Dear Andy,

I've just read your discussion document on laboratory testing for EHS and was wondering if I could add to the debate. I think you've raised some very good questions and while I won't pretend to have all the answers, maybe I can explain the stance we're taking in the King's College London study with regards to two of the issues you touch on; realism and delayed symptoms.

REALISM AND LABORATORY EXPERIMENTS

You rightly highlighted the problems involved in making sure that an experiment done in an artificial laboratory environment mimics conditions in the real world. This is the problem of 'ecological validity'. How do we know, for example, that the mobile phone signal we are using in our experiment at King's is one that would cause problems for our volunteers if they encountered it in real-life? Are the properties of the signal close enough to those of a real mobile phone signal? And even if they are, do mobile phone signals only trigger symptoms in real life when some other factor is present; for example, if the person is under stress or feeling run-down? I think there are at least two solutions to this, and both involve placing your trust in the experiences of the volunteer. Any good experiment on the effects of mobile signals should obviously be done 'double-blind' so that neither the volunteer nor the researcher knows whether a signal is present during each testing session. But it is also possible to use a non-blind exposure session before the experiment is begun. So a volunteer would come into the laboratory, be asked to hold our mobile phone equipment to his or her head whilst knowing that it definitely is emitting a signal, and then be asked whether they can detect any sensations or symptoms as a result. If they do, and the sensations they experience are similar to those they encounter in real life, then we could be reasonably confident that, for that particular volunteer, our experimental set-up is valid. We could then carry on and do our double-blind experiment as normal. One problem with this is that it does add an extra burden for the volunteer who has to come to the laboratory for an extra visit. In the Kings study we are already asking people to come to see us three times; for some, four visits to our lab might be too much. This technique also means exposing volunteers to an extra dose of mobile phone signals, something that many potential volunteers are understandably keen to avoid.

An alternative option is the one that we have chosen. In our study, participants are exposed to our mobile phone set-up under double-blind conditions, with one session being GSM, one continuous wave, and one sham. Importantly, at the end of each session we ask participants to tell us whether they could detect a signal and also to tell us how confident they are about this. If, for any of the sessions, a participant tells us that, yes, they could detect a signal and they are very confident about that, then we take that to mean that the participant finds our experimental set-up to be reasonably realistic. So far, the large majority of the sensitive participants we have tested have reported being fairly confident that they can tell which of our exposures is the 'real' one. So although conducting studies in the laboratory can never fully replicate the complex interactions that take place in the real world, we can still get some measure of whether the participants in the study think that they are realistic.

Other options are of course possible. For example, previous studies have placed real or sham screen filters on the computer screens of people's work computers to see if this has any impact on the symptoms they experience in the office. Other studies have visited the homes of EHS participants to perform provocation experiments there. Still others have adopted the route of testing participants in EMF-shielded laboratories, or in wooden houses far away from the nearest EMF source. I'm not sure if we can say that any one of these techniques is inherently better than another. Instead the results from all of them should be seen as complementary.

TIME DELAY AND SYMPTOMS

Some people report that they get headaches or other symptoms as soon as they use a mobile phone. Others say that their symptoms only come on after calls of a certain length. Still others tell us that they do not experience any short-term reactions from using mobiles, but after a week of heavy mobile use they tend to be more headache-prone. This difference in how symptoms are reported presents problems for us – who do we include in our study? Our approach has been to restrict the Kings study to the first and second of these groups, and to make sure that our testing sessions are long enough that we can be confident of observing any reaction that is likely to occur. So only people who tell us that they usually get symptoms following mobile phone calls of 20 minutes or less are eligible to take part in the study and most experience symptoms much more quickly than this. Meanwhile, our actual exposure sessions last for 50 minutes each, unless of course, a participant experiences symptoms earlier and asks us to turn our equipment off. We do not deny that the group who report delayed reactions is also an important group to study, but we simply have to accept that one experiment cannot cover everything.

You also highlight the problem of symptoms being triggered due to volunteers being exposed to EMF on their way to the laboratory. While this would certainly introduce 'noise' into the experiment, there is no reason to believe that this would *bias* the results. In other words, on average this uncontrolled exposure should cause the same increase in symptoms in both the sham and the active conditions; any effect of the experimental exposure should show up as an effect over and above this. Having said that, in the King's study we are trying to see whether this 'noise' might be a problem for our statistics. We are doing this by asking volunteers to tell us how they are feeling shortly before we start each exposure session and if need be we should be able to adjust for these results using statistical methods when we come to analyse our results.

James Rubin
Mobile Phones Research Unit
GKT School of Medicine
Bessemer Road
London
SE5 9PJ