian	---	92	89	75	26	3	<4	50	Norm	Norm	---	
Kuanyama (274)	African	---	---	90	73	19.9	2.8	8	62	---	Norm	---	
Baltimore-Austin (275)	USA-Black	90	---	---	75	65	3.1	<4	---	Norm	Norm	---	
Manjacaze (201)	Bantu	---	90	90	100	141	3.8	<4	---	Norm	Norm	---	
Cagliari II (276)	Sardinian	---	90	---	65	148	7	6	---	---	<8	---	
Morelia (214)	Mexican	93	92	82	77.5	44.2	15.3	5.9	71.4	Norm	Norm	8.6	
Tacoma (261)	USA-Black	---	94	81	100	66	4	<4	69	---	Norm	---	
Porte Alegre (277)	Brazilian-Portugese	---	91	85	80	32	1.7	<4	80	Norm	Bimod	---	
Balcali (180)	Turkish	89	85	---	93	38	3	<4	---	Norm	Norm	---	
(278)	Cuban	---	90	80	100	48.5	3.7	<4	---	sl.dec	Bimod	225	
Port Royal (279)	Sicilian	---	85	---	62.5	20	---	7.5	10	sl.dec	---	---	
Ijebu-Ode (280)	African	---	85	---	100	60	24	<4	---	sl.dec	Bimod	---	
Gambia (281)	W.African	---	---	85	78	58	5.3	<4	---	Norm	Norm	---	
Minas Gerais (282)	Brazilian	---	---	82	70	41	4	9	---	---	Norm	---	
Sao Borja (283)	White (Brazil)	---	82	79	100	---	---	<4	---	---	---	---	337A (283). Found only in females
Madrona (284)	USA-Black	---	---	80	75	32	3.5	<4	---	---	Norm	---	
Ibadan-Austin (275)	USA-Black	80	---	---	72	67	3.3	<4	---	Norm	Norm	---	

Porbandar (285)	Asian Indian	74	68	83	78	4.9	1	15.5	110	Norm	Norm	---	
Ekiti (253)	W.African	---	72	---	100	53	---	<4	---	---	---	---	
Punjab (286)	Indian	75	84	48	52	35	5	12	69	Norm	Bimod	---	More rapid electrophoretically after dialysis
Ita-Bale (280)	African	---	65	---	100	91	11	<4	---	sl.dec	Norm	---	
Capetown (287)	Cape coloured/Norwegian	85	66	46	69	14.3	3	11.5	111.3	Norm	Bimod	---	

CLASS 5 VARIANTS													
ELECTROPHORETICALLY FAST VARIANTS													
Chao Phya (262)	Thai	---	109	---	130	70	5.5	<4	54.2	Norm	Norm	---	Probably identical to A(+)
Hektoen (288)	USA-White	100	100	120	400	51	3	<4	44	Norm	Norm	---	Amino acid substitution known (289)
THE FOLLOWING VARIANTS COULD NOT BE CLASSIFIED ELECTROPHORETICALLY :													
Berlin (290)	German	---	---	---	2.6	230	---	<4	---	---	---	---	Electrophoresis not reported
Beaumont (291)	Spanish	---	---	---	<.1	56	---	76	45	sl.dec	<8	---	Electrophoresis not reported
Carapicuiba (292)	Brazilian/Spanish	---	---	---	54	105	6	<4	30	sl.dec	Norm	70	
Calgary (293)	Canadian White	---	---	---	<.1	---	---	<4	---	---	---	---	1178A (293)

Sunderland (294)		---	---	---	<.1	---	---	<4	---	---	---	---	105-107CAT Del (294)
Shinagawa (23)	Japanese?	---	---	---	<.1	242	15	<4	50	v.dec	Norm	---	1229A (23,295). Formerly 'Japan'. Changed at the suggestion of Hirono (295) is the characterization
Ierapetra (23)	Greek	---	---	---	<.1	---	---	<4	---	---	---	---	1057T(23)
Mexico City (23)	Mexican	---	---	---	<.1	---	---	<4	---	---	---	---	680A (23)
Chinese-1 (296)	Chinese (Hawaii)	---	---	---	<.1	---	---	<4	---	---	---	---	835T (296)
Santiago (23)	Chilean	---	---	---	<.1	---	---	<4	---	---	---	---	593C (23)
Chinese-2 (296)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	1360T (296,297)
Vancouver (298)	Icelandic-French-German	---	---	---	<.1	---	---	<4	---	---	---	---	317G & 544T & 592T(299)
Taipei (300)	Chinese (Taiwan)	---	---	---	<.1	---	---	<4	---	---	---	---	493G(300). Originally reported as Chinese-4 in (301)
Campinas (302)	Italian	---	---	---	<.1	---	---	<4	---	---	---	---	1463T (302)
Mt Sinai (303)	Puerto Rico	---	---	---	<.1	---	---	<4	---	---	---	---	376G/1159T(303)
Aures (304)		---	---	---	<.1	---	---	<4	---	---	---	---	143C (304)
Swansea (305)		---	---	---	<.1	---	---	<4	---	---	---	---	224C (305)
Plymouth (305)		---	---	---	<.1	---	---	<4	---	---	---	---	488A (305)
Telti (305)		---	---	---	<.1	---	---	<4	---	---	---	---	1318T(305)

Volendam (306)	Dutch	---	---	---	<.1	---	---	<4	---	---	---	---	514t(307)
Quing Yan (308)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	392T (309)
Stonybrook (24)		---	---	---	<.1	---	---	<4	---	---	---	---	724-729GGCACT Del (24)
Chinese-5 (308)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	1024T (308)
Shinshu (295)	Japanese	---	---	---	19.4	85	12	6.9	40	Norm	Norm	---	527G (295)
Nara (310)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	953-976| Del (310)
Partenope (311)	Italian	---	---	---	<.1	---	---	<4	---	---	---	---	1052T(311)
S.Antioco (311)	Italian	---	---	---	<.1	---	---	<4	---	---	---	---	1342G(311)
Olomouc (24)	Czech	---	---	---	<.1	---	---	<4	---	---	---	---	1141C (24)
Cleveland (24)	European	---	---	---	6.7	---	---	<4	---	---	---	---	820A (24)
Georgia (24)	American White	---	---	---	<.1	---	---	<4	---	---	---	---	1284A (24)
Praba (24)	Czech	---	---	---	<.1	---	---	<4	---	---	---	---	1166G (24)
Varndorf (24)	Czech	---	---	---	<.1	---	---	<4	---	---	---	---	splice site AG3' |(24)
Wisconsin (312)		---	---	---	<.1	---	---	<4	---	---	---	---	1177G (312)
Calvo Mackenna (313)		---	---	---	<.1	---	---	<4	---	---	---	---	1138G (313)
Riley (314)		---	---	---	<.1	---	---	<4	---	---	---	---	1139C (314)
Bari (315)	Italian	---	---	---	<.1	---	---	<4	---	---	---	---	1187T (315)
Urayasu (98)	Japanese	---	---	---	7.5	40	4	<4	60	Norm	Norm	4.4	281-283AGA del (98)

Chikugo (316)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	535T (316)
Honiara (317)	Melanesian	---	---	---	<.1	---	---	<4	---	---	---	---	
Seoul (316)	Korean	---	---	---	<.1	---	---	<4	---	---	---	---	916A (316)
Fukaya (316)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	1462A (316)
Kozukata (318)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	159C (318)
Kamogawa (318)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	169T (318)
Osaka (318)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	853T (318)
Nankang (319)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	517C(319)
Cairo (320)		---	---	---	<.1	---	---	<4	---	---	---	---	404C(320)
Malaga (321)		---	---	---	<.1	---	---	<4	---	---	---	---	542T(321)
Wexham (305)	English	---	---	---	<.1	---	---	10	17	---	---	---	833T(305)
Anadia (322)		---	---	---	<.1	---	---	<4	---	---	---	---	1193G(322)
Omiya (323)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	921C(323)
Harima (323)	Japanese	---	---	---	11	---	---	<4	---	---	---	---	1358A(323)
Iwatsuki (323)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	1081A(323)
Miaoli (324)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	519G (325)
Keelung (324)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	1387T (325)
Valladolid (326)	Spanish	---	---	---	<.1	---	---	<4	---	---	---	---	406T (326)
Girona (326)	Spanish	---	---	---	<.1	---	---	<4	---	---	---	---	1159G (326)
Lages (327)	Portuguese	---	---	---	<.1	---	---	<4	---	---	---	---	40A(327)

Farroupilha (327)	Portuguese	---	---	---	<.1	---	---	<4	---	---	---	---	977A (327)
Hartford (328)	White American	---	---	---	<.1	---	---	<4	---	---	---	---	1162G (328)
Gidera-1 (86)		---	---	---	<.1	---	---	<4	---	---	---	---	110C (86)
North Dallas (329)	Afro-American	---	---	---	<.1	---	---	<4	---	---	---	---	683-685|del (329)
Gidra-2 (86)		---	---	---	<.1	---	---	<4	---	---	---	---	849A (86)
Ludhiana (330)	Indian (Punjabi)	---	---	---	<.1	---	---	<4	---	---	---	---	929A (331). May also be class 3
Manhattan (328)		---	---	---	<.1	---	---	<4	---	---	---	---	962A (328)
Mira D'Aire (332)	Portuguese	---	---	---	<.1	---	---	<4	---	---	---	---	1048C (332)
Serres (333)	Greek	---	---	---	<.1	---	---	<4	---	---	---	---	1082T (333)
Lynwood (328)	Hispanic	---	---	---	<.1	---	---	<4	---	---	---	---	1154T (328)
Abeno (86)		---	---	---	<.1	---	---	<4	---	---	---	---	1220C (86)
Kawasaki (86)		---	---	---	<.1	---	---	<4	---	---	---	---	1229C (86)
Kalo (334)		---	---	---	<.1	---	---	<4	---	---	---	---	1360T (334)
Bangkok Noi (335)		---	---	---	<.1	---	---	<4	---	---	---	---	1376T/1502T (335)
Torun (336)	Polish	---	---	---	<.1	---	---	<4	---	---	---	---	1006G (336)
Sumare (337)		---	---	---	13	---	---	<4	---	---	---	---	1292G (337)
Rehovot (338)	Ethiopian/Jewish	---	---	---	<.1	---	---	<4	---	---	---	---	964C (338)
Sugao (339)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	826C->T (339)
Tenri (340)	Japanese	---	---	---	<.1	---	---	<4	---	---	---	---	1096A->G (340)

Surabaya (341)	Chinese	---	---	---	<.1	---	---	<4	---	---	---	---	1291G->A (341)
Aveiro (342)	Portugese	---	---	---	<.1	---	---	<4	---	---	---	---	806A (342)
_ ---	<4	---	---										

Reference List

1. **Elizondo J, Saenz GF, Paez CA, et al.: G6PD-Puerto Limon: A new deficient variant of glucose-6-phosphate dehydrogenase associated with congenital nonspherocytic hemolytic anemia. *Hum Genet* 62:110, 1982.**
2. **Beutler E, Kuhl W, Sáenz GF, Rodriguez W: Mutation analysis of G6PD variants in Costa Rica. *Hum Genet* 87:462, 1991.**
3. **Kahn A, Boulard M, Hakim J, Schaison G, Boivin P, Bernard J: Anémie hémolytique congénitale non sphérocytaire par déficit en glucose-6-phosphate-déshydrogénase érythrocytaire. Description de deux nouvelles variantes:Gd (-) Saint Louis (Paris) et Gd (-) Hayem. *Nouv Rev Fr Hematol* 14:587, 1974.**
4. **Takahashi K, Fujii H, Takegawa S, et al.: A new glucose-6-phosphate dehydrogenase variant (G6PD Nagano) associated with congenital hemolytic anemia. *Hum Genet* 62:368, 1982.**
5. **Junien C, Kaplan JC, Meienhofer MC, Maigret P, Sender A: G 6 PD Baudelocque: A new unstable variant characterized in cultured fibroblasts. *Enzyme* 18:48, 1974.**
6. **Nakai T, Yoshida A: G6PD Heian, a glucose-6-phosphate dehydrogenase variant associated with hemolytic anemia found in Japan. *Clin Chim Acta* 51:199, 1974.**
7. **Fujii H, Miwa S, Takegawa S, et al.: Gd(-) Gifu and Gd(-) Fukuoka. Two new variants of glucose-6-phosphate dehydrogenase found in Japan. *Hum Genet* 66:276, 1984.**
8. **Kahn A, Dao C, Cottreau D, Bilski-Pasquier G: 'GD (-) Hotel Dieu': A new G-6PD variant with chronic hemolysis in a negro patient from Senegal. *Hum Genet* 39:353, 1977.**
9. **Smith JW, Beutler E: *Unpublished* 1981.**
10. **Honig GR, Habacon E, Vida LN, Matsumoto F, Beutler E: Three new variants of glucose-6-phosphate dehydrogenase associated with chronic nonspherocytic hemolytic anemia: G-6-PD Lincoln Park, G-6-PD Arlington Heights, and G-6-PD West Town. *Am J Hematol* 6:353, 1979.**
11. **Ravindranath Y, Beutler E: Two new variants of glucose-6-phosphate dehydrogenase associated with congenital non-spherocytic hemolytic anemia: G6PD Wayne and G6PD Huron. *Am J Hematol* 24:357, 1987.**
12. **Beutler E, Prchal JT, Westwood B, Kuhl W: Definition of the mutations of G6PD Wayne, G6PD Viangchan, G6PD Jammu and G6PD "LeJeune". *Acta Haematol (Basel)* 86:179, 1991.**
13. **Beutler E, Grooms AM, Morgan SK, Trinidad F: Chronic severe hemolytic anemia due to G-6-PD Charleston: A new deficient variant. *J Pediatr* 80:1005, 1972.**
14. **Grossman A, Ramanathan K, Justice P, Gordon J, Shahidi NT, Hsia D: Congenital nonspherocytic hemolytic anemia associated with erythrocyte G-6-PD deficiency in a negro family. *Pediatrics* 37:624, 1966.**
15. **Prchal JT, Crist WM, Malluh A, Vitek A, Tauxe WN, Carroll AJ: A new glucose-6-phosphate dehydrogenase deficient variant in a patient with Chediak-Higashi Syndrome. *Blood* 56:476, 1980.**
16. **Beutler E, Kuhl W: The NT 1311 polymorphism of G6PD: G6PD Mediterranean mutation may have originated independently in Europe and Asia. *Am J Hum Genet***

47:1008, 1990.
17. Estrada M, Garcia M, Gutierrez A, Quintero I, Gonzalez R: G6PD Varadero. *Vox Sang* 43:102, 1982.
18. Feldman R, Gromisch DS, Luhby AL, Beutler E: Congenital nonspherocytic hemolytic anemia due to glucose-6-phosphate dehydrogenase East Harlem: A new deficient variant. *J Pediatr* 90:89, 1977.
19. Tanaka KR, Beutler E: Hereditary hemolytic anemia due to glucose-6-phosphate dehydrogenase Torrance: A new variant. *J Lab Clin Med* 73:657, 1969.
20. Howell EB, Nelson AJ, Jones OW: A new G-6-PD variant associated with chronic non-spherocytic haemolytic anaemia in a negro family. *J Med Genet* 9:160, 1972.
21. Vives-Corrons JL, Feliu E, Pujades MA, Rozman C, Carreras A, Vallespi MT: Severe glucose-6-phosphate dehydrogenase (G 6 PD) deficiency associated with chronic hemolytic anemia, granulocyte dysfunction and increased susceptibility to infections. Description of a new molecular variant (G 6 PD Barcelona). *Blood* 59:428, 1982.
22. Vaca G, Ibarra B, Romero F, Olivares N, Cantu JM, Beutler E: G-6-PD Guadalajara: A new mutant associated with chronic non-spherocytic hemolytic anemia. *Hum Genet* 61:175, 1982.
23. Beutler E, Westwood B, Prchal J, Vaca G, Bartsocas CS, Baronciani L: New glucose-6-phosphate dehydrogenase mutations from various ethnic groups. *Blood* 80:255, 1992.
24. Xu W, Westwood B, Bartsocas CS, Malcorra-Azpiazu JJ, Indrák K, Beutler E: Glucose-6 phosphate dehydrogenase mutations and haplotypes in various ethnic groups. *Blood* 85:257, 1995.
25. Thigpen JT, Steinberg MH, Beutler E, Gillespie GTJr, Dreiling BJ, Morrison FS: Glucose-6-phosphate dehydrogenase Jackson. A new variant associated with hemolytic anemia. *Acta Haematol (Basel)* 51:310, 1974.
26. Fairbanks VF, Nepo AG, Beutler E, Dickson ER, Honig G: Glucose-6-phosphate dehydrogenase variants: Reexamination of G6PD Chicago and Cornell and a new variant (G6PD Pea Ridge) resembling G6PD Chicago. *Blood* 55:216, 1980.
27. Alperin JB, Mills GC: New variants of glucose-6-phosphate dehydrogenase: G6PD Kilgore and G6PD Galveston. *Tex Rep Biol Med* 31:727, 1973.
28. Beutler E, Forman L: *Unpublished* 1990.
29. Beutler E, Kuhl W, Gelbart T, Forman L: DNA sequence abnormalities of human glucose-6-phosphate dehydrogenase variants. *J Biol Chem* 266:4145, 1991.
30. Chan TK, Todd D, Lai MCS: Glucose 6-phosphate dehydrogenase: Identity of erythrocyte and leukocyte enzyme with report of a new variant in Chinese. *Biochem Genet* 6:119, 1972.
31. Ramot B, Ben-Bassat I, Shchory M: New glucose-6-phosphate dehydrogenase variants observed in Israel and their association with congenital nonspherocytic hemolytic disease. *J Lab Clin Med* 74:895, 1969.
32. Beutler E, Mathai CK, Smith JE: Biochemical variants of glucose-6-phosphate dehydrogenase giving rise to congenital nonspherocytic hemolytic disease. *Blood* 31:131, 1968.
33. Talalak P, Beutler E: G-6-PD Bangkok: A new variant found in congenital nonspherocytic hemolytic disease (CNHD). *Blood* 33:772, 1969.
34. Kirkman HN, Riley HDJr: Congenital nonspherocytic hemolytic anemia. *Am J Dis Child* 102:313, 1961.
35. Wong PWK, Shih LY, Hsia DYY: Characterization of glucose-6-phosphate dehydrogenase among Chinese. *Nature* 208:1323, 1965.
36. Necheles TF, Snyder LM, Strauss W: Glucose-6-phosphate dehydrogenase Boston. A new variant associated with congenital nonspherocytic hemolytic disease. *Humangenetik* 13:218, 1971.
37. Rattazzi MC, Corash LM, Van Zanen GE, Jaffe ER, Piomelli S: G6PD deficiency and chronic hemolysis: Four new mutants--relationships between clinical syndrome and enzyme kinetics. *Blood* 38:205, 1971.
38. 38. Beutler E, Matsumoto F: *Unpublished* 1975.
39. Miller DR, Wollman MR: A new variant of glucose-6-phosphate dehydrogenase deficiency hereditary hemolytic anemia, G6PD Cornell: Erythrocyte, leukocyte, and platelet studies. *Blood* 44:323, 1974.
40. Miwa S, Ono J, Nakashima K, et al.: Two new glucose 6-phosphate dehydrogenase variants associated with congenital nonspherocytic hemolytic anemia found in Japan: Gd(-) Tokushima and Gd(-) Tokyo. *Am J Hematol* 1:433, 1976.
41. Wilson WW: Congenital hemolytic anemia due to deficiency of glucose-6-phosphate dehydrogenase. *Rocky Mt Med J* 73:160, 1976.

42. Gahr M, Schröter W, Sturzenegger M, Bornhalm D, Marti HR: Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency in Switzerland. *Helv Paediatr Acta* 31:159, 1976.
43. Vuopio P, Harkonen R, Johnsson R, Nuutinen M: Red cell glucose-6-phosphate dehydrogenase deficiency in Finland. *Ann Clin Res* 5:168, 1973.
44. Shatskaya TL, Krasnopolskaya KD, Idelson LI: The new form of glucose-6-phosphate dehydrogenase (G6PD "Kaluga") from erythrocytes of a patient with chronic non-spherocytic hemolytic anemia. *Vopr Med Khim* 22:764, 1976.
45. Tokarev YN, Chernyak NB, Batishchev AI, Lamzina NV, Alexeyev GA: Étude des propriétés électrophorétiques et cinétiques de la glucose-6-phosphate déshydrogénase (Gd) d'érythrocytes dans les déficits héréditaires de l'enzyme. Description d'une nouvelle variante de glucose-6-phosphate deshydrogenase: la Gd Kremenchug. *Nouv Rev Fr Hematol* 20:557, 1978.
46. Miwa S, Fujii H, Nakashima K, et al.: Three new electrophoretically normal glucose-6-phosphate dehydrogenase variants associated with congenital nonspherocytic hemolytic anemia found in Japan: G6PD Ogikubo, Yokohama, and Akita. *Hum Genet* 45:11, 1978.
47. Prchal J, Moreno H, Conrad M, Vitek A: G-6-PD Dothan: A new variant associated with chronic hemolytic anemia. *IRCS* 7:348, 1979.
48. McCann SR, Smithwick AM, Temperley IJ, Tipton K: G6PD (Dublin): Chronic non-spherocytic haemolytic anaemia resulting from glucose-6-phosphate dehydrogenase deficiency in an Irish kindred. *J Med Genet* 17:191, 1980.
49. Gahr M, Schröter W: Glucose-6-phosphate dehydrogenase (G-6-PD) Hamburg, a new variant with chronic nonspherocytic haemolytic anaemia. *Eur J Clin Invest* 4:187, 1974.
50. Kojima H: Congenital nonspherocytic hemolytic disease (CNHD) due to a G-6-PD variant: G-6-PD Kyoto. *Acta Haematol Jpn* 35:32, 1972.
51. Fujii H, Miwa S, Tani K, et al.: Glucose-6-phosphate dehydrogenase variants: A unique variant (G6PD Kobe) showed an extremely increased affinity for galactose 6-phosphate and a new variant (G6PD Sapporo) resembling G6PD Pea Ridge. *Hum Genet* 58:405, 1981.
52. Chiu DTY, Zuo L, Chen E, et al.: Two commonly occurring nucleotide base substitutions in Chinese G6PD variants. *Biochem Biophys Res Commun* 180:988, 1991.
53. Streiff F, Vigneron C: Chronic haemolytic anemia due to a defect of glucose-6-phosphate dehydrogenase (G6PD) in a Lorraine family. Demonstration of a new type of the enzyme: Gd(-) Nancy. *Nouv Rev Fr Hematol* 11:279, 1971.
54. Kitao T, Ito K, Hattori K, Matsuki T, Yoneyama Y: G6PD Kanazawa: A new variant of glucose-6-phosphate dehydrogenase associated with congenital nonspherocytic hemolytic anemia. *Acta Haematol (Basel)* 68:131, 1982.
55. Krasnopolskaia KD, Bochkov NP: Genetic heterogeneity of hereditary enzymopathies. *Vestn Akad Med Nauk SSSR* 9:56, 1982.
56. Eber SW, Gahr M, Schröter W: Glucose-6-phosphate dehydrogenase (G6PD) Iserlohn and G6PD Regensburg: Two new severe enzyme defects in German families. *Blut* 51:109, 1985.
57. Beutler E, Forman L, del Alarcon PA: *Unpublished* 1986.
58. Hirono A, Kuhl W, Gelbart T, Forman L, Fairbanks VF, Beutler E: Identification of the binding domain for $NADP^+$ of human glucose-6-phosphate dehydrogenase by sequence analysis of mutants. *Proc Natl Acad Sci USA* 86:10015, 1989.
59. Beutler E, Forman L, Miale T: *Unpublished* 1988.
60. Vives-Corrons JL, Pujades A, Petit J, et al.: Chronic nonspherocytic hemolytic anemia (CNSHA) and glucose 6 phosphate dehydrogenase (G6PD) deficiency in a patient with familial amyloidotic polyneuropathy (FAP). Molecular study of a new variant (G6PD Clinic) with markedly acidic pH optimum. *Hum Genet* 81:161, 1989.
61. Rovira A, Vulliamy T, Pujades MA, Luzzatto L, Corrons JLV: Molecular genetics of glucose-6-phosphate dehydrogenase (G6PD) deficiency in Spain: Identification of two new point mutations in the G6PD gene. *Br J Haematol* 91:66, 1995.
62. Beutler E, Forman L, Jackman R: *Unpublished* 1989.
63. Beutler E, Forman L, Gelbart T, Means RT: *Unpublished* 1990.
64. Town M, Athanasiou-Metaxa M, Luzzatto L: Intragenic interspecific complementation of glucose-6-phosphate dehydrogenase in human-hamster cell hybrids. *Somat Cell Mol Genet* 16:97, 1990.
65. Poggi V, Town M, Foulkes NS, Luzzatto L: Identification of a single base change in a new human mutant glucose-6-phosphate dehydrogenase gene by polymerase-chain- reaction amplification of the entire coding region from genomic DNA. *Biochem J* 271:157, 1990.
66. Endo M, Takano T, Suzuki K, et al.: A new glucose-6-phosphate dehydrogenase variant (G6PD Morioka). *Rinsho Ketsueki* 28 (Suppl):377a (abstract), 1995.

67. Hirono A, Fujii H, Takano T, Chiba Y, Azuno Y, Miwa S: Molecular analysis of eight biochemically unique glucose-6- phosphate dehydrogenase variants found in Japan. *Blood* 89:4624, 1997.
68. Johnson GJ, Kaplan ME, Beutler E: G-6-PD Long Prairie: A new mutant exhibiting sensitivity to inhibition by NADPH and accompanied by nonspherocytic hemolytic anemia. *Blood* 49:247, 1977.
69. Beutler E, Forman L, Gelbart T: *Unpublished* 1985.
70. Beutler E, Forman L, Gelbart T, LeGrand SB: *Unpublished* 1989.
71. Cederbaum AI, Beutler E: Nonspherocytic hemolytic anemia due to G-6-PD Grand Prairie. *IRCS* 3:579, 1975.
72. Balinsky D, Gomperts E, Cayanis E, et al.: Glucose-6-phosphate dehydrogenase Johannesburg: A new variant with reduced activity in a patient with congenital non-spherocytic haemolytic anaemia. *Br J Haematol* 25:385, 1973.
73. Beutler E, Davis S, Forman L, Gelbart T: *Unpublished* 1985.
74. Kirkman HN, Rosenthal IM, Simon ER, Carson PE, Brinson AG: "Chicago I" variant of glucose-6-phosphate dehydrogenase in congenital hemolytic disease. *J Lab Clin Med* 63:715, 1964.
75. Beutler E, Matsumoto F, Daiber A: Nonspherocytic hemolytic anemia due to G-6-PD Panama. *IRCS* 2:1389, 1974.
76. Beutler E, Phyliky RL: *Unpublished* 1978.
77. Beutler E, Gelbart T, Forman L, Winkelmann J: *Unpublished* 1989.
78. Johnson GJ, Beutler E: *Unpublished* 1980.
79. Beutler E, Bedros AA: *Unpublished* 1984.
80. Beutler E, Hartman K, Gelbart T, Forman L: G-6-PD Walter Reed: Possible insight into "structural" NADP in G-6-PD. *Am J Hematol* 23:25, 1986.
81. Zimmerman S, Ware RE, Forman L, Westwood B, Beutler E: G6PD Durham: A *de novo* mutation associated with chronic hemolytic anemia. *Blood* 88(Suppl 1):307a, 1996.
82. Engstrom PF, Beutler E: G-6-PD Tripler: A unique variant associated with chronic hemolytic disease. *Blood* 36:10, 1970.
83. Beutler E, Gelbart T, Forman L, Fairbanks VF: *Unpublished* 1989.
84. Kidder WR, Beutler E: *Unpublished* 1979.
85. Morisaki T, Fujii H, Takegawa S, et al.: G6PD Sendagi: A new glucose-6-phosphate dehydrogenase variant associated with congenital hemolytic anemia. *Hum Genet* 65:214, 1983.
86. Hirono A, Fujii H, Miwa S: *Unpublished* 1997.
87. Beutler E, Gelbart T, Forman L: *Unpublished* 1988.
88. Filosa S, Calabrò V, Vallone D, et al.: Molecular basis of chronic non-spherocytic haemolytic anaemia: A new G6PD variant (393 Arg-->His) with abnormal K_m^{GPD} and marked instability. *Br J Haematol* 80:111, 1992.
89. Beutler E, Rosen R: Nonspherocytic congenital hemolytic anemia due to a new G-6-PD variant: G-6-PD Alhambra. *Pediatrics* 45:230, 1970.
90. Westring DW, Pisciotta AV: Anemia, cataracts, and seizures in patient with glucose-6-phosphate dehydrogenase deficiency. *Arch Intern Med* 118:385, 1966.
91. Picat C, Etiemble J, Boivin P, Le Prise PY: Gd(-) Rennes a new deficient variant of glucose-6-phosphate dehydrogenase associated with congenital nonspherocytic hemolytic anemia found in France. *Hum Genet* 55:125, 1980.
92. Beutler E, Keller JW, Matsumoto F: A new glucose-6-P dehydrogenase (G-6-PD) variant associated with nonspherocytic hemolytic anemia: G-6-PD Atlanta. *IRCS* 4:579, 1976.
93. Weinreich J, Busch D, Gottstein U, Schaefer J, Rohr J: Über zwei neue Fälle von hereditärer nichtsphärocytärer hämolytischer Anämie bei Glucose-6-phosphat-dehydrogenase-defekt in einer Nord Deutschen Familie. *Klin Wochenschr* 46:146, 1968.
94. Mentzer WCJr, Warner R, Addiego J, Smith B, Walter T: G6PD San Francisco: A new variant of glucose-6-phosphate dehydrogenase associated with congenital nonspherocytic hemolytic anemia. *Blood* 55:195, 1980.
95. Snyder LM, Necheles TF, Reddy WJ: G-6-PD Worcester: A new variant, associated with x-linked optic atrophy. *Am J Med* 49:125, 1970.
96. Beutler E, Kuhl W: *Unpublished* 1991.

97. Ogura H, Morisaki T, Tani K, et al.: A new glucose-6-phosphate dehydrogenase variant (G6PD Tsukui) associated with congenital hemolytic anemia. *Hum Genet* 78:369, 1988.
98. Hirono A, Fujii H, Miwa S: Identification of two novel deletion mutations in glucose- 6- phosphate dehydrogenase gene causing hemolytic anemia. *Blood* 85:1118, 1995.
99. Gaetani GF, Galiano S, Melani C, et al.: A new glucose-6-phosphate dehydrogenase variant with congenital nonspherocytic hemolytic anemia (G6PD Genova). Biochemical characterization and mosaicism expression in the heterozygote. *Hum Genet* 84:337, 1990.
100. Argusti A, Ahluwalia A, Mason P: *Unpublished* 1990.
101. Hirono A, Fujii H, Hirono K, Kanno H, Miwa S: Molecular abnormality of a Japanese glucose-6-phosphate dehydrogenase variant (G6PD Tokyo) associated with hereditary non- spherocytic hemolytic anemia. *Hum Genet* 88:347, 1992.
102. Vulliamy TJ, D'Urso M, Battistuzzi G, et al.: Diverse point mutations in the human glucose 6-phosphate dehydrogenase gene cause enzyme deficiency and mild or severe hemolytic anemia. *Proc Natl Acad Sci USA* 85:5171, 1988.
103. Hirono A, Nakayama S, Fujii H, Miwa S: Molecular abnormality of a unique Japanese glucose-6-phosphate dehydrogenase variant (G6PD Kobe) with a greatly increased affinity for galactose-6-phosphate. *Am J Hematol* 45:185, 1994.
104. Kanno H, Takano T, Fujii H, et al.: A new glucose-6-phosphate variant (G6PD Iwate) associated with congential non-spherocytic hemolytic anemia. *Acta Haematol Jpn* 51:715, 1988.
105. Pekrun A, Eber SW, Schröter W: G6PD Avenches and G6PD Moosburg: biochemical and erythrocyte membrane characterization. *Blut* 58:11, 1989.
106. Milner G, Delamore IW, Yoshida A: G-6-PD Manchester: A new variant associated with chronic nonspherocytic hemolytic anemia. *Blood* 43:271, 1974.
107. Chiba Y, Takizawa S, Kishi K, et al.: A new glucose 6-phosphate dehydrogenase (G6PD) variant (G6PD Niigata) with chronic hemolysis and liver hemochromatosis. *Jpn J Int Med* 78:41, 1989.
108. McCurdy PR. 1975;
109. Du CS, Xu YK, Hua XY, Wu QL, Liu LB: Glucose-6-phosphate dehydrogenase variants and polymorphic frequency in Guangdong, China. *Hum Genet* 80:385, 1988.
110. Castro GAM, Snyder LM: G6PD San Jose: A new variant characterized by NADPH inhibition studies. *Humangenetik* 21:361, 1974.
111. Yoshida A, Baur EW, Motulsky AG: A Philipino glucose-6-phosphate dehydrogenase variant (G6PD Union) with enzyme deficiency and altered substrate specificity. *Blood* 35:506, 1970.
112. Rovira A, Vulliamy TJ, Pujades A, Luzzatto L, Vives Corrons J-L: The glucose-6-phosphate dehydrogenase (G6PD) deficient variant G6PD Union (454 Arg-->Cys) has a worldwide distribution possibly due to recurrent mutation. *Hum Mol Genet* 3:833, 1994.
113. Vives-Corrons JL, Pujades A: Heterogeneity of Mediterranean type glucose-6-phosphate dehydrogenase (G-6-PD) deficiency in Spain and description of two new variants associated with Favism. *Hum Genet* 60:216, 1982.
114. Beutler E, Kuhl W, Vives-Corrons J-L, Prchal JT: Molecular heterogeneity of G6PD A-. *Blood* 74:2550, 1989.
115. Panich V, Na-Nakorn S: G-6-PD variants in Thailand. *J Med Assoc Thai* 63:537, 1980.
116. Perroni L, Tassara P, Baldi M, Reali R, Scartezzini P: G 6 PD variants detected in Genoa area, in *Advances in Red Blood Cell Biology*, p 409. Raven Press, Inc., New York, 1982.
117. Shatskaya TL, Krasnopolskaya KD, Annenkov GA: A description of new mutant forms of erythrocyte glucose-6-phosphate dehydrogenase isolated at the territory of the Soviet Union. *Genetika* 11:116, 1975.
118. Karadsheh NS, Awidi AS, Tarawneh MS: Two new glucose-6-phosphate dehydrogenase (G6PD) variants associated with hemolytic anemia: G6PD Amman-1 and G6PD Amman-2. *Am J Hematol* 22:185, 1986.
119. Kahn A, North ML, Messer J, Boivin P: G-6-PD "Ankara". A new G-6PD variant with deficiency found in a Turkish family. *Humangenetik* 27:247, 1975.
120. Carandina G, Moretto E, Zecchi G, Conighi C: Glucose-6-phosphate dehydrogenase Ferrara. A new variant of G-6-PD identified in Northern Italy. *Acta Haematol (Basel)* 56:116, 1976.
121. Cappellini MD, Sampietro M, Toniolo D, et al.: G6PD Ferrara I has the same two mutations as G6PD A(-) but a distinct biochemical phenotype. *Hum Genet* 93:139, 1994.
122. Pawlak AL, Zagorski Z, Rozynkowa D, Horst A: Polish variant of glucose-6-phosphate dehydrogenase (G-6-PD Lublin). *Humangenetik* 10:340, 1970.

123. McCurdy PR, Blackwell RQ, Todd D, Tso SC, Tuchinda S: Further studies on glucose-6-phosphate dehydrogenase deficiency in Chinese subjects. *J Lab Clin Med* 75:788, 1970.
124. Kirkman HN, Kidson C, Kennedy M: Variants of human glucose-6-phosphate dehydrogenase. Studies of samples from New Guinea, in *Hereditary Disorders of Erythrocyte Metabolism*, p 126. Grune & Stratton, Inc., New York, 1968.
125. Calabrò V, Giacobbe A, Vallone D, et al.: Genetic heterogeneity at the glucose-6-phosphate dehydrogenase locus in southern Italy: A study on a population from the Matera district. *Hum Genet* 86:49, 1990.
126. Panich V, Bumrungtrakul P, Jitjai C, et al.: Glucose-6-phosphate dehydrogenase deficiency in South Vietnamese. *Hum Hered* 30:361, 1980.
127. Panich V, Na-Nakorn S, Wasi P: G-6-PD variants in Chinese in Thailand. *Southeast Asian J Trop Med Public Health* 11:250, 1980.
128. Chockkalingam K, Board PG, Nurse GT: Glucose-6-phosphate dehydrogenase deficiency in Papua New Guinea. The description of 13 new variants. *Hum Genet* 60:189, 1982.
129. Calabrò V, Mason PJ, Filosa S, et al.: Genetic heterogeneity of glucose-6-phosphate dehydrogenase deficiency revealed by single-strand conformation and sequence analysis. *Am J Hum Genet* 52:527, 1993.
130. Prchal JT, Harmon WA, Hall KB: Gilbert's syndrome associated with new variant of G6PD deficiency: G6PD-Pawnee. *Unpublished* 1985.
131. Kahn A, Hakim J, Cottreau D, Boivin P: Gd (-) Matam, an African glucose-6-phosphate dehydrogenase variant with enzyme deficiency. Biochemical and immunological properties in various hemopoietic tissues. *Clin Chim Acta* 59:183, 1975.
132. Stamatoyannopoulos G, Voigtlander V, Kotsakis P, Akrivakis A: Genetic diversity of the "Mediterranean" glucose-6-phosphate dehydrogenase deficiency phenotype. *J Clin Invest* 50:1253, 1971.
133. Ganczakowski M, Town M, Bowden DK, et al.: Multiple glucose 6-phosphate dehydrogenase-deficient variants correlate with malaria endemicity in the Vanuatu archipelago (southwestern Pacific). *Am J Hum Genet* 56:294, 1995.
134. Vives-Corrons J-L, Kuhl W, Pujades MA, Beutler E: Molecular genetics of G6PD Mediterranean variant and description of a new G6PD mutant, G6PD Andalus^{1361A}. *Am J Hum Genet* 47:575, 1990.
135. Kirkman HN, Luan-Eng L-I: Variants of glucose 6 phosphate dehydrogenase in Indonesia. *Nature* 221:959, 1969.
136. McCurdy PR, Mahmood L: Red cell glucose-6-phosphate dehydrogenase deficiency in Pakistan. *J Lab Clin Med* 76:943, 1970.
137. Kirkman HN, Schettini F, Pickard BM: Mediterranean variant of glucose-6-phosphate dehydrogenase. *J Lab Clin Med* 63:726, 1964.
138. Shatskaya TL, Krasnopolskaya KD, Tzoneva M, Mavrudieva M, Toncheva D: Variants of erythrocyte glucose-6-phosphate dehydrogenase (G6PD) in Bulgarian populations. *Hum Genet* 54:115, 1980.
139. McCurdy PR, Kamel K, Selim O: Heterogeneity of red cell glucose-6-phosphate dehydrogenase (G-6-PD) deficiency in Egypt. *J Lab Clin Med* 84:673, 1974.
140. Geerdink RA, Horst R, Staal GEJ: An Iraqi Jewish family with a new red cell glucose-6-phosphate dehydrogenase variant (Gd-Bagdad) and kernicterus. *Isr J Med Sci* 9:1040, 1973.
141. Kahn A, Bernard J-F, Cottreau D, Marie J, Boivin P: Gd(-)Abrami. A deficient G-6PD variant with hemizygous expression in blood cells of a woman with primary myelofibrosis. *Humangenetik* 30:41, 1975.
142. Gahr M, Bornhalm D, Schröter W: Haemolytic anaemia due to glucose-6-phosphate dehydrogenase (G6PD) deficiency: Demonstration of two new biochemical variants, G6PD Hamm and G6PD Tarsus. *Br J Haematol* 33:363, 1976.
143. Miwa S, Nakashima K, Ono J, Fujii H, Suzuki E: Three glucose 6-phosphate dehydrogenase variants found in Japan. *Hum Genet* 36:327, 1977.
144. Beutler E: Glucose-6-phosphate dehydrogenase deficiency: A new Indian variant, G-6-PD Jammu, in *Trends in Haematology*, p 279. K.P. Bagchi & Co., Calcutta, 1976.
145. Gahr M, Bornhalm D, Schröter W: Biochemische Eigenschaften einer neuen Variante des glucose-6- phosphatdehydrogenase (G-6-PD)-Mangels mit Favismus: G-6-PD Bielefeld. *Klin Wochenschr* 55:379, 1977.
146. Benabadji M, Merad F, Benmoussa M, et al.: Heterogeneity of glucose-6-phosphate dehydrogenase deficiency in Algeria. *Hum Genet* 40:177, 1978.
147. Testa U, Meloni T, Lania A, Battistuzzi G, Cutillo S, Luzzatto L: Genetic heterogeneity of glucose 6-phosphate dehydrogenase deficiency in Sardinia. *Hum Genet* 56:99, 1980.

148. De Vita G, Alcalay M, Sampietro M, Cappellini MD, Fiorelli G, Toniolo D: Two point mutations are responsible for G6PD polymorphism in Sardinia. *Am J Hum Genet* 44:233, 1989.
149. Kahn A, Boivin P, Hakim J, Lagneau J: Heterogeneite des glucose-6-phosphate deshydrogenase erythrocytaire deficitaires dans la race noire. Etude cinetique et description de deux nouvelles variantes Gd (-) Dakar et Gd (-) Mali. *Nouv Rev Fr Hematol* 11:741, 1971.
150. Benöhr HC, Waller HD, Arnold H, Blume KG, Löhr GW: Glucose-6-P-dehydrogenase Typ Bodensee (eine neue Enzymvariante). *Klin Wochenschr* 49:1058, 1971.
151. Yermakov N, Tokarev J, Chernjak N, et al.: New stable mutant Gd(-) variants: G6PD Tashkent and G6PD Nucus. Molecular basis of hereditary enzyme deficiency. *Acta Biol Med Ger* 40:559, 1981.
152. Mills GC, Alperin JB, Trimmer KB: Studies on variant glucose-6-phosphate dehydrogenases: G6PD Fort Worth. *Biochem Med* 13:264, 1975.
153. Batischev AI, Chernyak NB, Torakev YN: Detection of a new abnormal variant of glucose-6-phosphate dehydrogenase in human red cells. *Bull Eksperimental' Noi Bi* 84:728, 1977.
154. Vuopio P, Harkonen M, Helske T, Naeveri H: Red cell glucose-6-phosphate dehydrogenase deficiency in finland. Characterization of a new variant with severe enzyme deficiency. *Scand J Haematol* 15:145, 1975.
155. Morelli A, Benatti U, Guida L, De Flora A: G-6-PD Cagliari: A new low activity glucose-6-phosphate dehydrogenase variant characterized by enhanced intracellular lability. *Hum Genet* 66:62, 1984.
156. Toncheva D, Tzoneva M: Genetic polymorphism of G6PD in a Bulgarian population. *Hum Genet* 67:340, 1984.
157. Du CS, Xu YK, Wu QL, Liu LB, Wu M: Studies on erythrocyte glucose-6-phosphate dehydrogenase variants in Chinese. III. Gd(-) Miaozu-Baisha. *Acta Genet Sinica* 11:153, 1984.
158. Poon M-C, Hall K, Scott CW, Prchal JT: G6PD Viangchan: A new glucose 6-phosphate dehydrogenase variant from Laos. *Hum Genet* 78:98, 1988.
159. Koliakos G, Kalomenopoulou M, Grammatikos P, et al.: A new glucose 6-phosphate dehydrogenase variant (G6PD Thessaloniki) in a patient with idiopathic myelofibrosis. *Hum Hered* 39:141, 1989.
160. Fenu MP, Finazzi G, Manoussakis C, Palomba V, Fiorelli G: Glucose-6-phosphate dehydrogenase deficiency: Genetic heterogeneity in Sardinia. *Ann Hum Genet* 46:105, 1982.
161. Corcoran CM, Calabrò V, Tamagnini G, et al.: Molecular heterogeneity underlying the G6PD Mediterranean phenotype. *Hum Genet* 88:688, 1992.
162. Shatskaya TL, Krasnopolskaya KD, Idelson LJ: Mutant forms of erythrocyte glucose-6-phosphate dehydrogenase in Ashkenazi. Description of two new variants: G6PD Kirovograd and G6PD Zhitomir. *Hum Genet* 33:175, 1976.
163. Vergnes H, Yoshida A, Gourdin D, Gherardi M, Bierme R, Ruffie J: Glucose-6-phosphate dehydrogenase Toulouse. A new variant with marked instability and severe deficiency discovered in a family of Mediterranean ancestry. *Acta Haematol (Basel)* 51:240, 1974.
164. Saenz GF, Chaves M, Berrantes A, Elizondo J, Montero AG, Yoshida A: A glucose-6-phosphate dehydrogenase variant, Gd(-) Santamaria found in Costa Rica. *Acta Haematol (Basel)* 72:37, 1984.
165. Krasnopolskaya KD, Shatskaya TL, Filippov IK, et al.: Genetic heterogeneity of G 6 PD deficiency: Study of mutant alleles in Shekii district of Azerbaijan. *Genetika* 13:984, 1977.
166. Beutler E, Frenkel EP, Forman L: *Unpublished* 1987.
167. Fernandez M, Fairbanks VF: Glucose-6-phosphate dehydrogenase deficiency in the Philippines: Report of a new variant-- G 6 PD Panay. *Mayo Clin Proc* 43:645, 1968.
168. Shatskaya TL, Krasnopolskaya KD, Zakharova TV: Regularities of distribution of Gd- alleles in Azerbaijan. III. Identification of G 6 PD mutant forms. *Genetika* 16:2217, 1980.
169. Takizawa T, Fujii H, Takagawa S, et al.: A unique electrophoretic slow-moving glucose 6-phosphate dehydrogenase variant (G6PD Asahikawa) with a markedly acidic pH optimum. *Hum Genet* 68:70, 1984.
170. Pawlak AL, Mazurkiewicz CA, Ordynski J, Rozynkowa D, Horst A: G-6-PD Poznan, variant with severe enzyme deficiency. *Humangenetik* 28:163, 1975.
171. Nakashima K. 1978;
172. Kahn A, Esters A, Habedank M: Gd(-)Aachen, a new variant of deficient glucose-6-phosphate dehydrogenase. *Hum Genet* 32:171, 1976.

173. Miwa S, Fujii H, Nakatsuji T, et al.: Four new electrophoretically slow-moving glucose 6-phosphate dehydrogenase variants associated with congenital nonspherocytic hemolytic anemia found in Japan: Gd(-) Kurume, Gd(-) Fukushima, Gd(-) Yamaguchi and Gd(-) Wakayama. *Am J Hematol* 5:131, 1978.
174. Colonna-Romano S, Iolascon A, Lippo S, Pinto L, Cutillo S, Battistuzzi G: Genetic heterogeneity at the glucose-6-phosphate dehydrogenase locus in southern Italy: A study on the population of Naples. *Hum Genet* 69:228, 1985.
175. Chockkalingam K, Board PG: Further evidence for heterogeneity of glucose-6-phosphate dehydrogenase deficiency in Papua New Guinea. *Hum Genet* 56:209, 1980.
176. Gonzalez R, Estrada M, Garcia M, Gutierrez A: G6PD Ciudad de la Habana: A new slow variant with deficiency found in a Cuban family. *Hum Genet* 55:133, 1980.
177. Azevedo E, Kirkman HN, Morrow AC, Motulsky AG: Variants of red cell glucose-6-phosphate dehydrogenase among Asiatic Indians. *Ann Hum Genet* 31:373, 1968.
178. Nsouly GM, Prchal JT: Characterization of a new G6PD variant and its associated oxidative damage. *Clin Res* 29:829, 1981.
179. Kwiatkowska J, Kacprzak-Bergman I: New erythrocyte glucose-6-phosphate dehydrogenase variant. *Acta Haematol (Basel)* 46:188, 1971.
180. Aksoy K, Yuregir GT, Dikmen N, Unlukurt I: Three new G6PD variants, G6PD Adana, G6PD Samandag, and G6PD Balcali in Cukurova, Turkey. *Hum Genet* 76:199, 1987.
181. Marks PA, Banks J, Gross R: Genetic heterogeneity of glucose-6-phosphate dehydrogenase deficiency. *Nature* 194:454, 1962.
182. Csepreghy M, Yeilding A, Lilly M, Scott CW, Prchal JT: Characterization of a new glucose-6-phosphate dehydrogenase variant: G6PD Central City. *Am J Hematol* 28:61, 1988.
183. Hirono A, Beutler E: Molecular cloning and nucleotide sequence of cDNA for human glucose-6-phosphate dehydrogenase variant A(-). *Proc Natl Acad Sci USA* 85:3951, 1988.
184. Lisker R, Perez-Briceno R, Beutler E: A new glucose-6-phosphate dehydrogenase variant, Gd(-) Tepic, characterized by moderate enzyme deficiency and mild episodes of hemolytic anemia. *Hum Genet* 69:19, 1985.
185. Beutler E, Kuhl W, Ramirez E, Lisker R: Some Mexican glucose-6-phosphate dehydrogenase (G-6-PD) variants revisited. *Hum Genet* 86:371, 1991.
186. Panich V: G-6-PD variants in Laotians. *Hum Hered* 24:285, 1974.
187. McCurdy PR, Maldonado N, Dillon DE, Conrad ME: Variants of glucose-6-phosphate dehydrogenase (G-6-PD) associated with G-6-PD deficiency in Puerto Ricans. *J Lab Clin Med* 82:432, 1973.
188. Yoshida A, Stamatoyannopoulos G, Motulsky A: Negro variant of glucose-6-phosphate dehydrogenase deficiency (A-) in man. *Science* 155:97, 1967.
189. Chao L, Du C-S, Louie E, et al.: A to G substitution identified in exon 2 of the G6PD gene among G6PD deficient Chinese. *Nucl Acids Res* 19:6056, 1991.
190. Prchal JT, Hall K, Csepreghy M, Lilly M, Berkow R, Scott CW: Two apparent glucose-6-phosphate dehydrogenase variants in normal XY man: G6PD Alabama. *Am J Med* 84:517, 1988.
191. Beutler E, Lisker R, Kuhl W: Molecular biology of G6PD variants. *Biomed Biochim Acta* 49:236, 1990.
192. Kageoka T, Satoh C, Goriki K, et al.: Electrophoretic variants of blood proteins in Japanese IV. Prevalence and enzymological characteristics of G6PD variants in Hiroshima and Nagasaki. *Hum Genet* 70:101, 1985.
193. Kissin C, Cotte J: Etude d'un variant de glucose-6-phosphate deshydrogenase: Le type Constantine. *Enzyme* 11:277, 1970.
194. Crookston JH, Yoshida A, Lin M, Booser DJ: G 6 PD Toronto. *Biochem J* 8:259, 1973.
195. Nakashima K, Ono J, Abe S, Miwa S, Yoshida A: G6PD Ube, a glucose-6-phosphate dehydrogenase variant found in four unrelated Japanese families. *Am J Hum Genet* 29:24, 1977.
196. Hirono A, Fujii H, Miwa S: Molecular abnormality of G6PD Konan and G6PD Ube, the most common glucose-6-phosphate dehydrogenase variants in Japan. *Hum Genet* 91:507, 1993.
197. Rattazzi MC, Lenzerini L, Khan PM, Luzzatto L: Characterization of glucose-6-phosphate dehydrogenase variants. II. G6PD Kephalonia, G6PD Attica, and G6PD "Seattle-like" found in Greece. *Am J Hum Genet* 21:154, 1969.
198. Othieno-Obel A: East African variant of glucose-6-phosphate dehydrogenase. *East Afr Med J* 49:230, 1972.
199. Vergnes H, Riber A, Bommelaer G, Amadieu J, Brun H: Gd(-) Muret and Gd(-) Colomiers, two new variants of glucose-6-phosphate dehydrogenase associated with favism. *Hum Genet* 57:332, 1981.
200. Vergnes H, Gherardi M, Yoshida A: G6PD Lozere and Trinacria-like. Segregation of two non hemolytic variants in a French family. *Hum Genet* 34:293, 1976.

201. Reys L, Manso C, Stamatoyannopoulos G: Genetic studies on Southeastern Bantu of Mozambique. I. Variants of glucose-6-phosphate dehydrogenase. *Am J Hum Genet* 22:203, 1970.
202. Lisker R, Briceno RP, Zavala C, Navarrete JI, Wessels M, Yoshida A: A glucose 6-phosphate dehydrogenase Gd (-) Castilla variant characterized by mild deficiency associated with drug induced hemolytic anemia. *J Lab Clin Med* 90:754, 1977.
203. Lisker R, Briceno RP, Agrilar L, Yoshida A: A variant glucose-6-phosphate dehydrogenase Gd (-) Chiapas. Associated with moderate enzyme deficiency and occasional hemolytic anemia. *Hum Genet* 43:81, 1978.
204. Nakatsuji T, Miwa S: Incidence and characteristics of glucose-6-phosphate dehydrogenase variants in Japan. *Hum Genet* 51:297, 1979.
205. Lisker R, Perez-Briceno R, Rave V, Yoshida A: Glucosa-6-Fosfato Deshidrogenasa Gd(-) Distrito Federal. Nueva variante asociada a deficiencia enzimatica moderada y anemia hemolitica ocasional. *Rev Invest Clin* 33:209, 1981.
206. Kaeda JS, Luzzatto L, Mason PJ: *Unpublished* 1996.
207. Kaplan JC, Rosa R, Seringe P, Hoeffel JC: Le polymorphisme genetique de la glucose-6-phosphate deshydrogenase erythrocytaire chez l'homme. *Enzyme* 8:332, 1967.
208. Gutierrez A, Garcia M, Estrada M, Quintero I, Gonzalez R: Glucose-6-phosphate dehydrogenase (G6PD) Guantanamo and G6PD Caujeri: Two new glucose-6-phosphate dehydrogenase-deficient variants found in Cuba. *Biochem Genet* 25:231, 1987.
209. Stamatoyannopoulos G. 1975;
210. Kirkman HN, Ramot B, Lee JT: Altered aggregational properties in a genetic variant of human glucose-6-phosphate dehydrogenase. *Biochem Genet* 3:137, 1969.
211. McCurdy PR, Kirkman HN, Naiman JL, Jim RTS, Pickard BM: A Chinese variant of glucose-6-phosphate dehydrogenase. *J Lab Clin Med* 67:374, 1966.
212. Stevens DJ, Wanachiwanawin W, Mason PJ, Vulliamy TJ, Luzzatto L: G6PD Canton a common deficient variant in South East Asia caused by a 459 Arg-->Leu mutation. *Nucl Acids Res* 18:7190, 1990.
213. Ninfali P, Baronciani L, Ruzzo A, et al.: Molecular analysis of G6PD variants in northern Italy: A study on the population from the Ferrara district. *Hum Genet* 92:139, 1993.
214. Vaca G, Ibarra B, Garcia-Cruz D, et al.: G-6-PD Jalisco and G-6-PD Morelia: Two new Mexican variants. *Hum Genet* 71:82, 1985.
215. Mandelli F, Amadori S, De Laurenzi A, Kahn A, Isacchi G, Papa G: Glucose-6-phosphate dehydrogenase Velletri. *Acta Haematol (Basel)* 57:121, 1977.
216. Panich V, Sungnate T: Characterization of glucose-6-phosphate dehydrogenase in Thailand. *Humangenetik* 18:39, 1973.
217. Sansone G, Perroni L, Yoshida A: Glucose-6-phosphate dehydrogenase variants from Italian subjects associated with severe neonatal jaundice. *Br J Haematol* 31:159, 1975.
218. Panich V, Sungnate T, Wasi P, Na-Nakorn S: G-6-PD Mahidol. The most common glucose-6-phosphate dehydrogenase variant in Thailand. *J Med Assoc Thai* 55:576, 1972.
219. Vulliamy TJ, Wanachiwanawin W, Mason PJ, Luzzatto L: G6PD Mahidol, a common deficient variant in South East Asia is caused by a (163)glycine-->serine mutation. *Nucl Acids Res* 17:5868, 1989.
220. Panich V, Sungnate T, Na-Nakorn S: Acute intravascular hemolysis and renal failure in a new glucose-6- phosphate dehydrogenase variant: G-6-PD Siriraj. *J Med Assoc Thai* 55:726, 1972.
221. Pinto PVC, Newton WAJr, Richardson KE: Evidence for four types of erythrocyte glucose-6-phosphate dehydrogenase from G-6-PD deficient human subjects. *J Clin Invest* 45:823, 1966.
222. Kahn A, Boivin P, Lagneau J: Etude cinetique et thermodynamique de la glucose-6-phosphate- deshydrogenase erythrocytaire chez l'homme. Application a 7 variantes differentes de la race noire. *Biochim Biophys Acta* 54:775, 1972.
223. Cayanis E, Gomperts ED, Balinsky D, Disler P, Myers A: G6PD Hillbrow: A new variant of glucose-6-phosphate dehydrogenase associated with drug-induced haemolytic anaemia. *Br J Haematol* 30:343, 1975.
224. Toncheva D: Variants of glucose-6-phosphate dehydrogenase in a Vietnamese population. *Hum Hered* 36:348, 1986.
225. Gonzalez OL, Espina A, Calcines P: G6P-DH Santa Clara and G6P-DH Villa Clara: two new Cuban variants. *Acta Paediatr Hung* 30:17, 1990.
226. Kaeda JS, Chhotray GP, Ranjit MR, et al.: A new glucose-6-phosphate dehydrogenase variant, G6PD Orissa (44 Ala-->Gly), is the major polymorphic variant in tribal

populations in India. *Am J Hum Genet* 57:1335, 1995.
227. Panich V: G-6-PD Intanon. A new glucose-6-phosphate dehydrogenase variant. *Humangenetik* 21:203, 1974.
228. Stamatoyannopoulos G, Yoshida A, Bacopoulos C, Motulsky A: Athens variant of glucose-6-phosphate dehydrogenase. *Science* 157:831, 1967.
229. Beutler E, Maurer HS: *Unpublished* 1984.
230. Kahn A, North ML, Cottreau D, Giron G, Lang JM: G6PD Vientiane: A new glucose-6-phosphate dehydrogenase variant with increased stability. *Hum Genet* 43:85, 1978.
231. Du CS, Hua XY, Wu QL, Li CQ, Zhen JF, Li HL: Studies on erythrocyte glucose-6-phosphate dehydrogenase variants in Chinese. IV. Gd(-) Gaohe associated with paroxysmal nocturnal hemoglobinuria. *Chinese J Pathophysiol* 1:12, 1985.
232. Beutler E, Matsumoto F: A new glucose-6-phosphate dehydrogenase variant: G-6-PD (-) Los Angeles. *IRCS* 5:89, 1977.
233. Viglietto G, Montanaro V, Calabrò V, et al.: Common glucose-6-phosphate dehydrogenase (G6PD) variants from the Italian population: Biochemical and molecular characterization. *Ann Hum Genet* 54:1, 1990.
234. Sansone G, Perroni L, Yoshida A, Dave V: A new glucose-6-phosphate dehydrogenase variant (GD Trinacria) in two unrelated families of Sicilian ancestry. *Ital J Biochem* 26:44, 1977.
235. De Flora A, Morelli A, Benatti U, et al.: G6PD Napoli and Ferrara II: Two new glucose-6-phosphate dehydrogenase variants having similar characteristics but different intracellular lability and specific activity. *Br J Haematol* 48:417, 1981.
236. Sansone G, Perroni L, Testa U, Mareni C, Luzzatto L: New genetic variants of glucose-6-phosphate dehydrogenase (G6PD) in Italy. *Ann Hum Genet* 45:97, 1981.
237. Ventura A, Panizon F, Soranzo MR, et al.: Congenital dyserythropoietic anaemia type II associated with a new type of G6PD deficiency (G6PD Gabrovizza). *Acta Haematol (Basel)* 71:227, 1984.
238. Cappellini MD, Sampietro M, Toniolo D, et al.: Biochemical and molecular characterization of a new sporadic glucose-6-phosphate dehydrogenase variant described in Italy: G6PD Modena. *Br J Haematol* 87:209, 1994.
239. Harley JD, Agar NS, Yoshida A: Glucose-6-phosphate dehydrogenase variants: Gd (+) Alexandra associated with neonatal jaundice and Gd (-) Camperdown in a young man with lamellar cataracts. *J Lab Clin Med* 91:295, 1978.
240. Shows TB, Tashian RE, Brewer GJ: Erythrocyte glucose-6-phosphate dehydrogenase in caucasians: New inherited variant. *Science* 145:1056, 1964.
241. Kumakawa T, Suzuki S, Fujii H, Miwa S: Frequency of glucose 6-phosphate dehydrogenase (G6PD) deficiency in Tokyo and a new variant: G6PD Musashino. *Acta Haematol Jpn* 50:25, 1987.
242. Nowicki L, Strobel S, Martin H, Koschwitz U: Über Eine neue erythrocytäre Glucose-6-phosphatdehydrogenase-Variante, Typ Frankfurt I. Charakterisierung der Variante durch enzymkinetische Parameter. *Klin Wochenschr* 52:478, 1974.
243. Ninfali P, Bresolin N, Baronciani L, et al.: Glucose-6-phosphate dehydrogenase Lodi^{844C}: A study on its expression in blood cells and muscle. *Enzyme* 45:180, 1991.
244. Lisker R, Linares C, Motulsky AG: Glucose-6-phosphate dehydrogenase Mexico. A new variant with enzyme deficiency, abnormal mobility and absence of hemolysis. *J Lab Clin Med* 79:788, 1972.
245. Beutler E, Kuhl W. 1990;
246. Beutler E, Taylor GP: *Unpublished* 1982.
247. Beutler E, Phyliky RL, Nishimura RA: *Unpublished* 1983.
248. Kirkman HN, Simon ER, Pickard BM: Seattle variant of glucose-6-phosphate dehydrogenase. *J Lab Clin Med* 66:834, 1965.
249. Alfinito F, Cimmino A, Ferraro F, et al.: Molecular characterisation of G6PD deficiency in Southern Italy: heterogeneity, correlation genotype-phenotype and description of a new variant (G6PD Neopolis). *Br J Haematol* 98:41, 1997.
250. Ahluwalia A, Corcoran CM, Vulliamy TJ, et al.: G6PD Kalyan and G6PD Kerala; two deficient variants in India caused by the same 317 Glu-->Lys mutation. *Hum Mol Genet* 1:209, 1992.
251. Chuanshu D, Yankang X, Lin WQR, Xiaoyun H: Studies on erythrocyte glucose-6-phosphate dehydrogenase variants in Chinese. I. Gd(-) Liau-Baisha. *Acta Academiae Medicinae Zhong* 2:649, 1981.
252. Chockkalingam K, Board PG, Breguet G: Glucose 6-phosphate dehydrogenase variants of Bali Island (Indonesia). *Hum Genet* 60:60, 1982.

253. Usanga EA, Bienzle U, Cancedda R, Fasuan FA, Ajayi O, Luzzatto L: Genetic variants of human erythrocyte glucose 6-phosphate dehydrogenase: New variants in West Africa characterized by column chromatography. *Ann Hum Genet* 40:279, 1977.
254. Ishwad CS, Naik SN: A new glucose-6-phosphate dehydrogenase variant (G-6-PD Kalyan) found in a Koli family. *Hum Genet* 66:171, 1984.
255. Siegel NH, Beutler E: Hemolytic anemia caused by G-6-PD Carswell, a new variant. *Ann Intern Med* 75:437, 1971.
256. Sayyed Z, Mukherjee MB, Mudera VC, Colah R, Gupte S: Characterization of G6PD Rohini--a new class III Indian variant. *Indian J Med Res* 96:96, 1992.
257. Vergnes H, Gherardi M, Quilici JC, Yoshida A, Giacardy R: G6PD Luz-Saint-Sauveur: A new variant with abnormal electrophoretic mobility mild enzyme deficiency and absence of haematological disorders. *IRCS* 3:14, 1973.
258. Boyer SH, Porter IH, Weilbacher RG: Electrophoretic heterogeneity of glucose-6-phosphate dehydrogenase and its relationship to enzyme deficiency in man. *Proc Natl Acad Sci USA* 48:1868, 1962.
259. Takizawa T, Yoneyama Y, Miwa S, Yoshida A: A single nucleotide base transition is the basis of the common human glucose-6-phosphate dehydrogenase variant A(+). *Genomics* 1:228, 1987.
260. Csepreghy M, Hall MK, Berkow RL, Jackson S, Prchal JT: Characterization of a new G6PD variant: G6PD Titusville. *Am J Med Sci* 297:114, 1989.
261. Yoshida A, Baur E, Voigtlander B: *Unpublished* 1975.
262. Panich V: Glucose-6-phosphate dehydrogenase in Thailand. *Hum Genet* 53:227, 1980.
263. Stamatoyannopoulos G, Kotsakis P, Voigtlander V, Motulsky AG: Electrophoretic diversity of glucose-6-phosphate dehydrogenase among Greeks. *Am J Hum Genet* 22:587, 1970.
264. Yoshida A. 1975;
265. Beutler E, Lind S: *Unpublished* 1987.
266. Yoshida A: Glucose-6-phosphate dehydrogenase of human erythrocytes. I. Purification and characterization of normal (B+) enzyme. *J Biol Chem* 241:4966, 1966.
267. Stamatoyannopoulos G, Voigtlaender V, Akrivakis A: Thessaly variant of glucose-6-phosphate dehydrogenase. *Humangenetik* 9:23, 1970.
268. Hall K, Schreeder MT, Prchal JT: G6PD Huntsville: A new glucose-6-phosphate dehydrogenase associated with chronic hemolytic anemia. *Hum Genet* 79:90, 1988.
269. Barretto OCO, Nonoyama K: Gd(+) Cuiaba, a new rare glucose-6-phosphate dehydrogenase variant presenting normal activity. *Hum Genet* 77:201, 1987.
270. Stocco dos Santos RC, Barretto OCO, Nonoyama K, et al.: X-linked syndrome: Mental retardation, hip luxation, and G6PD variant [Gd(+) Butantan]. *Am J Med Genet* 39:133, 1991.
271. Saha N, Samuel APW: Characterization of glucose-6-phosphate dehydrogenase variants in the Sudan--including $Gd^{Khartoum}$, a hyperactive slow variant. *Hum Hered* 41:17, 1991.
272. Weimer TA, Schueler L, Beutler E, Salzano FM: Gd (+) Laguna, a new rare glucose-6-phosphate dehydrogenase variant from Brazil. *Hum Genet* 65:402, 1984.
273. Ermakov NV, Chernyak NB, Tokarev YN: Properties of new variant of glucose-6-phosphate dehydrogenase (Regar variant). Glucose metabolism in erythrocytes containing abnormal enzyme. *Biokhimiia* 48:577, 1983.
274. Balinsky D, Rootman AJ, Nurse GT, et al.: G6PD Kuanyama: A new variant of human erythrocyte glucose-6-phosphate dehydrogenase showing slower than normal electrophoretic mobility. *S Afr J Med Sci* 39:5, 1974.
275. Long WK, Kirkman HN, Sutton HE: Electrophoretically slow variants of glucose-6-phosphate dehydrogenase from red cells of negroes. *J Lab Clin Med* 65:81, 1965.
276. Frigerio R, Sole G, Olla N, Lovicu M, Passiu G, Carcassi U: G-6-PD Cagliari II: A new G-6-PD variant. *Haematologica (Pavia)* 72:241, 1987.
277. Hutz MH, Yoshida A, Salzano FM: Three rare G-6-PD variants from Porto Alegre, Brazil. *Hum Genet* 39:191, 1977.
278. Gonzalez R, Wade M, Estrada M, Svarch E, Colombo B: G6PD Pinar del Rio: A new variant discovered in a Cuban family. *Biochem Genet* 15:909, 1977.
279. Kaplan JC, Hanlickova-Leroux A, Nicholas AM, Rosa R, Weiler C, Lepercq G: A new glucose-6-phosphate dehydrogenase variant (G6PD Port-Royal). *Enzyme* 12:25, 1970.
280. Luzzatto L, Afolayan A: Different types of human erythrocyte glucose-6-phosphate dehydrogenase, with characterization of two new genetic variants. *J Clin Invest* 47:1833, 1968.
281. Welch SG, McGregor IA, Williams K: A new variant of human erythrocyte G6PD occurring at a high frequency amongst the population of two villages in the Gambia,

West Africa. *Hum Genet* 40:305, 1978.
282. Azevedo ES, Yoshida A: Brazilian variant of glucose-6-phosphate dehydrogenase (Gd Minas Gerais). *Nature* 222:380, 1969.
283. Weimer TA, Salzano FM, Westwood B, Beutler E: Molecular characterization of glucose-6-phosphate dehydrogenase (G6PD) variants from Brazil. *Hum Biol* 65:41, 1993.
284. Hook EB, Stamatoyannopoulos G, Yoshida A, Motulsky AG: Glucose-6-phosphate dehydrogenase Madrona: A slow electrophoretic glucose-6-phosphate dehydrogenase variant with kinetic characteristics similar to those of normal type. *J Lab Clin Med* 72:404, 1968.
285. Cayanis E, Lane AB, Jenkins T, Nurse GT, Balinsky D: Glucose-6-phosphate dehydrogenase Porbandar: A new slow variant with slightly reduced activity in a South African family of Indian descent. *Biochem Genet* 15:765, 1977.
286. Verma C, Wijnen JTh, Khan PM: G6PD Punjab, a dialysis sensitive variant of human glucose-6-phosphate dehydrogenase. *J Genet* 66:17, 1987.
287. Botha MC, Dern RJ, Mitchell M, West C, Beutler E: G6PD Capetown, a variant of glucose-6-phosphate dehydrogenase. *Am J Hum Genet* 21:547, 1969.
288. Dern RJ, McCurdy PR, Yoshida A: A new structural variant of glucose-6-phosphate dehydrogenase with a high production rate (G6PD). *J Lab Clin Med* 73:283, 1969.
289. Yoshida A: Amino acid substitution (histidine to tyrosine) in a glucose-6-phosphate dehydrogenase variant (G6PD Hektoen) associated with overproduction. *J Mol Biol* 52:483, 1970.
290. Helge H, Borner K: Kongenitale nichtsphärozytäre hämolytische Anämie, Katarakt und Glucose-6-phosphat-dehydrogenase-mangel. *Dtsch Med Wochenschr* 91:1584, 1966.
291. Mamlok RJ, Mills GC, Goldblum RM, Daeschner CWI: Glucose-6-phosphate dehydrogenase Beaumont: A new variant with severe enzyme deficiency and chronic nonspherocytic hemolytic anemia. *Enzyme* 34:15, 1985.
292. De OB, Nonoyama K: GB(-) Carapicuiba, a new rare glucose-6-phosphate dehydrogenase variant with moderate deficiency presenting chronic non spherocytic hemolytic anemia. *Blood* 76(Suppl):30a, 1990.
293. Poon M-C, Prchal J, Beutler E: *Unpublished* 1991.
294. MacDonald D, Town M, Mason P, Vulliamy T, Luzzatto L, Goff DK: Deficiency in red blood cells. *Nature* 350:115, 1991.
295. Hirono A, Miwa S, Fujii H, Ishida F, Yamada K, Kubota K: Molecular study of eight Japanese cases of glucose-6-phosphate dehydrogenase deficiency by nonradioisotopic single-strand conformation polymorphism analysis. *Blood* 83:3363, 1994.
296. Beutler E, Westwood B, Kuhl W, Hsia YE: Glucose-6-phosphate dehydrogenase variants in Hawaii. *Hum Hered* 42:327, 1992.
297. Perng L-I, Chiou S-S, Liu T-C, Chang J-G: A novel C to T substitution at nucleotide 1360 of cDNA which abolishes a natural Hha I site accounts for a new G6PD deficiency gene in Chinese. *Hum Mol Genet* 1:205, 1992.
298. Gray GR, Klebanoff SJ, Stamatoyannopoulos G, et al.: Neutrophil dysfunction, chronic granulomatous disease, and nonspherocytic haemolytic anaemia caused by complete deficiency of glucose-6-phosphate dehydrogenase. *Lancet* 2:530, 1973.
299. Maeda M, Constantoulakis P, Chen C-S, Stamatoyannopoulos G, Yoshida A: Molecular abnormalities of a human glucose-6-phosphate dehydrogenase variant associated with undetectable enzyme activity and immunologically cross-reacting material. *Am J Hum Genet* 51:386, 1992.
300. Tang TK, Yeh C-H, Huang C-S, Huang M-J: Expression and biochemical characterization of human glucose-6-phosphate dehydrogenase in *Escherichia coli*: A system to analyze normal and mutant enzymes. *Blood* 83:1436, 1994.
301. Tang TK, Huang C-S, Huang M-J, Tam K-B, Yeh C-H, Tang C-JC: Diverse point mutations result in glucose-6-phosphate dehydrogenase (G6PD) polymorphism in Taiwan. *Blood* 79:2135, 1992.
302. Baronciani L, Tricta F, Beutler E: G6PD "Campinas:" A deficient enzyme with a mutation at the far 3' end of the gene. *Hum Mutat* 2:77, 1993.
303. Vlachos A, Westwood B, Lipton JM, Beutler E: G6PD Mt. Sinai: A new severe hemolytic variant characterized by dual mutations at nucleotides 376G and 1159T (N126D). *Hum Mutat* Suppl. 1 (6):S154, 1998.
304. Nafa K, Reghis A, Osmani N, et al.: G6PD Aures: A new mutation (48 Ile-->Thr) causing mild G6PD deficiency is associated with favism. *Hum Mol Genet* 2:81, 1993.
305. Mason PJ, Sonati MF, MacDonald D, et al.: New glucose-6-phosphate dehydrogenase mutations associated with chronic anemia. *Blood* 85:1377, 1995.
306. Khan PM, Ploem JE, Wijnen JTh, Breukel C, Korthof G, Weening RS: G6PD Volendam: De Novo mutation of unusual mechanism in a severly deficient Dutch female born to apparently normal parents. *7th International Congress of Human Genetics* 418a, 1986.

307. Roos D, van Zwieten R, Wijnen JT, et al.: Molecular basis and enzymatic properties of glucose 6-phosphate dehydrogenase volendam, leading to chronic nonspherocytic anemia, granulocyte dysfunction, and increased susceptibility to infections. *Blood* 94:2955, 1999.
308. Chiu DTY, Zuo L, Chen E, et al.: DNA sequence abnormalities in Chinese glucose-6-phosphate dehydrogenase (G6PD) variants. *Blood* 78:252a, 1991.
309. Chiu DTY, Zuo L, Chao L, et al.: Molecular characterization of glucose-6-phosphate dehydrogenase (G6PD) deficiency in patients of Chinese descent and identification of new base substitutions in the human G6PD gene. *Blood* 81:2150, 1993.
310. Hirono A, Fujii H, Shima M, Miwa S: G6PD Nara: A new class 1 glucose-6-phosphate dehydrogenase variant with an eight amino acid deletion. *Blood* 82:3250, 1993.
311. Cappellini MD, Di Montemuros FM, De Bellis G, Debernardi S, Dotti C, Fiorelli G: Multiple G6PD mutations are associated with a clinical and biochemical phenotype similar to that of G6PD mediterranean. *Blood* 87:3953, 1996.
312. Beutler E, Westwood B, Gill: *Unpublished* 1994.
313. Beutler E, Westwood B, Dal Borgo P: *Unpublished* 1994.
314. Beutler E, Westwood B, Melemed A, Dal Borgo P, Margolis D: Three new exon 10 glucose-6-phosphate dehydrogenase mutations. *Blood Cells Mol Dis* 21:64, 1995.
315. Filosa S, Cai W, Galanello R, et al.: A novel single-base mutation in the glucose 6-phosphate dehydrogenase gene is associated with chronic non-spherocytic haemolytic anaemia. *Hum Genet* 94:560, 1994.
316. Hirono A: *Unpublished* 1994.
317. Hirono A, Ishii A, Kere N, Fujii H, Hirono K, Miwa S: Molecular analysis of glucose-6-phosphate dehydrogenase variants in the Solomon Islands. *Am J Hum Genet* 56:1243, 1995.
318. Hirono A: *Unpublished* 1995.
319. Chen HL, Huang MJ, Huang CS, Tang TK: G6PD NanKang (517T-->C; 173Phe-->Leu): A new Chinese G6PD variant associated with neonatal jaundice. *Hum Hered* 46:201, 1996.
320. Kaeda J, Roper D, Mason PJ, Luzzatto L: *Unpublished* 1996.
321. Vulliamy T, Rovira A, Yusoff N, Colomer D, Luzzatto L, Vives-Corrons JL: Independent origin of single and double mutations in the human glucose-6-phosphate dehydrogenase gene. *Hum Mutat* 8:311, 1996.
322. Yussoff N, Tamagnini G, Goncalves P, Vulliamy TJ: *Unpublished* 1996.
323. Hirono A: *Unpublished* 1996.
324. Tang TK, Chen H-L, Tzou W-S, Huang M-J: Structural and functional analysis of Chinese G6PD mutations on the basis of a three dimensional structural model of human enzyme. *Blood* 88(Suppl 1):307a, 1996.
325. Chen HL, Huang MJ, Huang CS, Tang TK: Two novel glucose 6-phosphate dehydrogenase deficiency mutations and association of such mutations with F8C/G6PD haplotype in Chinese. *J Formos Med Assoc* 96:948, 1997.
326. Vives Corrons JL, Aymerich M, Carrera A, et al.: Molecular genetics of glucose-6-phosphate dehydrogenase (G6PD) deficiency in Spain. *Blood* 88(Suppl 1):7b, 1996.
327. Weimer TA, Salzano FM, Westwood B, Beutler E: G6PD variants in three South American ethnic groups: Population distribution and description of two new mutations. *Hum Hered* 48:92, 1998.
328. Demina A, Beutler E: *Unpublished* 1997.
329. Weinthal J, Demina A, Beutler E: *Unpublished* 1997.
330. Kaeda JS, Britt RP, Bainbridge I, Mason PJ: *Unpublished* 1996.
331. Bollag RJ, Waldman AS, Liskay RM: Homologous recombination in mammalian cells. *Annu Rev Genet* 23:199, 1989.
332. Goncalves P: *Unpublished* 1996.
333. Vulliamy TJ, Kaeda JS, Ait-Chafa D, et al.: Clinical and haematological consequences of recurrent G6PD mutations and a single new mutation causing chronic nonspherocytic haemolytic anaemia. *Br J Haematol* 101:670, 1998.
334. Wagner G, Bhatia K, Board P: Glucose-6-phosphate dehydrogenase deficiency mutations in Papua New Guinea. *Hum Biol* 68:383, 1996.
335. Tanphaichitr VS, Hirono A: *Unpublished* 1997.

336. Jablonska-Skwiecinska E: *Unpublished* 1998.
337. Saad STO, Salles TS, Arruda VR, Sonati MF, Costa FF: G6PD Sumare: a novel mutation in the G6PD gene (1292 T-->G) associated with chronic nonspherocytic anemia. *Hum Mutat* 10:245, 1997.
338. Barac Y, Beutler E, Westwood B. 1999;
339. Orita M, Taki M, Hirono A, Miwa S. 1999;
340. Fushimi YSK, Hirono A, Miwa S. 1999;
341. Harsono, Matsuoka M, Hirono A. 1999;
342. Costa E, Cabeda JM, Vieira E, et al.: Glucose-6-phosphate dehydrogenase Aveiro: a de novo mutation associated with chronic nonspherocytic hemolytic anemia. *Blood* 95:1499, 2000.