Granger causality (GC) is a statistical technique used to estimate temporal associations in multivariate time series. Many applications and extensions have been proposed since its formulation by Granger in 1969. Here we apply Granger causality in the context of electrocorticography (ECoG), also known as intracranial electroencephalography. A pruning approach to remove spurious connections and simultaneously reduce the required number of estimations to fit the functional connectivity graph is proposed. This approach overcomes limitations encountered when estimating many parameters in multivariate time series data, an increasingly common predicament in today’s brain mapping studies.