

広島統計談話会  
Hiroshima Statistics Study Group

第 309 回談話会を下記のように開催致しますので  
御参集下さいませようご案内申し上げます。

You are cordially invited to the 309<sup>th</sup> meeting as scheduled below.

日 時 : 2017 年 12 月 22 日 (金) 15:00 –  
Date : December 22nd, 2017 (Fri) 15:00 –

場 所 : 放射線影響研究所 E-205 会議室  
Place : RERF Conference Room E-205

演 者 : ハリー M. カリングス (放射線影響研究所 統計部 部長)  
Speaker : Harry M. Cullings, Ph.D.  
Chief, Department of Statistics, RERF

演 題 : 「放影研で原爆被爆者に用いている DS02R1 線量推定値のための誤差モデル」  
Title : “Error Models for the DS02R1 Dose Estimates Used by RERF for the Atomic Bomb Survivors”

要 約 :

**Summary:**

This talk will discuss several types of errors that are known to contribute to the uncertainty of the DS02R1 dose estimates that RERF uses in risk regressions for cancer and other health outcomes of the atomic bomb survivors in Hiroshima and Nagasaki. The discussion will begin with the distinction between additive and multiplicative errors, with an explanation of the reasons why the significant errors in the dosimetry are treated as multiplicative errors. The second distinction to be treated will be that between classical or “measurement”-type errors and Berkson-type errors. Classical errors arise primarily from errors in each survivor’s reported location and shielding. Berkson errors, in contrast, arise from grouping or averaging, which in the RERF case involves the input data that are used to calculate doses, primarily in the shielding that is calculated for survivors. The lognormal error model that has been used for classical errors at RERF will be discussed, along with the estimates for the size of that error that have been suggested by RERF researchers. The estimated sizes of Berkson errors for different subsets of survivors, which are in principle amenable to accurate estimation based on the dosimetric procedures that generate them, will also be discussed. They are markedly larger among survivors, predominantly at longer distances  $> 1.6$  km (2 km in Nagasaki), who did not have shielding histories collected. An important question relates to different possible probability models for the Berkson error and whether they are equivalent. Another important question for RERF application is the extent of Berkson errors in dosimetry-system dose estimates that are used to estimate the size of the classical error by comparison to biodosimetric data and their effect in combination with classical error on the apparent overdispersion of the biodosimetric data when they are regressed on dose estimates. Finally, this talk will discuss the concept of shared errors, to which attention has recently been drawn in the literature on dose uncertainty in radiation risk regression. Shared errors have some defined structure among the members of a cohort such as the atomic bomb survivors whose doses are estimated by RERF. The name “shared” comes from the idea that the same error applies to multiple members of the cohort, but the concept more generally applies to errors that are shared among a group and are fixed multiples of one error. Methods have been developed in the recent literature to evaluate the effect of estimated shared error on a risk regression by a Monte Carlo approach of generating multiple cohort-vectors of dose estimates and performing a risk regression on each.