

東北大学

# Cooking activates bilateral prefrontal cortex, and can be applied as an intervention method to improve prefrontal function of elders.



## -Bridges between neuroimaging and social science-

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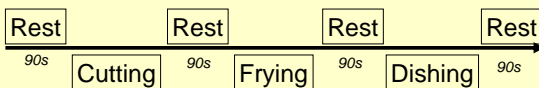
It is well known that lesion of the right dorso-lateral prefrontal cortex (DLPFC) impairs the ability of cooking. The aims of this study are that to confirm whether DLPFC is activated during cooking using near infra-red spectroscopy (NIRS), and that to determine whether cooking can be applied for daily intervention methods to improve function of prefrontal cortex of elders.

### Brain Imaging Study

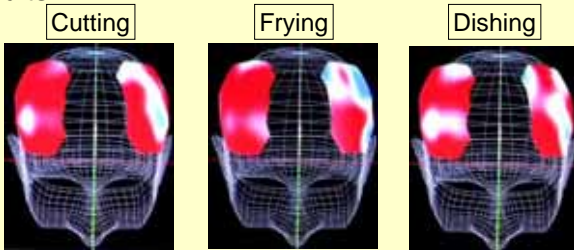
#### Methods

- 15 healthy females (aged 35~55, mean 45.3)
- Measured activity of the dorso-lateral prefrontal cortex (DLPFC) by NIRS during following tasks;
  1. cutting ingredients
  2. frying the cut ingredients
  3. dishing up
  4. baseline: eye close rest

· Protocol: NIRS measurements



#### Results



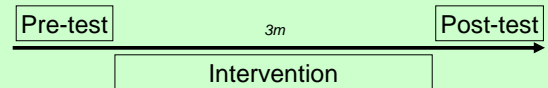
Typical examples of one subject are shown here. All the subjects statistically significantly activated the DLPFC of the bilateral hemispheres compared with baseline during cutting, frying and dishing. (Statistical threshold was estimated by analysis of noise distribution during control state for all channels.) The result confirms the results of previous lesion studies, and indicates that the DLPFC plays important role in cooking.

### Daily Intervention Study

#### Methods

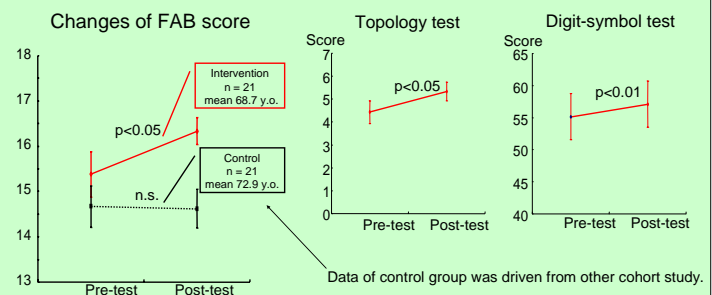
- 21 healthy males (aged 59~81, mean 68.7)
- Measured changes of cognitive functions during course of intervention by following tests;
  1. FAB (frontal assessment battery at bed side)
  2. Topology test (see poster 187M-AM)
  3. Digit-symbol test (DST)

· Protocol



Subjects were asked to come up to a cooking school once a week, and learn basic techniques for daily cooking. They were also asked to cook and prepare their meal once a day at their home.

#### Results



FAB, DST and topology scores were statistically significantly improved at follow up (post-test) compared with baseline (post-test) (ANOVA, post hoc paired t-test). The result indicates that cooking can be suitable methods to train DLPFC functions of humans in daily life.

Our challenge in these studies is to create bridges between neuroimaging and social sciences. Neuroimaging techniques can determine how to activate targeted brain structure(s) by cognitive and/or motor tasks. Therefore, one can offer effective intervention methods on the basis of knowledge of neuroimaging.