



Comment on: Construction of simplified models to simulate estrogenic disruptions by esters of 4-hydroxybenzoic acid (parabens). Patricia Guadarrama, Serguei Fomine, Roberto Salcedo, Ana Martínez. *Biophys. Chem.* 137 (2008) 1–6.
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I wish to point out several serious failings in the conclusions of this recent paper [1]. Both claims – that methylparaben is the most potent oestrogen mimic and the most active antibacterial compound amongst the parabens – are in direct contravention with all the published evidence to date. Several groups have studied the oestrogenic activities of some of the parabens using the rat uterotrophic assay, including Routledge [2] and Houssani [3] and, in all cases methylparaben was concluded to be orders of magnitude weaker than butylparaben. For example, Routledge determined that methylparaben was 2,500,000 times weaker than oestradiol, whereas butylparaben was only 10,000 times weaker than oestradiol in their *in vitro* study. It may be concluded, therefore, that methylparaben is 250 times weaker than butylparaben. Indeed, in Routledge's *in vivo* study [2], methylparaben demonstrated no detectable oestrogenic activity, compared with butylparaben being determined as 100,000 times weaker than oestradiol. From these data it is difficult to accept that the model proposed by the authors of [1] has any semblance of accuracy.

The authors' claim that the results obtained are in agreement with experimental studies of extraction and quantification of parabens in tumours is totally illogical, since the study to which the authors refer, by Darbre et al. [4] contains no determination of oestrogenic activity, and only claims to have detected the presence of parabens in the tumours. There is no connection between the presence of parabens and their relative potency as oestrogen mimics as neither the presence, nor the relative concentrations present can be indicative of relative oestrogenic activity. It is difficult, therefore, to comprehend how the authors concluded that methylparaben is more oestrogenic

than butylparaben simply because it appeared to be present in the tissues tested at a higher concentration. Indeed, the Darbre study fails to prove conclusively the presence of parabens in tumour tissue as the blank samples were also found to contain parabens, and at concentrations statistically indistinguishable from those found in the tumours themselves.

The claim that methylparaben is the most potent antibacterial amongst the parabens is not borne out by the wealth of data available from any manufacturer or supplier of these materials. Table 1 lists the minimum inhibitory concentrations of methylparaben against a range of bacteria and, for comparison, against some fungi.

The data in Table 1 are typical of the values quoted by all parabens manufacturers.

Table 1

Minimum inhibitory concentrations (mic) of parabens against various microbial species [5]

Organism	Paraben	mic (%)
<i>Pseudomonas aeruginosa</i> (bacterium)	Methylparaben	0.200
<i>Pseudomonas aeruginosa</i>	Ethylparaben	0.120
<i>Pseudomonas aeruginosa</i>	Propylparaben	0.080
<i>Pseudomonas aeruginosa</i>	Butylparaben	0.015
<i>Staphylococcus aureus</i> (bacterium)	Methylparaben	0.160
<i>Staphylococcus aureus</i>	Ethylparaben	0.120
<i>Staphylococcus aureus</i>	Propylparaben	0.045
<i>Staphylococcus aureus</i>	Butylparaben	0.015
<i>Candida albicans</i> (fungus)	Methylparaben	0.100
<i>Candida albicans</i>	Ethylparaben	0.060
<i>Candida albicans</i>	Propylparaben	0.025
<i>Candida albicans</i>	Butylparaben	0.015
<i>Aspergillus niger</i> (fungus)	Methylparaben	0.085
<i>Aspergillus niger</i>	Ethylparaben	0.045
<i>Aspergillus niger</i>	Propylparaben	0.035
<i>Aspergillus niger</i>	Butylparaben	0.025

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The lower the minimum inhibitory concentration, the more powerful the activity and it is very clear that the order of activity is methylparaben < ethylparaben < propylparaben < butylparaben for all organisms. This is entirely the opposite of what is claimed by the authors for their model and, therefore, it must surely be concluded that this model is not suitable for purpose.

Declaration of interest: The author is employed by S. Black Ltd., a distributor of raw materials to the personal care industry. The company supplies parabens and most other preservatives commonly used in this industry.

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