Food for Life: Galen’s On Health
(De sanitate tuenda)

Abstract. In Galen’s view, health was a natural state and disease unnatural. If a body became unwell, balance was best restored by adjustments to daily life, in particular to the environment, food and drink, exercise, sleep, physiological balance and mental health. If none of these worked, only then should drugs or more drastic treatments be considered. Galen sets out in On Health how the natural state is best preserved, starting from birth, through childhood, to adulthood and old age. There are several features to be noted, not least the relentlessly male focus (with childbirth the major area of consideration for women specifically) and the use of the idealised young man as the canon against which to measure all bodies. This latter feature has led commentators to suppose that Galen only has the leisured rich class in mind, wrongly I believe. Two recent translations in the Loeb series (Johnston) and in the CUP Galen series (Singer forthcoming) have made the text readily available to all, and further discussion is timely. In my paper I will focus on Galen’s use of diet and massage to keep the body healthy. I shall also consider the unhealthy body which takes up the last three of the six books, as the life span nears later age and greater fragility. Even here, Galen prefers food and gentle remedies to bloodletting and drugs (which are in effect often stronger versions of food plants). Galen claims that this regime has kept him healthy for 50 years, despite his less than perfect constitution and lifestyle. He is thus a doctor who experiments on himself to promote a lifestyle which, he claims, should, after an initial assessment, maintain the patient without need of a doctor for life.

Keywords: ancient medicine, Greek medicine, Galen, De Sanitate Tuenda, health, disease, food

For the past 150 years, Galen has been on the back foot, rejected by medical science after the discovery of microbiological organisms. He was rejected too in Classics as an extensive writer in the rhetorical style of the second and third centuries AD, which supposedly lacked the ideal canonical qualities of the Classical Period. Furthermore, he was considered a technical writer who belonged to the Medical School rather than the Classics Department.

There are some exceptions to this, most notably the Corpus Medicorum Graecorum (CMG) published by the Berlin Academy for the past 100 years, and more recently the Budé Galen series and the new Cambridge Galen in Translation (first volume 2013), which has just brought out Peter Singer’s translation of Health (San. Tu.).
Things however are changing. Canonical texts have ceded ground to works written in the Greco-Roman period and in later Antiquity. And in medical science, there is more recognition than 60 years ago of the contribution of lifestyle to mortality rates. Medical success in areas of multiple deprivation such as Glasgow in the UK is limited, while depression, diabetes and heart disease are major challenges in all five continents according to the WHO, all caused or exacerbated by the way of life in modern societies. Poorer countries suffer more from the challenges Galen himself faced, neonatal mortality for mother and baby in particular.

In this chapter I want to explore how Galen might contribute to good health in the modern world (along with Ayurvedic and TCM probably). I begin with some basic comments on pharmacology, and then move to deeper reflection of Galen’s methods for preserving health, with drug remedies only a final resort. In a final coda I suggest that Galen’s approach to balance in medicine and his belief in health as a natural state may contribute something to modern health systems which are overburdened by diseases generated by modern ways of living in more wealthy countries.

Galen’s pharmacology

Galen’s understanding of how drugs work is based on ‘mixtures’ of the ‘qualities’ heating, cooling, moistening and drying. A world apart from microbiology. But what both drug systems have in common are preparations or isolated products from plants, animals and minerals. Manuela Marai¹ notes that in the period 1981 to 2014, 73% of drug products commercially available were plant-based². A few examples: Yew (Taxus spp) was known to Galen as a toxin; it has proved a valuable drug in chemotherapy. Artemisia spp. (wormwood and related plants) were known to Galen as a heating and drying plant: it has been found to be efficacious by Chinese doctors in the treatment of malaria. Willow bark, efficacious for Galen, is isolated as a painkiller in the drug aspirin. Finally Vinca spp were known to Galen (SMT 12.31): a member of that family, Vinca rosea has been found an effective treatment for childhood leukaemia³. These are similar plant families used in deeply different medical systems, ancient and modern.

Another approach to understanding ancient drug therapy has recently opened up. Manuela Marai⁴ has found that a preparation for healing wounds in Galen’s therapeutic work De methodo medendi and in his Compound Medicines according to Place shows a consistency of approach. A green plaster found in 160 formulations

¹ M. Marai, A Green Plaster for Wound Healing. Antimicrobial Formulations and the Use of Plant Resins in Graeco-Roman medicine, https://warwick.ac.uk/fac/arts/classics/research/publicengagement/impact/material_musings/2023/#March [31 V 2023].
⁴ M. Marai, A Green Plaster for...
for certain compound drugs has common features, Marai has found. Common elements are a beeswax base, a drying element (often copper compounds) and plant resins. These recipes are used in plasters to restore tissue and heal wounds or ulcers. Marai has followed work by the microbiologist Freya Harrison as applied to some Mediaeval recipes in the UK. Experiments show that the compounds contain microbial properties which act against infection. This constitutes a modern scientific understanding of compounds conceived by Galen in his completely different system. Key features here are consistency across Galen’s recipes and a possible measure of efficacy.

A related study by Effie Photos-Jones5 has shown that Lemnian Earth, as described by Galen and identified at a sanctuary on Lemnos that had exclusive mining rights, might be seen to be effective in modern scientific terms. Galen tells us (SMT 12.169) that when the priestess of Artemis received the clay from the miners, she gave in exchange cereal grains. She then set up the drying and authenticating process, which produced discs of clay with a seal of Artemis stamped in it. Galen describes the clay and the cereal grains very precisely. Microbial action may have resulted from Penicillium fungi linked with the rotting cereal grains that had been added to the reserves of Lemnian Earth.

A further project in Prague on the reconstruction of ancient perfume manufacture within a modern scientific framework has shown how the resins mentioned in Marai’s ingredients, for example, can be found to be efficacious in certain preparations6.

### Galen on preserving good health

These studies all explore how Galen’s drugs might in a modern methodology be understood to work. I turn now to the much lower level of proof needed to understand Galen’s advice on preventive medicine. This involves ways of life and ways of living, with drugs only called upon in exceptional cases where things have gone wrong. The major feature here is the concept of συμμετρία or balance.

In Galen’s view, health was a natural state and disease unnatural. If a body became unwell, balance was best restored by adjustments to daily life, in particular to the environment, food and drink, exercise, sleep, physiological balance and mental health. These are the six necessary activities, later known as Galen’s six non-naturals. They are activities, ἐνέργειαι, in the sense of an action which acts on the body in actuality rather than potentially, for which Galen’s word, after Aristotle, is δύναμις. If none of these worked, only then should drugs or more

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drastic treatments be considered. Galen sets out in *On Health* how the natural state is best preserved, starting from birth, through childhood, to adulthood and old age. There are several features to be noted, not least the relentlessly male focus (with childbirth the major area of consideration for women specifically) and the use of the idealised young man as the canon against which to measure all bodies. This latter feature has led commentators to suppose that Galen only has the leisureed rich class in mind, wrongly I believe.

This discussion is timely since two recent translations have appeared, one in the Loeb series, by Ian Johnston 7 and one in the Cambridge Galen in Translation series8. These translations have made the text readily available to all, the former using more technical medical vocabulary for the general reader. These translations replace R. M. Green 19519, which in attempting to mediate Galen to the 20th century, does not translate technical terms consistently and also introduces some plants not known to the ancient world. The translations benefit from the excellent CMG edition of Helmreich 192310.

Galen's study of preserving health is based on his model of the human body, which sustains itself, as noted above, through ‘mixtures’ of ‘qualities’, of which the predominant are heating, cooling, drying and moistening. Deriving ultimately from the four elements earth, air, fire and water, these qualities govern stability and change in the body, each body being different and natural to itself, as Galen sets out in his treatise *Mixtures*, itself recently translated by Peter Singer in the CGT series. Rebalancing the body may require bathing, modifications in diet or drug therapy, depending upon the severity of the disruption to the body’s individual natural balance: fevers for example are a major challenge, ‘fatigue’ to which I return below a moderately serious condition, and the daily restoration of energy to the body taken up in movement of the muscles and maintaining body heat is a routine demand but a matter of restoring the body’s substance rather than a change or challenge. In the words of Galen’s proemium to SMT, a drug changes the body, whereas a food maintains it. Galen discusses this process of replacing lost energy in the body at the beginning of *San.Tu.* (1.3), and this typifies his approach to physiology in this particular treatise. It is the background nature of the body, on which the natural and necessary activities act. Food and drink are part of the essential maintenance of the body: as Galen says. All animals lose substance11

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10 Galeni De sanitate tuenda, ed. G. Helmreich, Lipsiae 1923 [= CMG, V.4.2].
11 In this sense human beings like most if not all animals are ’needy’, needing this energy replacement as part of being mortal. This divides humans and other animals from gods: in myth, human beings are particularly needy because their babies are helpless and take a long time to grow. In some respects human beings are the most needy of animals, as Protagoras suggests in the myth of Prometheus and Epimetheus in Plato’s *Protagoras*. 
(οὐσία) through the loss of body heat and the effects of breathing and pulsation: such substance when replaced is not identical with what was lost but must be as close as possible (οἰκεῖος) to the original substance. Bread and cheese have very different substance from blood and bone, and so considerable change is needed in the digestive process, a change which if not perfectly conducted will produce ‘residues’ which may disrupt body systems. Food intake is one of the necessary activities, to which I now turn.

In this chapter I will focus on two of Galen’s necessary activities, his use of diet and massage to keep the body healthy, and his concerns with mental health. I shall also consider the unhealthy body which takes up the last three of the six books. The book follows the life cycle from birth to old age: as the life span nears later age there is greater fragility. Even here, though, the body can be healthy. If other challenges face the body, Galen still prefers food and gentle remedies to bloodletting and drugs (which are often in effect stronger versions of food plants). The main challenge in this volume is ‘fatigue’, κόπος, arising from unbalanced exercise or inappropriate foods.

Galen claims that this regime has kept him healthy for 50 years, despite his less than perfect constitution and lifestyle (Health 5.1, 136.14–35 Helmreich, 6.308–9 K). He is thus a doctor who experiments on himself to promote a lifestyle which, he claims (6.14, 197.15–7 Helmreich, 6.450 K), should, after an initial assessment, maintain the patient for life, without need of a doctor. Unless accidents befall, such as injury, plague, or indeed ‘fatigue’ from which Galen occasionally suffered, so arduously did he attend to patients and research during the hours of night when he should have been asleep. Galen’s best remedies to restore balance in mind and body are simple meals, bathing and massage. It should be noted that activities at the gymnasium and bath complex, most often in the afternoon in Greco-Roman cities, are a great preoccupation in Galen’s advice on healthy living. He is building his lifestyle that is nicely balanced around the daily life of many people of all classes in Greco-Roman culture. The bath-house is where moderate exercise could be undertaken and where bathing in waters of different temperature and even more so various kinds of massage could relax or close the pores in the skin and allow the body to retain or lose heat and also retain or lose certain bodily fluids. Particularly important in this regard is the removal of unhealthy fluids which had been created by excessive exercise, anger or imperfect digestion.

Massage is a procedure which dominates in books two and three of San.Tu. It is something which huge numbers of the population of cities undertook when they visited the public baths, normally in the afternoon. Wealthy people may have had private facilities in their villas. Galen refers to the well-known series of pools

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12 There are similar examples in Alim.Fac. and SMT.
13 136.27 Helmreich: ‘fatigue’ combined with fever.
14 The wealthy, men and women, Imperial slaves, manual workers, to take some examples.
in the baths, ranging from cold to hot and steamy, but the massage is important in our treatise, to the extent that Galen investigates an early (non-medical) study by a trainer called Theon, and then extends his own advice. Massage provides a way of opening or closing the pores, depending on whether it is a dry massage, or the familiar massage with olive oil, and depending too on the vigour or gentleness with which the pressure of the masseur’s hand is applied. Galen treats massage extensively also in SMT, in the second book, when he is considering how doctors assess the impact of treatments on the body and evaluate the evidence of certain medical techniques, making the point that drugs are as much a matter of technique and external treatment as internal applications. There too, an earlier study by the otherwise unknown Archidamus had provided misleading guidance in Galen’s view, guidance which had been unwisely believed by the influential doctor of the fourth century BC, Diocles of Carystus. Baths and massage are part of the treatment of wounds and ulcers also in De methodo medendi (MM). All this makes clear that Galen considers massage part of the doctor’s repertoire of non-invasive therapy which can restore any imbalances in the body on a regular and non-invasive basis, just as eating provides regular maintenance of body systems on a daily basis, with no medical intervention needed unless inappropriate foods disrupt the digestive system and produce an imbalance in body heat, for example. Such an imbalance might lead to a fever, and then to a form of ‘fatigue’, which, again, is treatable within the gentle remedies of San.Tu.

The aim of all procedures in San.Tu. is to maintain συμμετρία or balance, and to restore it if it has been disturbed by disease or by an accident. Balance is particular to every body, as is the body’s mixture; but for purposes of calibration, Galen develops the concept of the perfect balance of the body which is the standard, or κάνων in Greek. Galen derived it from the Canon of Polyclitus, a work based by the sculptor on his doryphoros which was cast in bronze in about 440 BC. The statue claimed to have perfect proportion between the parts of the body. Galen took this further and explored the internal proportions (συμμετρία) of the human body, that is the proportions between organs, external parts and the connective passages of the body. Singer summaries the discussions of Galen in a number of treatises, to which we should add SMT, which refers to a standard without mentioning the spear-bearer explicitly (11.715 and 725 K). Such a body in perfect proportion will be trained from birth in the methods of balance, will be a body that does not have to work excessively, and will ideally be the body of a young man.

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15 See Ph. van der Eijk 2000.
16 1.5, 8.14–14.28 H, 6.13–29 K.
17 P. Singer 2018, p. 93.
who is living in a well-balanced environment. Such a person has a good chance of having a body that is ‘well-fleshed’ and ‘with a good mixture’. Galen however has to modify and calibrate this ideal body in order to deal with the vast majority of human bodies which are sub-optimal. Such a perfect mixture is

the clearest proof that not even these [the single, fully finished mixtures] have absolutely the best mixture, since that state does not remain [long-term]; but we should accept first of all that there is change with age, with no life-stage ever remaining in the same state, but always tending towards a dryer state. Secondly, that there are differences for those asleep and those awake, in rest and in movement, and in the movements themselves. Then difference in the demands of hunger and thirst, or eating and drinking, or being full of food and of drink. And in addition to these, again, bathing, emotions, anxieties, distress, and all such things all but change the mixture at each turn (San.Tu. 1.5, 14.11–20 H, 6.28 K).

Galen adds to this modification in 1.6 the idea that different parts of the body have different mixtures: the head may be perfectly constituted, but the thorax, abdomen and genitals have poor mixtures.

Singer adds to this picture the seasons and what we would call the climate and environment. Much of Galen’s thought derives from the Hippocratic Regimen 3.68, though Galen ignores the ‘Hippocratic’ link on this occasion since he was doubtful about the authorship of the four Regimen treatises, based as they are on a cosmos composed of two elements only, fire and water. We shall see Galen in very ‘Hippocratic’ vein at San.Tu. 2.7 below. The body is affected by seasonal change and balance in the air and temperature. If we are to have a reasonably proportioned body inside and out we must also have a climate that is in no sense extreme, as, for example, Galen finds the cold of Germany and the heat of Libya to be (1.5). In addition to environmental change, our treatise is structured loosely around the seven ages of man, on which see Singer. Galen broadly follows this structure through books 1–3, then, for later stages of life, the challenges tend to dominate, whether of exercise and fatigue or the body-changes which come with old age. Galen’s overall model is the baby at the start of life with a warmer and moister nature, while the aged body is cooler and dryer. He has inherited this from the Hippocratic and other earlier authors.

At the beginning of life, then, babies need the best food, and a sense of rhythm from the earliest age. The best food is breastmilk, since it is closest in nature to the baby’s own nature. Galen envisages that either the mother or the wet nurse will feed the baby: this is one of the few occasions in the treatise in which women are mentioned, and it is in the context of reproduction as is often the case

20 On which see P.N. Singer, Time for the Ancients..., p. 40–52. Singer discusses for example, Aristotle Politics 7.17, 1336b40–1337a1, Hippocrates, De hebdomadibus, along with San.Tu.
21 Mother’s milk is best: 1.7, 17.13–18.11, 6.35–6 K.
in Hippocratic and Galenic medicine. How the female body might be affected by food, employment or environment more widely is not considered.

Moderate movement and careful use of the voice are also desirable for the new baby (1.6, 18.13–4, 6.37 K). Massage should be administered, in a rhythmic form. The young person may need all sorts of other training in rhymes and orderly living, even including songs and ridiculous mimes at precincts of Asclepius. These too help to calm a troubled soul: 20.13–7 H, 6.41 K. At 20.31–21.3 H, 6.30 K, Galen advises further on the baby’s mental well-being as follows:

Small children with the best constitution – for it is those that we are talking about – need considerable care to ensure there is no immoderate motion occurring in their souls [minds]. Since they do not yet have the ability to speak, they cry, shout, get angry and move erratically to show their distress. What they need must be provided on each occasion before their discomfort grows and the stronger and erratic movement involves the whole soul and the body.

This holistic view of balancing mind and body by attending closely to needs informs the whole treatise. Singer has studied the many passages in Health in which Galen identifies rage, anger, grief and other emotions as a danger too well-being and conditions not only of the emotions but of the full body and soul complex of the individual. Singer shows that in this and other treatises Galen sees mental imbalances as a product of the physical body and its complex structures, in contrast with his psychological works in which the soul is the object of investigation.

The nature of the human and animal body is such that exercise and the other non-naturals support and guarantee balance of mind and body:

The limbs at this [young] age reveal the extent to which our nature is suited to exercises. For not even if you locked up children would you be able to stop them running about and frisking like colts and calves. Nature is able to embed appropriate impulses for health and safety in all animals 19.4–9.

At an adolescent age, the young man needs further balancing, in particular at the gym and baths, especially at the right time of year that is best balanced, namely the spring. Galen details what is needed at 2.7: in order to follow the canon of Polyclitus (56.27–8 H, 6.126 K) the young man has the best chance if the location is moderate (56.33 H) as too the climate (56.34–6 H). It should be the middle of spring, preferably at midday, in a well-climatized building: this will ideally allow his body to be at a moderate temperature and in balance before the massage starts. Many more details follow, the intricacy of which is based on Galen’s desire to set out what the best possible circumstances for maintaining what a balanced body


23 Galen, Psychological Writings, trans. P.N. Singer, Ph. van der Eijk, Cambridge 2013 [= CGT].
and mind need, from which to calibrate what an ordinary body will need with its minor imperfections.

There is less emphasis on age after this, and adverse balances, especially fatigue are addressed. They may be ulcerous, tensive or inflammatory. The first form, ulcerous fatigue, receives most of Galen’s attention. There are facilities for people who do not submit willingly to certain procedures such as blood-letting: dietary and other adjustments, and substitutes are provided for those who cannot afford expensive drugs.

Ulcerous fatigue may have many causes, the most likely being poor digestion of food, excessive emotion or excessive exercise. The condition causes acrid fluids to build up in parts of the body, perhaps under the skin, in the joints, or within the muscles and their ligaments. The doctor needs to intervene in such cases and establish what the patient normally does in such circumstances. Has something unusual happened? Does the patient use vomiting or other evacuations to address the problem? Has the patient eaten anything unusual? Or drunk sweet wine rather than the usual wine? Bloodletting may be needed, failing which, massage, purges, fasting, rest and drug treatment should work as an alternative. Various drug recipes are proposed for such ulcerous fatigue: ‘Diospolis’, honey recipes, and a cat-mint and fir-cone recipe.

Before further corrective treatments are prescribed, Galen returns to the ages of man structure with modified diets suitable for the very old. Such people can maintain a balanced life, though with modifications such as wine to heat the body and massage to address dryness. Doctor Telephus, who is 80, continues to practice: he lives in a well organised house, cool in summer and warm in winter, walks round the city, and eats a diet of lighter foods, especially fish from rocky waters and birds, preferably from wild hills. At 100, the orator Antiochus has a similar routine and diet. He bathes more in summer than winter, eats vegetables and fish, and has bread soaked in wine for supper. Exercise and massage for both men are calibrated for their ages.

Coda

The coda mentions some benefits which might accrue from the adoption of Galen’s six non-naturals in 2023, as an analogue to run alongside biomedicine with all its remarkable insights and possibilities. Galen is not a threat or ‘wrong’ but a potential asset for modern health systems.

Before turning to our own times, I mention an engagement with Galen in Scotland during the First World War in Europe. The Scottish physician Arthur Brock treated victims of shell-shock and other traumas in the trench warfare of Northern France. In these early years of the development of Psychology, he used techniques such as talking therapy, engagement with nature and socialisation in order to restore troubled minds to calm and balance. One of his most influential patients
at the Craiglockart Hospital in Edinburgh was the war poet Wilfred Owen, who returned to the trenches and was killed. Brock’s colleague, William Rivers, used slightly different techniques on his patients, among whom was the distinguished war poet Siegfried Sassoon. Rivers had helped to develop the new discipline at Cambridge University, and while interested in Jung and Freud, followed his own specialities of vision and neurosis.

Brock however had two major influences upon him. First the visionary sociologist and town planner, another Scotsman, Patrick Geddes, who believed that the urban poor had as much need of hygienic homes and green spaces, including gardens, as wealthy people, and persuaded the rich inhabitants of the Edinburgh New Town to finance slum-clearance and gardens in the notoriously unhealthy Old Town. Geddes also designed the town of Tel-Aviv and continued his work from Montpellier. Geddes believed in a big, socialised, community-based world within the terrible stresses of urbanisation and industrialisation in the Britain of the early twentieth century, rather like Ebenezer Howard, the designer of the Garden Cities of Letchworth and Welwyn in the South of England. Brock was rather more utopian than Geddes, favouring countryside over town and tradition over modern industry.

His other influence was Galen. He translated Natural Faculties into English in the Loeb series in 1916, the only Galen volume in that series in the twentieth century and well into the twenty first. He might well have wished to translate Health for Loeb, had the opportunity arisen. He also produced Brock 192924, a translation of selected works of ancient medicine by authors that he thought important. Galen figures extensively. Galen’s approach to nature and the ‘natural’ human body resonated with Brock while he was treating minds shocked by the impact of industrialised warfare in the trenches of France.

Galen provided a way forward for mental health at one of the worst times in twentieth century history. More destruction was to follow of course. I believe that Galen may be able to inspire us in turn, in our own time, as we face the challenges of global warming and the damage done to natural and human systems by over-zealous industrial processes.

Galen’s six non-naturals can, I believe, be integrated into life in most countries in the 21st century. A survey taken on a non-controlled basis of 900 people in the UK25 found that of the six non-naturals, the one that respondents found most urgent for them to address comes under the heading of exercise, in particular stress at work, which Galen might call ‘fatigue’, namely the fallout from actions followed with too much intensity.

24 A. Brock, Greek Medicine. Being Extracts Illustrative of Authors from Hippocrates to Galen, Dent 1929.
Many people who have heard a description of Galen’s programme pronounce that it is ‘common sense’. But of course human societies rarely follow common sense, if such a term has any meaning. The World Health Organisation predicts that the main causes of death in 2030 in all five inhabited continents of the world will be diseases caused in part by modern ways of living, namely heart disease, diabetes and depression, together with other mental health conditions.

To people likely to suffer such conditions, whether through their way of life, stress, subjection to advertising, or whatever it might be, Galen offers balance and moderation in all six relevant areas, not least in the unreasonable burdens imposed by employers. Even here, as with the ditch diggers and harvest workers, Galen had moderate measures to rebalance those involved in heavy manual work. As too with imperial slaves subject to an unreasonable emperor, as we have seen.

Furthermore, Galen’s system offers integration of physical and mental health systems, which many health services do not offer in the modern world, as is well exemplified by an under-resourced mental health service in the UK. Galen’s system was not his own invention, but was inherited from Hippocratic and other predecessors, including those with whom he strongly disagreed, such as Asclepiades of Bithynia and the Methodists. The message about moderation and balance comes from ancient medical thought more widely.

The key feature of Galen’s system, along with balance and moderation, is that health is a recognisable state which is ‘natural’ and achievable for each individual from cradle to grave. The human body is an organic whole and not a machine like a car, to be serviced by a mechanic at regular intervals.

**Bibliography**

**Brock A.,** *Greek Medicine. Being Extracts Illustrative of Authors from Hippocrates to Galen,* Dent 1929.


**Galen,** *Hygiene,* trans. R.M. Green, Springfield 1951.


**Galen,** *Psychological Writings,* trans. P.N. Singer, Ph. van der Eijk, Cambridge 2013 [= Cambridge Galen Translations].


**Galeni De sanitate tuenda,** ed. G. Helmreich, Lipsiae 1923 [= Corpus Medicorum Graecorum, V.4.2].


**John Wilkins**

University of Exeter
Department of Classics and Ancient History
Room 342, Amory Building
Rennes Drive
Streatham Campus Exeter EX4 4RJ, Great Britain
J.M.Wilkins@exeter.ac.uk

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