The objective of numerical SAR computation is to examine the dosimetric interaction of RF radiation from mobile telephone operation with the human body including the head, hand, and the entire body [Lin and Gandhi, 1996; and see Paulsen, **this volume**]. Results are used in safety assessment, equipment certification, and product compliance verification of mobile telephone systems under a wide range of operating situations. The SAR results are also valuable to human epidemiological investigations on the health effects of mobile telephone usage.

Numerical procedures applied, to date, have modelled the transceivers as a metal box with antenna. Even with the currently detailed anatomical representations, these numerical simulations would likely not be able to render the required dosimetric information for safety assessment, certification, and compliance verification. The primary reason is that these models do not account for the internal circuitries and subassemblies which can influence induced SAR in the head and hand of the user. The use of massively parallel supercomputers in this regard would allow the incorporation of coupling influences of internal circuitry, subassembly, packaging, in addition to the antenna and detailed modelling of external geometry of the mobile telephone.

Table 5. Permittivity (conductivity and dielectric constant) of biological tissues for the radio frequency used by mobile telephones (800-900 MHz).

Tissue Type	Dielectric Constant	Conductivity (S/m)
Air	1.0	0.0
Fat	11	0.17
Bone	21	0.33
Cartilage	37	0.8
Skin	35	0.6
Muscle	50	1.08
Lung	12	0.24
Brain	41	0.86
Cerebral spinal fluid	78	1.97
Blood	55	1.86
Eye	67	1.97
Viteous humor	67	1.68
Cornea/sclera	51	1.13
Lens	45	0.75

Data from C. Gabriel [See Lin and Gandhi, 1996]

Nevertheless, employing detailed computer generated anatomical and mobile telephone models and the numerical finite-difference, time-domain (FDTD) method, the induced SAR distributions inside the head by mobile transceivers have been studied by several investigators. To date, at least three magnetic resonance imaging (MRI) based models of the human adult have been used