VII

High Blood Pressure

In 1733 the Reverend Stephen Hales cannulated a mare's carotid artery using a goose's trachea to which an eleven foot upright glass tube was attached. The blood rose in the tube to a height of eight feet three inches above the level of the left ventricle.[1] No other direct ways of recording blood pressure and no indirect means were devised before the end of the eighteenth century even though a "hard" artery difficult to compress when taking the pulse had long been recognized. The incidence and severity of high blood pressure during the Georgian era will therefore never be known. However, it is possible to garner information about the changing eighteenth-century incidence of factors now known to be associated with blood pressure elevation, notably age, smoking, obesity and some specific aspects of diet. The changing age structure of the population of eighteenth-century England was reviewed in Chapter III where it was shown that there was a rise in the absolute numbers of people living to middle and old age. The growth in tobacco usage at the turn of the eighteenth century has been detailed in the previous chapter where a connection between nicotine absorption and blood pressure elevation was noted. Consideration of other factors conducive to high blood pressure follows.

Obesity

The gargantuan meals that were consumed by members of eighteenth-century English society have been described above. The resulting obesity did not escape contemporary notice. It received considerable attention in the cartoons of Thomas Rowlandson, the engravings of William Hogarth and the caricatures of James Gillray (Illustrations 6–8). Rowlandson's depiction of feasting aldermen (Illustration 7) and Gillray's caricature of the Prince of Wales (Illustration 8) are exaggerations, but they have a basis in reality. The judge in illustration 3 shows a typical eighteenth-century example of fairly marked truncal obesity. Although gluttony and its consequences were subject to criticism by contemporary moralists, both religious and secular, being overweight was not generally viewed askance in the Georgian era, attitudes towards corpulence contrasting with those of later times. "The boards of the rich remained mountainous and unsubtle."[2]

One detailed record of people's weights in the eighteenth century has been preserved. Messrs Berry Brothers, a firm of wine and coffee merchants founded in 1698, installed a beam scale in their London shop for the exclusive use of their customers (Illustration 9). Beginning in the early eighteenth century their patrons weighed themselves year

[1] George Pickering, 'Systemic arterial hypertension', in A P Fishman and D W Richards (eds), *Circulation of the blood: men and ideas*, New York, Oxford University Press, 1964, p. 489.
[2] Roy Porter, *English society in the eighteenth century*, London, Penguin, 1990, p. 216.

Illustration 6: Simon Fraser, Lord Lovat (1667–1747). Etching after W Hogarth (from the collection of Ronald Paulson, reproduced with permission).

by year and the results were duly noted in the firm's records. Note was made of whether the person wore ordinary clothes or an army or navy uniform. The scale is still in use and the firm continues to record the weights of its patrons. Unfortunately, listings prior to 1765 are no longer available and, with few exceptions, there is no information about the ages of the patrons. In 1884, Francis Galton used this source to publish data concerning the weights of 139 members of the greater and lesser nobility who were born in the eighteenth century. They were selected because serial measurements could often be obtained and the age of each subject ascertained readily from other sources. The initial average weights are not necessarily indicative of obesity, especially as the heights were not recorded, but the results indicate an overall considerable gain in weight after early adulthood (Table VII.1).[3] Unless underweight in early adult life, many must have been overweight by middle age.

My own perusal of the records from 1765 to 1780 resulted in a listing of the weights of some 305 men, civilian and military who were patrons of Berry Brothers. If serial weights of any individual had been listed, the first alone was tabulated. Shoes or boots had been worn while the person was weighed and occasionally military accoutrements were not removed. The weights are therefore over-estimates to some extent and they cannot be related to height, which, as noted above, had

[3] Francis Galton, 'The weights of British noblemen during the last three generations', *Nature*, 1884, **29**: 266–8, p. 267.

Illustration 7: A vision of the first of Mayor of London appears to feasting aldermen to warn them against luxury. Etching by Thomas Rowlandson, 1809. (Wellcome Library, London.)

Table VII.1
Average weights (lbs) of male members of the English nobility. Cohort born between 1740 and 1769

Mean age (1st weighing)	Average weight	No. of observations*
27	166	13
30	176	18
40	184	24
50	181	21
60	181	18
70	180	12

* These exceed the number of subjects as serial weights were obtained in some instances.

Source: Francis Galton, 'The weights of British noblemen during the last three generations', *Nature*, 1884, **29**: 266–8, p. 267.

not been measured. However, even with these limitations, the records indicate that obesity was certainly not uncommon. Forty-two of the 305 men weighed 200 pounds or more and four were in excess of 250 pounds (Table VII.2).

Examination of the association of hypertension with obesity has to take account of cuff artefact: apparently high blood pressure readings are observed when a cuff

Illustration 8: 'A Voluptuary under the horrors of Digestion'. The Prince of Wales lingers over a meal at Carlton House. Caricature by James Gillray, 1792. (© Copyright The British Museum.)

of standard width is wrapped around an "outsize" arm. The pressure to which the cuff has to be inflated in order to compress the main artery in the upper arm is increased in this circumstance. However, the falsely high readings thus obtained can

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Table VII.2
Weights of male wine store patrons, 1765–80

Weight (lbs)	Number	% of total
<150	87	28.5
150–174	117	38.4
175–199	59	19.3
200–224	28	9.2
225–249	10	3.3
>250	4	1.4

Based on author's perusal of Messrs Berry Brothers' and Rudd's records. (Permission for abstracting records given and facilitated.)

Illustration 9: The beam scale at Berry Brothers and Rudd Ltd. (Reproduced with permission.)

be avoided quite simply by use of a special wide cuff. With this measure an association of obesity with high blood pressure has been found to be independent of cuff artefact. As examples, this relationship was found in insurance company data (Table V.15) and in the Framingham study in which blood pressure was reported to be, among various risk factors, the "strongest correlate" with weight. Jeremiah Stamler and his colleagues recorded very highly significant positive correlations between weight and blood pressure, systolic and diastolic, in both sexes and at various ages.[4] A direct

[4] Jeremiah Stamler, R Stamler and T N Pullman (eds), *The epidemiology of hypertension: proceedings of an international symposium ... Chicago, Illinois*, London, Grune and Stratton, 1967, p. 113.

causative relationship is suggested by the findings of Efrain Reisin and his colleagues who showed that even if salt intake is kept constant, overweight hypertensive subjects who diet successfully have significant reductions in blood pressure.[5] More specifically, Pirjo Pietinen and fellow workers undertook a comprehensive review of studies relating animal fat intake to blood pressure elevation. It was found that in populations as disparate as those of Finland and the United States there was a positive relationship between a diet high in saturated and low in polyunsaturated fat on the one hand and blood pressure levels on the other.[6] Conversely, other studies reviewed by these authors showed that increasing the P/S ratio was followed by a fall in blood pressure even if the total fat intake remained the same. The decline in systolic blood pressure ranged from 1 to 13 mmHg and up to 8 mmHg in the case of the diastolic. Switchback observations with reduction in P/S ratio were made in nine studies. In seven they resulted in an increase in systolic and diastolic pressures when the ratio was low.[7] The findings of J M Iacono and co-workers were confirmatory. They found that a six-week reduction in dietary fat content from 42 to 25 per cent with an *increase* in the polyunsaturated–saturated ratio resulted in a reduction in both the systolic and the diastolic pressures of normotensive healthy adult volunteers. The total energy intake was unchanged during the observation period.[8] Quantitatively, linoleic acid was the commonest polyunsaturated fatty acid in these diets. In experimental rats its administration has been found to have a diuretic effect, increasing sodium excretion, a precursor of blood pressure fall.[9] In contrast, Pietinen and colleagues have reported animal studies indicating that diets *deficient* in linoleic acid are associated with blood pressure *elevation*.[10] In combination these observations indicate a linkage of hypertension with diets conducive to obesity and either high in saturated or low in unsaturated fats.

Fibre

The evidence for a decline in consumption of fibre by the middle and upper classes during the course of the eighteenth century was presented in Chapter V. A considerable body of evidence is indicative of an inverse relationship between fibre intake and blood pressure levels. Angela Wright and her colleagues compared the blood pressures of ninety-four subjects taking experimental diets that were consistently either high or low in fibre. At the end of four weeks the mean systolic and diastolic pressures

[5] Efrain Reisin *et al.*, 'Effect of weight loss without salt restriction on the reduction of blood pressure in overweight hypertensive patients', *N Engl J Med*, 1978, **298**: 1–6, pp. 2–4.

[6] Pirjo Pietinen *et al.*, 'Dietary fat and blood pressure—a review', *Eur Heart J*, 1987, **8:** Suppl B 9–17, p. 11.

[7] Ibid., p. 12.

[8] J M Iacono *et al.*, 'Reduction in blood pressure associated with high polyunsaturated fat diets that reduce blood cholesterol in man', *Prev Med*, 1975, **4**: 426–43, p. 443.

[9] J Rosenthal, P G Simone and A Silbergleit, 'Effects of prostaglandin deficiency natriuresis, diuresis and blood pressure', *Prostaglandins*, 1974, **5**: 435–40, p. 440.

[10] Pietinen *et al.*, op. cit., note 6 above, p. 13.