practically all be included in those designated *pyogenes*. Other staphylococci are less proteolytic and saccharolytic on substrates usually tested in culture, and are less haemolytic and toxigenic. They would therefore be less likely than *Staph. pyogenes* to be concerned in the aetiology of caries.

Conclusion

A combined clinical and bacteriological investigation using a highly sensitive and selective medium for the isolation of *Staph. pyogenes* has failed to reveal an aetiological relationship between this organism and dental caries.

We desire to express our thanks to Mr. R. Bradbury, school dental officer, Borough of Stretford, for arranging and assisting with the examination of the children. We also acknowledge our indebtedness to Professor H. B. Maitland, Director of the Department of Bacteriology.

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SENILE DETERIORATION OF THE CENTRAL NERVOUS SYSTEM

A CLINICAL STUDY

BY

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Comparatively little has been written about the clinical aspects of neurology in the aged. Even textbooks dealing with old age, such as those of Thewlis (1946) and Stieglitz (1943), are unsatisfactory. The best account at present is that of Macdonald Critchley (1931). He notes the frequent occurrence of several clinical changes. Diminution of objective pain sensation is mentioned, while complaints of subjective pains are said to be common. Progressive loss of vibration sense is stated to be customary, while sluggish pupils, missing superficial reflexes, and weak or absent tendon-jerks are said to be the usual findings. No indication is given, however, of the frequency of these signs or of the age at which they may be expected.

Since the absence of reflexes and alterations of sensation might give rise to the misdiagnosis of neurological lesions, it seemed expedient to examine a series of healthy old people to ascertain what variations are normal. I therefore examined 200 Chelsea pensioners. Most of these men were known to me both personally and professionally, so that considerably more co-operation was forthcoming than might otherwise have been the case. This should add to the credibility of the clinical findings. Among the pensioners examined a small number were found to have neurological lesions previously unrecognized: these were omitted from the series. The results of the clinical examination of the nervous system are described below.

Motor Changes

Tendon Reflexes.—Each case was tested for supinator, triceps, biceps, knee, and ankle jerks. Only 7% of those examined had every reflex present, these being in the younger age groups. The arm-jerks were normal in all men under 70, but the ankle-jerks were not elicited in over half the cases even at this age. In those over 70 there was a definite drop in frequency of all reflexes, but no

further decrease until the age of 85 except in the ankle-jerks (Table I).

TABLE I.—Percentage of Tendon Reflexes Obtained

Age	No.	Supinator		Biceps		Triceps		Knee		Ankle	
		R.	L.	R.	L.	R.	L.	R.	L.	R.	L.
65-69	16	100	100	100	100	100	100	87	87	43	38
70-74	57	67	65	88	88	70	72	79	77	32	35
75-79	72	69	68	84	85	84	84	76	76	32	35
80-84	31	68	65	90	90	87	80	80	80	12	12
85-91	9	33	33	66	66	44	55	44	44	22	22
Mean values	..	69	63	86	87	79	79	77	77	29	31

Superficial Reflexes.—Contrary to expectation, the vast majority of plantar responses were normal. Age did not seem to have any bearing on the frequency of abnormality, which was 5%, mainly scattered in the age groups between 70 and 84. There was no difference between the two sides of the body, except in three pensioners. The abdominals, however, were elicited less regularly. The upper quadrants always responded more easily than the lower ones, but there was no constant difference between right and left sides of the belly. The average for all the men was less than 50%, with a drop at 70 years of age and another drop after 85, similar to that found in the deep reflexes (see Table II).

TABLE II.—Superficial Reflexes

Age	No.	Abdominals		Plantars	
		R.	L.	R.	L.
65-69	16	100%	100%	100%	95%
70-74	57	63%	75%	96%	94%
75-79	72	54%	49%	96%	96%
80-84	31	51%	52%	89%	87%
85-91	9	47%	45%	100%	100%
		36%	40%		
		61%	48%		
		42%	35%		
		22%	22%		
		0%	0%		

Power.—Power was assessed only roughly in the absence of a dynamometer. The pensioners were graded by strength of grip and by power of flexion and extension at elbow and knee. The results were classified as very good, good, fair, and poor. Loss of strength seemed to develop with increase of age, but this was not universally true in the cases examined, as may be seen in Table III.

TABLE III.—Power in Limbs

Age	No.	Very Good	Good	Fair	Poor
65-69	15	40%	33%	27%	0%
70-74	54	13%	62%	20%	5%
75-79	66	8%	39%	45%	8%
80-84	31	16%	29%	32%	23%
85-91	8	0%	37%	50%	13%
Means :		13%	44%	34%	9%

Sensory Changes

Vibration Sense.—As changes in vibration sense were among the positive findings noted by earlier observers considerable care was taken in testing for this form of sensation. Bony points on both wrists, elbows, shoulders, ankles, knees, shins, and the sacrum were tested. The percentage registering on the sacrum was uniformly small in every age group. More than 90% appreciated vibration on the bones of the upper extremity. Ankles and shins showed perception in over 70% of cases, but the knees appreciated the sensation in just over 50%. The results are shown in Table IV.

TABLE IV.—Percentage Registering Vibration Sense

Age	No.	Wrists		Elbows		Shldrs.		Ankles		Shins		Knees		Sacrum
		R.	L.	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.	
65-69 ..	16	100	100	100	100	80	94	87	87	94	87	50	56	12
70-74 ..	57	100	100	100	100	98	98	88	84	81	79	61	67	18
75-79 ..	72	100	100	100	100	90	89	76	73	73	74	51	53	15
80-84 ..	32	97	97	94	97	94	94	62	56	62	44	31	34	10
85-91 ..	9	100	100	100	100	100	100	89	89	67	78	67	78	11
Mean:		99	99	98	99	94	94	79	76	75	72	52	56	15

Joint Sense of Position.—The sense of position of joints was tested by moving the great toe on each side. Three tests were made for each toe after a period of irregular movement. The vast majority of patients showed normal position sense in the feet (Table V).

TABLE V.—Position Sense of Toes

Age	No.	Abnormal Right	Abnormal Left
65-69	16	0%	0.5%
70-74	56	4%	3%
75-79	72	2%	3.5%
80-84	33	1%	1%
85-91	9	0%	0%

Nose-Touching.—To my surprise quite a number of the pensioners were unable to touch their noses accurately when their eyes were closed. The resulting movement was not an intention tremor but a definite dysmetria. This was usually present in both hands, but if one alone was involved the left was the site of occurrence more often than the right. Up to the age of 85, increasing years had no effect on the frequency of the abnormal findings (Table VI).

TABLE VI.—Dysmetria in Touching Nose

Age	No.	Right	Left	Both
65-69	16	0%	25%	19%
70-74	56	9%	14%	20%
75-79	72	11%	14%	18%
80-84	33	6%	15%	21%
85-91	9	0%	0%	44%
Mean:		8%	15%	20%

Rotation of Wrists.—This test showed normal results in four-fifths of the men examined. When there was difficulty in carrying out the movements both wrists were equally at fault. The difficulty appeared to be one of performing an unfamiliar series of muscular exercises and not a cerebellar dysfunction. It is significant that the disability percentage increases steadily with the age of the pensioners tested (Table VII).

TABLE VII.—Difficulty in Wrist Rotation

Age	No.	Defective
65-69	16	0%
70-74	56	4%
75-79	72	25%
80-84	33	33%
85-91	9	44%

Pain, Temperature, and Light Touch.—The results of examination for these sensations were often very hard to interpret. Sometimes pain and temperature sense would be diminished over the same area. Sometimes one would be normal while the other seemed impaired. Touch was involved only half as often as the other sensations. Altogether some 45 patients failed to register 73 sensations between them. The findings were most frequent in the age groups between 70 and 85. The sites of anaesthesia were fairly constant, being almost always on either the shin or the forearm. Usually the inner aspects of the limbs were

involved, but the distribution seemed to follow more of a cord segmental pattern than to conform to any actual superficial nerve area. As it is not possible to summarize this information satisfactorily in the form of a table, let me state that 24% of the men showed impairment of one kind or another. Two-fifths of these did not register pain, two-fifths did not register changes in temperature, and one-fifth could not appreciate light touch. Deep pain sensation was not tested in this examination.

Cranial Nerves

In the examination of the cranial nerves, Nos. 1, 2, and 8 were omitted. The only abnormality detected, apart from changes in the pupils, was an external rectus palsy in two cases. The reactions of the pupils were, however, often abnormal. Sometimes they reacted to light alone, sometimes to accommodation alone, often to neither. A small pupil was more common than a dilated one, but the proportion of either was not great enough to impress the observer.

TABLE VIII.—Percentage of Positive Reactions of the Pupils

Age	No.	Light		Accommodation		Neither	
		One	Both	One	Both	One	Both
65-69 ..	16	6	69	0	69	6	12
70-74 ..	57	9	60	0	60	9	25
75-79 ..	72	12	54	7	36	10	24
80-84 ..	32	3	50	0	19	3	44
85-91 ..	9	0	33	0	0	0	67
Mean:		9	54	3	41	8	28

It will be seen from Table VIII that if a response is lost it usually disappears in both pupils. Even at the earliest age group nearly one-third of the men had lost either light or accommodation reaction. The percentage of failures to react increases steadily with age, being more complete in the case of accommodation. A completely inactive pupil was found in two-thirds of those over 85.

Discussion

What is the meaning of the findings recorded above? Let us first try to make a rough statement about the anatomical location of some of the lesions which are indicated. This is not easy, for they appear to be very widely scattered in their distribution.

Judging by the plantar response it would appear that the pyramidal tract is affected in less than 5%, since some of the responses considered abnormal were not of true Babinski type. The frequent absence of the tendon reflexes would suggest possible cord lesions at varying levels. With regard to the sensory losses, it would seem that sensations passing in the lateral spinothalamic tract are lost twice as often as those conducted by the ventral one. A discrepancy appears, however, when the various posterior column sensations are examined. Position sense is normal in the feet of nearly all those examined. Yet vibration is often not felt in the sacrum, ankles, and knees. Dysmetria in the arms is not uncommon. It seems hard to reconcile such findings anatomically. In the same way, the variations in response of the pupils to light and accommodation, tending to become more frequent with advancing years, suggest a progressive but patchy dissolution. It is possible, of course, that some of these lesions may be functional and not organic. For example, it has been shown that the incontinent bladder of old age can be brought under conscious cerebral control by suitable treatment in a number of cases.

The most important result of the investigation, however, is the wide variation of "normal" findings in old age.

Until this is appreciated, non-existent disease of the central nervous system will frequently be suspected or even diagnosed. I have often seen clinical combinations suggesting tabes dorsalis or progressive muscular atrophy in pensioners who were really healthy. Doubtless others have had a similar experience.

Summary

The results of neurological examination in 200 healthy Chelsea pensioners are given.

Absent pupillary reactions, missing tendon-jerks, and superficial reflexes were common motor findings.

Absent vibration sense in sacrum and lower limbs, dysmetria, and patchy analgesia in the forearms and shins were not unusual.

Anatomical location of lesions accounting for such findings was difficult or impossible.

The possibility of misdiagnosis owing to such results of senile deterioration is stressed.

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Medical Memoranda

A Case of Tetanus in a Child

Recovery from tetanus, though not unduly uncommon, merits being reported, especially when there are additional interesting and unusual features in the case.

CASE REPORT

A boy aged 8 was admitted at 1.30 p.m. on June 9, 1947. The receiving officer diagnosed "generalized peritonitis? cause." On June 7 the boy fell down and hurt his left leg and his chest. Shortly afterwards he had pain in the abdomen, which became very severe during the night of June 8. There was no nausea or vomiting. The doctor who first saw him found some rigidity and tenderness of the abdomen and diagnosed intestinal obstruction.

On admission the receiving officer observed "absolute rigidity." When I saw the patient, he was flushed and looked ill; pulse 110, temperature 99° F. (37.2° C.), respiration 26, laboured and with working alae nasi. He had marked fetor oris and a furred tongue. The abdomen was a little tender in the left hypochondrium and right iliac fossa; there was no guarding or rigidity. Nothing abnormal found in chest. Several bruises on left leg, recent scratches on front of right chest, and an old healing abrasion over the right knee were seen. He had no neck rigidity or any difficulty in voluntary movement of limbs, but severe pain on attempted movement of trunk. Back very stiff and lumbar muscles tender. Rectal examination revealed nothing abnormal. Blood count within normal limits. Acetone and a trace of sugar were found in the urine.

At 5 p.m. he could not open his mouth wide enough for inspection of the throat, and the attempt produced a painful spasm of the abdominal muscles. On interrogation he remembered some difficulty in opening his mouth the previous evening. A tentative diagnosis of tetanus was suggested, and became evident at 7.15 p.m. with risus sardonius and typical generalized painful spasm, most pronounced in the abdominal muscles. Treatment was started at 7.30 p.m. with 5 dr. (19 g.) of paraldehyde (in saline) per rectum with 1/200 gr. (0.32 mg.) of atropine subcutaneously. A.T.S. 120,000 units (in two doses) intravenously, and 100,000 units (in three doses) intramuscularly, was given, also 300,000 units of penicillin (in wax). Next day paraldehyde was administered at suitable intervals by the intramuscular route and penicillin was continued. Fluids were taken well and urine was passed. Orthotonus and risus sardonius were well marked, and occasional generalized spasms were still occurring. Next day the pain became more severe and pethidine had to be given as well as paraldehyde. June 12: trismus still marked, but only one generalized spasm occurred. June 13: general rigidity more pronounced than previously; severe pain in both legs, but no spasms; some cutaneous irritation. June 14: well-marked serum rash; still much pain in abdomen, chest, and legs, but no spasms. June 19: trismus less; general improvement definite; solid food started. June 24: no more pain; rash subsided. On June 29 he got up and on July 5 was discharged home.

The boy received 120,000 units of A.T.S. intravenously and 100,000 units intramuscularly in the six hours following diagnosis, 21 dr. (82 g.) of paraldehyde per rectum in the 18 hours following diagnosis, and 65 ml. of paraldehyde by intramuscular injection adminis-

tered over the next 11 days (average 5.9 ml. a day; maximum actually given in 24 hours was 19 ml.). In addition he received 1,700 mg. of pethidine hydrochloride (including 100 mg. orally) in eight days (average 212.5 mg. a day; maximum actually given in 24 hours, including 50 mg. orally, was 300 mg.). A total of 6,900,000 units of penicillin was administered in 21 days. All this actually entailed 96 needle punctures. The old abrasion on the right knee (which was considered to be the portal entry of the infection rather than the recent scratches on the chest) was dressed for about two days with a hydrogen peroxide dressing.

COMMENT

This case has certain curious features. Most notable is the fact that it presented itself as an acute abdomen, and the first two doctors who saw him diagnosed in succession an acute intestinal obstruction and acute generalized peritonitis. The misleading history of a fall within 48 hours of onset raised the possibility of a ruptured spleen or of an osteomyelitis of the vertebral column. The general appearance and laboured breathing suggested the presence of a pneumonia. Risus sardonius did not become evident until about 24 hours after the first appearance of trismus (which at no time prevented the boy from speaking distinctly or drinking) and only a very short period before the onset of generalized spasms. Pethidine appeared to give much relief, definitely more than paraldehyde, especially after the appearance of the serum rash (which started four days after the administration of A.T.S. and took 11 days to subside without any special treatment). The patient remained throughout quite bright and co-operative.

I wish to thank Mr. John Scholefield for permission to publish this case, Dr. Dynski-Klein for her help in establishing the diagnosis, and Dr. Rilstone for admitting this child into my ward.

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Dystocia after Amputation of Cervix

The Manchester operation for prolapse is carried out so often that it is well to record any untoward results. Hunter (1939) drew attention to the occurrence of dystocia and abortion after the operation and urged conservation of the cervix in the child-bearing period. However, the occasional case does occur in which pregnancy follows extensive operation.

CASE REPORT

In November, 1938, a patient, then aged 40, was treated by anterior and posterior colporrhaphy and amputation of the cervix for procidentia. The cervix was grossly lacerated and hypertrophied, so that the amputation was maximal. There had been four children, all delivered by forceps, and subsequent pregnancy was not anticipated. The cure was complete, and the menstrual cycle was not altered except that the periods were rather scanty.

In September, 1944, the patient's doctor (Harold Hirsch, of Stockport) sought her admission to hospital. He stated that she had been two days in labour, and that although the head was well down in the pelvis he could distinguish no external os on vaginal examination. This examination was repeated in hospital, with the same findings. The head was separated from the examining finger by a thin sheet of muscle in which there seemed to be no aperture. Lower-segment caesarean section was carried out immediately. On exploring the lower pole of the uterine cavity from above no internal os could be found, but there was a definite dimpling where the muscle seemed very thin. After closing the abdomen, vaginal examination was carried out with antiseptic precautions. No blood was present in the vagina, nor could any be expressed. The thin area mentioned above was identified and deliberately perforated with the finger, after which lochia drained freely.

The puerperium was satisfactory, the lochia being normal for a caesarean case—i.e., rather scanty. Vaginal examination was repeated on the 17th day, when again no external os could be identified. Obviously some orifice must have survived the first operation, otherwise neither menstruation nor conception could have occurred. It is suggested that cicatrization had reduced it to a very small aperture, and that the swelling consequent upon the hyper-vascularity of pregnancy had completed the closure.

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