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THE PATHOLOGIC PHYSIOLOGY OF PELLAGRA: *I. Tabulated Clinical and Physiologic Data*

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THE PATHOLOGIC PHYSIOLOGY OF PELLAGRA

I. Tabulated Clinical and Physiologic Data

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Pellagra is almost unique among major diseases in the scarcity of accurate information concerning it. There is still uncertainty about its etiology; the nature of its pathologic lesion is obscure; the diagnosis in atypical cases is a mere matter of opinion; and there are no adequate criteria for cure or for prognosis. The pellagrin who remains ill for a prolonged period may be suffering from chronic pellagra or may be suffering from some mysterious sequel rather than the disease itself. Prognosis is based chiefly on mass statistics largely unmodified by the clinical features of the individual patient. Even the causes of death are little understood. Pellagrins frequently die unexpectedly when apparently convalescent. The treatment at present is highly unsatisfactory. More than 25 per cent of the pellagrins admitted to the New Orleans Charity Hospital die in the hospital, in spite of treatment along the most approved lines. The treatment is dietary and symptomatic. The dietary is based on inexact knowledge of the dietary fault to be overcome. The symptomatic treatment rests on imperfect knowledge of the disturbed physiology represented by the symptoms. Pellagra takes a variety of clinical forms, so that some writers have suggested that what is called pellagra is a mixture of diseases rather than an entity. If typical skin lesions are accepted as a *sine qua non* there can be little doubt that pellagra is a unique disease for there is hardly any lesion in medicine more distinctive clinically. Even with classic skin lesions the cases fall into sharply contrasting groups. The mechanisms which bring this about are quite mysterious. The studies upon which this and subsequent papers are based were undertaken with the belief that there was no better mode of attack on many of the

TABLE 1

Data relative to forty-two pellagrins analyzed in this and succeeding papers

(For significance of code designations, see footnote to table)

Case number	Race	Sex	Age	Interval	Skin lesions				Diarrhea		Glossitis	Vomiting	Psychoses	Neuritis	Gastric acidity	Edema	Fever	Weight		Red blood cell volume	Blood volume	Plasma volume	Volume packed red blood cells	Serum proteins			Calcium	Inorganic phosphorus	Chloride as NaCl	CO_2 capacity plasma	Total base	Remarks
					Duration	Extent	Severity	Present state	Duration	Severity								Ideal	Present					Albumin	Globulin	Total						
			yrs.	*days*	*wks.*	*code*	*code*	*code*	*wks.*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*kgm.*	*kgm.*	*per cent*	*cc.*	*cc.*	*cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*vol. per cent*	*m.eq. per liter*	
1	W.	M.	51		1	2	3	B	1	2	3	0	0	0	A	0	1	76	54.2	40.6	5,500	3,200	2,300	4.11	1.98	6.09	9.7	3.5	416	54		Chronic alcoholism. Esophageal pain
				5				U			2	0	0	0		0	1		50.8	40.3	5,200	3,000	2,100	3.88	2.56	6.44	9.5	3.7	510	59		
				7				D			0	0	0	0		0	0		49.9	42.2	5,030	2,830	2,120	3.56	2.63	6.19	11.7	3.4	554	54		Abdominal pain after meals
				7				H			0	0	0	1		?	0		51.4	37.7	4,130	2,530	1,560	2.98	2.19	5.17	8.7	3.3	600	53		Abdominal pain after meals
				7				H			0	0	0	1		0	0		49.2	45.5	4,730	2,560	2,100	3.41	2.45	5.86	10.9	4.3	562	57		Abdominal pain after meals
				9				H			0	0	0	1		0	0		48.6	40.3	4,390	2,560	1,730	3.28	2.16	5.44	10.0	4.2	532	50		Abdominal pain after meals
				9				H			0	0	0	2		0	0		48.5	42.3	4,920	2,800	2,080	3.02	2.05	5.07	10.1	4.1	554	55		No abdominal pain
				11				H			0	0	0	2		0	0		48.3	39.2	4,700	2,830	1,840	3.50	2.04	5.54	10.0	4.7	600	55	146	
				12				H			0	0	0	1		0	0		49.7	40.0	5,200	3,100	2,080	3.70	2.24	5.94	12.0	4.8	530	60	148	
				14				H			0	0	0	1		0	0		50.8	41.2	4,850	2,800	2,000	3.54	2.19	5.73	11.1	5.0	546	56	147	Discharged improved
2	C.	F.	26		8	3	1	D	4	2	3	0	0	0	A	0	2	60	46.5	20.2	3,760	2,980	760	2.81	3.05	5.86	8.7	3.7	550	59		Stricture of rectum
				7				H		2	1	0	0	0		0	1		40.4	19.8	3,780	3,030	750	2.92	2.81	5.73	8.4	4.2	548	69		
				5				H		2	0	0	0	0		0	1		40.4	20.6	3,080	2,410	640	3.14	3.40	6.54	9.3	4.4	540	52		
				8				H		2	0	0	0	0		0	1		39.0	18.4	3,310	2,670	610	3.00	1.85	4.85	9.6	4.0	560	39		
				8				H		1	0	0	0	0		0	1		39.5	17.6	3,660	2,950	650	2.48	3.29	5.77	8.6	2.7	484	52		Transfusion 300 cc. whole
				9				H		1	0	0	D	0		1	1		39.7	20.8	3,700	2,900	770	1.88	3.01	4.89	8.5	3.9	560	53		blood day after fifth study
				14				H		1	0	0	D	0		1	1		37.5	21.5	3,800	2,950	815	1.95	2.79	4.79	8.6	4.3	576	47	136	
				8				H		1	0	0	D	0		1	1		34.7	21.5	3,200	2,500	790	1.80	2.88	4.68	9.0	3.6	586	52		
				12				H		2	0	0	D	0		1	1		33.6	22.6	3,130	2,400	700	1.64	3.07	4.71	8.5	4.9	570	51	143	Died 10 days later
3	C.	M.	29	—	4	3	2	DU	8	1	2	0	0	0	A	0	0	73	38.6	31.3	3,390	2,310	1,060	3.60	2.15	5.75	10.9	3.7	578	52		Recurrent skin lesions
				6				U		1	0	0	0	0		0	0		34.5	36.5	3,260	2,060	1,190	3.31	2.06	5.57	11.0	4.6	570	54		
				8				U		1	0	0	0	0		0	0		33.8	33.3	3,250	2,100	1,080	2.93	1.62	4.55	8.8	3.5	504	52		
				8				D		0	0	0	0	0		1	0		36.1	27.3	4,040	2,930	1,100	2.71	1.56	4.27	9.8	4.8	542	52		
				9				H		0	0	0	0	0		1	0		36.8	26.3	3,900	2,840	1,030	1.95	1.59	3.54	8.5	3.7	512	53	141	
				14				H		3	0	0	0	0		3	0		39.0	30.8	3,910	2,670	1,200	1.76	1.66	3.42	8.1	3.4	600	50	146	Died one week later

4	C.	F.	44	—	4	3	2	DU	4	1	0	0	0	0	H	0	1	70	41.8	26.7	3,540	2,590	1,040	3.93	3.48	7.31	10.3	3.7	612	44		Syphilis
				10						0	0	0	0	0		0	0		42.2	24.7	3,570	2,670	890	3.86	3.07	6.93	13.0	3.5	496	61		
				27						0	0	0	0	0		0	0		43.1	31.4	3,460	2,340	1,090	3.72	3.74	7.46	9.8	4.1	580	51	139	Improved
5	C.	F.	18	—	8	5	1	D	8	1	0	0	0	0	A	0	0	59	53.6	37.9	4,380	2,670	1,660	3.93	2.80	6.73	11.2	4.3	616	58		Discharged improved
6	C.	M.	26	—	2	2	2	E	3	1	0	0	0	0	N	0	0	63	53.5	42.7	4,200	2,400	1,800	3.86	2.11	5.97	10.3	4.1	530	62		Third annual attack
				14				D		0	0	0	0	0		0	0		54.5	41.2	5,100	2,990	2,120	2.88	2.70	5.58	9.3	3.2	536	58		Improved
7	W.	M.	19	—	½	1	1	E	2	1	0	0	0	0	—	0	1	61	38.1	42.6				2.97	2.10	5.07	9.3	4.0	508	58		Probable attack 4 months
				13				D		1	0	0	0	0		0	0		37.4	43.5	4,830	2,670	2,100	3.72	2.14	5.86	8.5	4.3	530	64		previously
				14				H		0	0	0	0	0		0	0		37.2	37.6	4,500	2,790	1,690	3.26	2.45	5.71	11.7	4.1	498	64		
				19				H		0	0	0	0	0		0	0		37.4	36.8	4,980	3,090	1,840	3.18	2.38	5.56	10.9	4.2	500	68	149	Clinically stationary
8	W.	M.	43	—	2	2	1	E	2	3	3	0	D	?	—	0	0	75	45.3	48.9	3,360	1,680	1,640	3.12	1.19	4.31	11.0	4.3	520	53	118	Chronic alcoholism. Died 3 days later
9	C.	M.	23	—	1	3	2	E	3	1	1	0	0	0	A	0	1	65	62.7	25.7	5,120	3,770	1,320	2.48	3.68	6.16	9.6	4.1	474	62	127	Urethral stricture; active
				11				D		0	0	0	0	0		0	1		61.7	24.7	*5,220*	*3,990*	*1,190*	2.41	4.04	6.45	10.3	3.6	490	59	145	gonorrhea
				14				H		0	0	0	0	0		0	1		61.1	22.9	5,230	3,990	1,190	2.00	3.28	5.28	8.9	3.8	560	58	136	
				5				H		3	1	0	0	0		0	3		57.6	28.6	5,180	3,670	1,490	2.37	3.83	6.20	10.4	3.5	530	50	139	
				17				U		1	0	0	0	0		?	1		55.2	23.8	5,730	4,080	1,630	1.89	3.56	5.45	11.8	4.1	530	62	154	Unimproved
10	C.	M.	26	—	3	1	1	E	50	3	0	0	0	0	A	2	1	63	58.6	15.3	8,000	6,780	1,220	2.71	3.48	6.19	9.8	4.6	542	57		Tuberculous peritonitis
				14				D		3	0	0	0	0		1	1		62.0	18.8	8,420	6,830	1,580	2.85	3.07	5.92	8.7	3.8	580	48	144	Transfusion 500 cc. whole blood
				13				H		3	0	0	0	0		0	1		61.3	19.1	8,280	6,680	1,600	2.38	2.81	5.19	8.6	2.6	606	61	152	Unimproved
11	C.	F.	28	—	4	4	3	U	4	3	4	0	0	0	A	0	2	60	45.9	27.4	3,760	2,900	850	1.88	2.32	4.19	8.8	2.5	444	57	121	Died 3 days later
12	W.	F.	37	—	3	5	3	U	3	1	2	0	0	0	A	0	1	60	42.4	31.8	3,470	2,330	1,100	3.61	1.81	5.42	9.8	4.5	500	57	145	Transfusion 500 cc. whole blood
				11				H		0	0	0	0	0		0	0		42.2	38.3	4,570	2,790	1,750	3.46	2.26	5.72	10.7	5.0	500	57		Improved
13	W.	F.	27	—	4	2	1	D	50	1	0	0	S	0	A	0	1	59	48.1	33.1	3,170	2,100	1,050	2.86	2.32	5.23	9.5	3.1	530	55	145	Died 1 month later
14	C.	F.	39	—	5	3	1	D	2	1	1	0	0	0	N	0	0	61	66.8	32.0	5,370	3,610	1,720	3.34	2.19	5.53	9.8	4.3	528	52		Early carcinoma of cervix
				11				H		0	0	0	0	0		0	0		62.6	32.2	6,720	4,540	2,180	3.48	2.02	5.50	10.6	4.7	540	59	154	Radium applied 1 week before second study
				15				H		0	0	0	0	0		0	0		63.5	33.8	6,250	4,120	2,120	3.15	2.22	5.37	10.6	4.2	542	58	162	Improved

TABLE 1—*Continued*

Case number	Race	Sex	Age	Interval	Skin lesions: Duration	Extent	Severity	Present state	Diarrhea: Duration	Severity	Glossitis	Vomiting	Psychoses	Neuritis	Gastric acidity	Edema	Fever	Weight: Ideal	Present	Red blood cell volume	Blood volume	Plasma volume	Volume packed red blood cells	Serum proteins: Albumin	Globulin	Total	Calcium	Inorganic phosphorus	Chloride as NaCl	CO_2 capacity plasma	Total base	Remarks
			yrs.	*days*	*wks.*	*code*	*code*	*code*	*wks.*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*kgm.*	*kgm.*	*per cent*	*cc.*	*cc.*	*cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*vol. per cent*	*m.eq. per liter*	
15	C.	M.	61	—	1	3	3	B	1	2	1	0	0	0	A	0	2	72	49.5	34.5	4,260	2,740	1,470	2.87	3.07	5.94	10.7	3.4	492	71	138	
				17				H		0	0	0	0	0		0	0		51.0	28.0	4,420	3,150	1,240	2.65	3.01	5.66	11.5	4.5	524	62	147	Improved
16	C.	F.	60	—	4	3	3	U	4	3	4	1	C	?	A	0	2	64	38.0	31.4	3,060	2,100	930	3.88	2.88	6.76	10.1	4.2				Skin lesions probably recurrent
				5				U		3	3	1		—		0	0		37.6	31.5	3,100	2,050	980	3.31	2.71	6.02	9.8	5.4		53		
				6				U		2	2	0		—		2	0		42.2	29.8	2,610	1,830	750	2.96	2.30	5.26	10.1	4.6	500	41		Died 1 day later
17	C.	M.	46	—	½	1	1	E	0	0	3	0	0	0	A	0	0	61	40.8	38.8	3,730	2,260	1,440	3.88	1.89	5.77	9.9	4.1		69		Skin lesions and diarrhea
				11		2	2	E		1	2	2	0	—		0	0		36.4	46.4	4,520	2,370	1,120	4.02	1.99	6.01	10.1	5.1		62		developed in the hospital
				6		3	3	UD		2	1	2	C	—		0	0		37.7	37.4	2,380	1,470	880	4.81	1.94	6.75	9.5	6.3	416	54		
				6		3	3	UD		1	1	2	C	—		2	0		39.9	38.0	3,720	2,290	1,400	4.18	1.67	5.85	8.5	12.0	336	22		Died 3 hours later. Autopsy
18	C.	M.	55	—	3	2	3	U	10	2	1	0	0	0	—	0	1	74	57.2	31.4	4,330	3,000	1,350	3.94	3.07	7.01	10.4	3.6				Luetic heart disease
				5				U		1	0	0	0	0		0	1		57.4	31.5	4,330	2,970	1,400	3.00	2.52	5.52	9.3	3.6		57		
				6				UH		1	0	0	0	0		0	3		57.2	32.9	4,610	3,060	1,520	3.30	2.81	6.11	9.9	2.8	554	49		Died suddenly 4 days later
19	W.	F.	46	—	4	2	1	DE	4	2	0	0	0	0	A	0	1	61	40.3	32.3	3,390	2,290	1,080	3.34	1.96	5.30	9.8	5.1				Recurrent skin lesions
				7				D		0	0	0	0	0		0	0		39.0	32.0	2,900	1,970	910	4.04	2.05	6.09	10.1	3.7	624	65		Unimproved
20	C.	M	44	—	3	3	2	D	3	1	1	0	0	0	A	0	1	70	47.2	30.7	5,500	3,790	1,680	3.78	2.27	6.05	9.5	3.2		71		Syphilis
				15				H		0	0	0	0	1		2	0		52.6	29.0	*5,850*	*4,140*	*1,680*	3.43	2.56	5.99	10.6	3.8	616	62		
				6				H		0	0	0	0	1		1	0		50.9	33.1	5,080	3,340	1,680	4.18	2.68	6.86	11.3	4.0	634	61		
				7				H		0	0	0	0	1		0	0		51.3	35.2	*4,760*	*3,060*	*1,680*	4.18	2.37	6.55	11.8	3.9	604	54		Discharged improved
21	W.	F.	29	—	12	3	2	DU	12	2	1	0	0	2	H	0	1		38.0	34.0	3,530	2,350	1,170	2.63	1.93	4.56	10.7	4.8	530	59	140	Recurrent skin lesions. Active delirium 1 week later, then died

22	C.	F.	11	—	12	2	3	D	12	2	1	0	D	0	—	0	0	43	27.2	28.0	—	—	—	2.22	3.05	5.27	8.5	5.2	432	53	118	Died 1 hour later
23	C.	M.	10	—	16	3	3	D	4	2	1	0	0	0		0	0	35	24.1	30.1	2,570	1,770	770	2.81	2.11	4.92	8.4	5.3	464	51	123	
				10				U		0	0	0	0	0		0	0		24.1	31.1	2,580	1,750	800	2.84	2.03	4.87	11.9	6.7	512	63		Improved
24	C.	F.	34	—	5	3	1	H	12	3	0	0	D	0	A	0	0	61	48.7	25.2	4,240	3,090	1,120	2.12	3.28	5.40	8.5	3.8	568	53	154	Stricture of rectum
				5				H		3	0	1	D	0		0	0		48.7	28.9	3,960	2,790	1,140	3.11	3.26	6.37	9.6	5.7	544	29	153	Discharged unimproved
25	W.	F.	16	—	12	5	1	H	4	1	0	0	0	0	A	0	0	56	36.3	34.5	2,860	1,830	990	4.82	2.20	7.02	11.4	5.7		53		Ptyalism. Diarrhea had
				7				H		0	0	0	0	1		0	0		36.8	30.6	2,640	1,810	810	4.04	2.13	6.17	10.76	6.2	614	57		stopped 3 months before
				11				H		0	0	0	0	1		0	0		37.2	32.5	3,130	2,110	1,000	4.16	2.17	6.33	11.0	3.4	604	50		admission
				7				H		0	0	0	0	1		0	0		37.5	33.8	2,600	1,700	880	4.14	2.15	6.29	11.1	4.8	590	60		
				8				H		0	0	0	0	1		0	0		37.6	36.1	2,950	1,870	1,060	4.10	2.27	6.37	11.6	5.6	600	56		Clinically stationary
26	W.	F.	23	—	6	2	1	H	0	0	1	0	0	0	A	0	0	54	44.8	31.8	3,500	2,350	1,110	3.16	1.59	4.75	10.2	4.7	611			Third annual attack. Was edematous 5 days ago. Improved
27	C.	F.	39	—	4	2	2	DU	0	0	1	0	0	1	A	0	1	56	36.3	25.2	2,800	2,060	710	3.89	2.42	6.31	10.6	4.4	558	60		
				9				D		1	0	0	0	1		0	0		34.0	28.6	2,230	1,570	640	3.93	2.93	6.86	11.9	5.4	578	54		
				9				H		0	0	0	0	2		0	0		33.3	32.2	2,780	1,860	890	3.65	2.49	6.14	10.6	6.3	584	59		
				8				H		1	0	0	0	3		0	0		34.0	34.5	2,810	1,810	970	3.72	2.63	6.35	11.3	5.8	560	52		
				12				H		0	0	0	0	2		1	0		33.2	38.5	3,340	2,040	1,280	3.43	2.30	5.73	10.8	5.4	540	57		
				14				H		0	0	0	0	1		1	0		34.1	38.6	3,130	1,900	1,210	3.47	1.95	5.43	11.1	5.2	500	60	143	
				12				H		0	0	0	0	1		0	0		34.9	39.9	3,380	2,010	1,350	3.74	2.00	5.74	11.3	5.4	540	66	157	Improved
28	W.	F.	26	—	5	2	1	H	0	0	2	0	0	0	—	1	0	53	37.2	33.3	2,620	1,770	830	3.41	3.44	6.85	10.2	4.2	584	62		Stricture of rectum; recto-vaginal fistula. Unimproved
29	W.	M.	36	—	4	2	1	E	0	0	1	0	0	0	A	0	0	67	52.2	36.0	4,940	3,110	1,780	4.03	2.32	6.35	11.8	3.2	620	58		
				7				E		0	0	0	0	0		0	0		52.7	35.5	4,550	2,890	1,610	3.91	2.37	6.28	11.8	3.4	540	55		Unimproved
30	W.	M.	44	—	6	3	1	E	0	0	1	2	0	0	—	0	0	75	78.5	49.8	8,780	4,330	4,380	4.19	2.32	6.51	11.1	3.5	651	52		Unimproved
31	C.	M.	53	—	1	1	1	E	0	0	0	0	0	0	A	0	0	70	59.0	43.4	5,580	3,150	2,420	3.60	3.01	6.61	9.8	3.4	492	53		Luetic heart disease
				10				D	0	0	0	0	D	0		0	0		58.1	41.6	*5,680*	*3,220*	*2,420*	2.90	2.88	5.80	9.1	3.2	600	47		Died suddenly 3 days later

TABLE 1—*Concluded*

Case number	Race	Sex	Age	Interval	Skin lesions				Diarrhea		Glossitis	Vomiting	Psychoses	Neuritis	Gastric acidity	Edema	Fever	Weight		Red blood cell volume	Blood volume	Plasma volume	Volume packed red blood cells	Serum proteins			Calcium	Inorganic phosphorus	Chloride as NaCl	CO_2 capacity plasma	Total base	Remarks
					Duration	Extent	Severity	Present state	Duration	Severity								Ideal	Present					Albumin	Globulin	Total						
			yrs.	*days*	*wks.*	*code*	*code*	*code*	*wks.*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*code*	*kgm.*	*kgm.*	*per cent*	*cc.*	*cc.*	*cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*gms. per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*mgm per 100 cc.*	*vol. per cent*	*m. eq. per liter*	
32	C.	F.	25	—	12	4	1	DE	0	0	2	0	0	0	A	0	1	59	38.1	35.0	2,790	1,780	980	3.24	2.06	5.30	10.9	4.1	552	46		Recurrent skin lesions
				13				HD		1	0	0	0	0		0	0		36.3	34.7	3,390	2,190	1,175	3.30	1.69	4.99	10.3	3.8	532	47	144	
				11				H		0	0	0	0	0		0	0		37.2	38.0	3,520	3,140	1,340	3.99	1.58	5.57	11.9	3.4	552	53	152	
				13				H		0	0	0	0	1		0	0		38.1	32.0	3,200	2,150	1,030	3.93	1.59	5.52	11.0	3.8	570	54	154	
				15				H		0	0	0	0	1		?	0		39.9	31.7	3,300	2,240	1,050	3.26	1.74	5.00	10.4	3.6	560	54	139	Improved
33	C.	F.	39	—	4	4	1	D	0	0	0	0	0	0	A	0	0	70	62.5	31.8	4,240	2,860	1,350	2.97	4.60	5.57	11.8	3.2	538	51		Stricture of rectum. Probable previous mild annual attacks
				14				H		0	0	0	0	0		0	0		59.9	31.0	5,150	3,520	1,600	2.83	4.85	7.68	10.8	4.4	562	54		
				13				H		0	0	0	0	0		0	0		59.4	32.2	4,630	3,100	1,490	2.73	5.11	7.84	6.0	3.9	570	60		
				13				H		0	0	0	0	0		0	0		60.3	29.6	5,200	3,620	1,540	2.63	4.18	6.80	11.1	4.7	552	60	146	Improved
34	W.	M.	29	—	4	2	1	E	0	0	0	0	0	2	A	0	1	53	46.3	50.4	3,470	1,720	1,680	5.46	2.14	7.50	11.3	4.9		51		Chronic alcoholism. Deserted
				60				HD		0	0	0	0	2	A	0	0		44.4	52.0	3,200	1,520	1,680	3.96	1.72	5.68	11.4	4.1	512	49		Returned with additional lesions
				14				H		0	0	0	0	2		0	0		39.3	47.9	3,770	1,950	1,800	4.01	1.62	5.64	11.0	4.7	536	54	138	
				14				H		0	0	0	0	2		0	1		38.5	46.9	2,690	1,400	1,260	3.51	1.83	5.34	14.3	4.3	530	55		
				14				H		0	0	0	0	1		0	0		37.6	42.2	—	—	—	3.28	1.46	4.17	11.1	4.5	574	54	143	
				12				H		0	0	0	0	1		0	0		37.6	44.2	—	—	—	3.94	1.63	5.54	10.9	5.2	564	56	161	Slight improvement
35	C.	F.	30	—	12	3	1–3	DU	0	0	1	0	0	0	H	0	0	60	52.0	22.3	3,630	2,820	810	3.37	2.26	5.63	11.9	4.2	530	56	141	Stricture of rectum. Recurrent skin lesions
				14				HU		0	0	0	0	0		0	0		50.9	22.5	3,570	2,740	810	3.38	2.50	15.88	10.1	4.4	588	57	144	
				13				HD		0	0	0	0	0		0	0		55.1	22.7	4,100	3,160	930	3.22	2.50	5.72	9.2	3.8	600	49		
				14				H		0	0	0	0	0		0	0		58.6	25.0	4,350	3,250	1,090	3.14	2.71	5.85	10.4	4.5	550	54	155	Improved
36	C.	F.	23	—	10	3	1–3	DU	3	1	3	0	D	0	A	0	2	56	44.5	19.6	3,810	3,060	750	1.71	3.80	5.57	7.4	2.6	356	57	123	Recurrent skin lesions. Died 28 hours later

37	W.	F.	50	—	8	3	1	H	1	2	0	0	0	0	A	0	0	63	52.2	34.0	3,440	2,110	1,320	4.22	2.41	6.63	10.1	3.2	540	58	142	Mild hypothyroidism. Discharged unchanged. Third annual attack
38	C.	F.	32	—	12	3	1	HE	0	0	0	0	0	0	—	0	0	62	66.7	40.8	5,090	2,970	1,980	3.15	2.09	5.24	11.1	4.0	560	55	137	Recurrent skin lesions. Recto-vaginal fistula
				13				HD		0	0	0	0	0		0	0		68.2	39.6	5,180	3,110	2,050	3.83	2.45	6.27	10.9	3.8	582	60		
				14				H		0	0	0	0	0		0	0		69.9	38.8	5,100	3,010	2,080	3.21	1.90	5.11	10.3	4.3	522	55	142	
				15				H		0	0	0	0	0		0	0		70.4	38.1	5,300	3,270	2,020	3.43	2.27	5.70	11.0	4.4	530	59	162	Improved
39	C.	F.	22	—	4	3	2	D	1	1	0	0	0	0	A	0	0	57	62.2	35.7	4,740	3,050	1,690	3.66	2.97	6.63	10.4	3.3	490	64	139	Previous attack 7 years ago
				16				H		0	0	0	0	0		0	0		62.4	35.7	4,100	2,620	1,460	3.14	2.70	5.84	11.0	3.8	570	55		
				13				H		0	0	0	0	0		0	0		64.4	34.5	4,160	2,710	1,430	3.40	2.63	6.03	10.7	4.4	534	57	154	Improved
40	C.	F.	28	—	4	5	2	DB	0	0	1	0	0	0	A	0	1	58	53.3	32.8	4,430	2,930	1,450	3.68	2.14	6.42	11.1	5.2	564	49	141	Recurrent skin lesions
				10				U		2	0	0	0	0		0	2		53.1	28.7	4,970	3,520	1,420	3.16	3.07	6.23	9.9	3.4	592	53		
				5				U		2	0	0	D	—		0	3		51.5	30.6	*4,640*	*3,220*	*1,420*	3.23	2.72	5.95	10.0	3.2	506	39	135	Died 17 hours later
41	C.	F.	32	—	2	2	1	E	3	0	1	0	0	0	A	0	0	60	45.7	35.8	*3,140*	*1,980*	*1,120*	3.71	2.42	6.13	10.0	4.5	530	59		
				9				DU		0	0	0	0	0		0	0		45.7	34.3	3,200	2,080	1,100	3.64	2.19	5.83	11.3	4.6	580	59		
				14				D		0	0	0	0	0		0	0		46.8	32.7	*3,370*	*2,200*	*1,100*	3.60	2.40	6.00	11.1	5.0	540	58	150	Improved
42	W.	F.	30	—	2	4	2	ED	0	0	1	0	0	?		0	0	56	38.7	34.1	3,740	2,450	1,270	3.40	2.09	5.49	10.3	4.9	480	55	149	Chronic alcoholism Unimproved

Skin lesions: Duration: Time in weeks since appearance of skin lesions of present attack. In a number of cases before skin lesions were healed fresh ones appeared. These are referred to as recurrent skin lesions. They are considered as being a part of the same attack of pellagra as the unhealed lesions. Figures in this column do not refer to the time of appearance of recurrent lesions.

Extent: Figures in this column indicate roughly the surface area involved. The areas referred to are those most commonly involved, their equivalents in extent elsewhere is occasionally substituted.

1 = parts of hands only. 2 = entire surface of hands exclusive of palms. 3 = hands and forearms or elbows. 4 = hands and feet. 5 = hands and feet plus other extensive areas.

Severity: Terminology that of burns: 1 = first degree. 2 = second degree. 3 = third degree. Third degree pellagra lesions on healing do not cause contracture but the skin is far from normal.

State: Condition of lesions at the time of study. B = bullae. U = ulceration. E = erythema. D = desquamation. H = healed.

Diarrhea: Duration: Weeks after onset.

Severity: 1 = 3 to 6 times a day. 2 = 7 to 10 times. 3 = 11 or more times a day.

Glossitis: 1 = mild diffuse redness. 2 = marked diffuse injection with pain. 3 = marked injection plus areas of ulceration. 4 = bald tongue due to atrophy of papillae.

Vomiting: 0 = absent. 1 = occasional. 2 = 3 to 5 times daily.

Psychosis: D = delirium. C = coma. S = suicidal depression.

Neuritis: Symptoms of peripheral neuritis in legs but with exaggerated knee jerks. 1 = mild, chiefly subjective. 2 = moderate. 3 = severe bedridden. — = information not available.

Gastric acidity: A = absence of free hydrochloric acid. N = normal acidity. H = hypoacidity. — = information not available.

Edema: Pitting edema: 1 = just demonstrable. 2 = moderate in degree and distribution. 3 = anasarca.

Fever: 1 = temperatures up to 101.5°F. 2 = more than 101.5° but less than 103°F. 3 = temperatures higher than 103°F.

Blood volume: The figures in italics are estimated values obtained by comparing the hematocrit at that particular time with the hematocrit of the preceding or following study. The calculation is based on the assumption that the volume of circulating blood cells is unchanged from one occasion to the next.

Weight: Given in kilograms. Ideal weights are those given by the tables of the Medico-Actuary Mortality Investigations (5) for sex, age, and height.

problems of pellagra than the accumulation of more exact knowledge of the disturbed physiology.

All patients studied were in-patients of Charity Hospital, and all had typical skin lesions of pellagra together with other evidences of the disease.

Detailed methods will be presented as indicated in subsequent papers of this series.

The first study was usually made one or two days after admission to the hospital, and with few exceptions the blood volume was determined each time blood was taken for chemical study. The studies were repeated, provided the patients remained sufficiently long under observation, at intervals of from 5 to 15 days. All patients were given during their stay in the hospital a special "pellagra diet." This diet has a daily caloric value of 2500 to 3500 calories, contains more than 100 grams of protein, a part of which is liver or sweetbread, and contains an abundance of green leafy vegetables and 500 cc. buttermilk. It is given to patients with diarrhea in bland form, and, when necessary, a liquid diet of similar caloric value was given by gavage. Routinely there was included for the vitamin content 30 cc. of fresh brewer's yeast three times a day, 150 cc. of orange or lemon juice daily and in addition some of the patients received 4 cc. of cod liver oil three times a day. The nurses usually took especial interest in their pellagrins and in their nutrition and fluid intake.

No particular effort was made to influence by treatment the derangements of physiology revealed in these studies. Therapeutic studies are to be made later. In the present studies pellagra was observed under what has been considered an excellent regimen.

The detailed clinical information, the blood volumes, and the results of chemical studies are shown for 42 cases in table 1.

The pellagrins which we have studied made a fairly representative group. The proportion of severe cases of pellagra is much greater in hospital than in general practice, but mild forms of the disease are also present.

In subsequent articles (1, 2, 3, 4) detailed procedures will be presented and the results of the physiologic investigations analyzed and discussed.

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SUMMARY OF CLINICAL DATA

Detailed clinical data obtained from a study of 42 pellagrins are recorded in one table which also includes the results of determinations of circulating blood volume, serum albumin and globulin, serum calcium and inorganic phosphorus, of plasma chlorides, of carbon dioxide combining power, and of serum total base.

The group of patients consisted of 6 white men, 9 white women, 9 negro men, 16 negro women, and 2 negro children. Twenty were less than 30 years old and 36 were less than 50.

Thirteen patients, 31 per cent, died in the hospital.

Thirty-nine had had no previous attacks of pellagra; 3 had had attacks 1 to 7 years previously.

Eleven patients of the group had other diseases: Syphilis, 5, two with heart disease; stricture of the rectum, 4; active gonorrhea, 1; intestinal tuberculosis, 1.

Fifty-nine per cent of the patients were more than 20 per cent underweight and 35 per cent more than 30 per cent underweight, and 10 per cent were overweight.

Eight patients showed edema.

The skin lesions at the time of the first study showed erythema in 26, 62 per cent; 9 of the 26 showed recurrent lesions in the presence of older unhealed lesions.

Vomiting was a serious problem in 2 patients.

Glossitis was present in 26, 62 per cent; diarrhea in 25, 60 per cent.

Gastric analysis was done in 34 and achylia found in 29, 60 per cent, of the entire group; hypoacidity in 3, and a normal acidity in 2 patients.

Seven patients were delirious, 2 were comatose and 1 suicidal; a total of 10, 24 per cent, with psychoses.

Six patients showed evidences of peripheral neuritis.

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