# Detecting colon cancer using dogs – results of a pilot study

KNGF GELEIDE HONDEN

April 2017

# The project

- Collaboration between VUmc, a university hospital in Amsterdam and KNGF, the Dutch guide dog school
- Funded by charity and sponsoring
- Project members/trainers Danielle de Jonge and Patrick Hilverink
- Scientific support Adee Schoon

KNGF GELEIDE HONDEN

# Topics today

- Training methods and procedures – Danielle
- Training results – Adee

KNGF GELEIDE HONDEN

# Pre-Training

- From whole Kong, to tiny pieces of kong, to kong odour on cotton pads
- From free search to structured search of hides and containers
- Gradually introducing carousel arms

KNGF GELEIDE HONDEN

# Goals pre-training

- Develop use of nose
- Motivation
- Systematic search pattern
- Focused indication

KNGF GELEIDE HONDEN

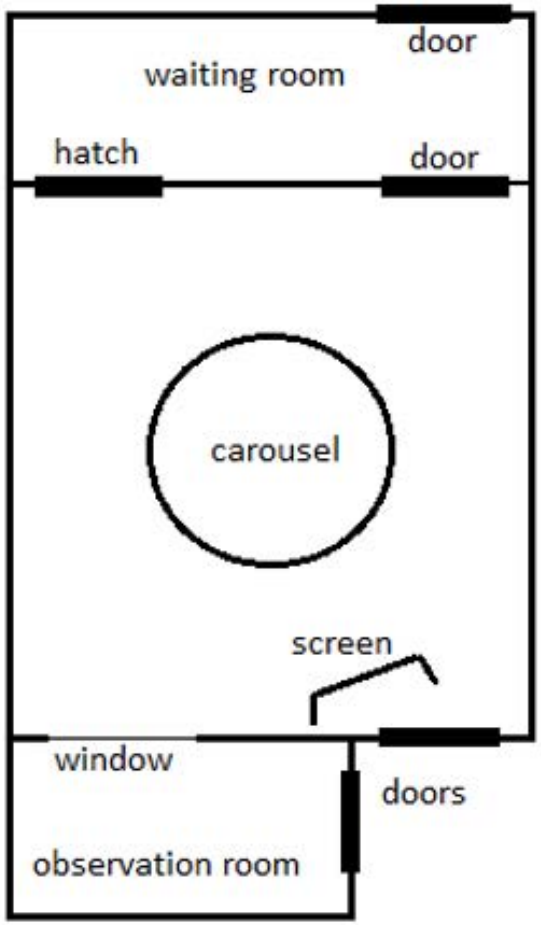
# Carousel training

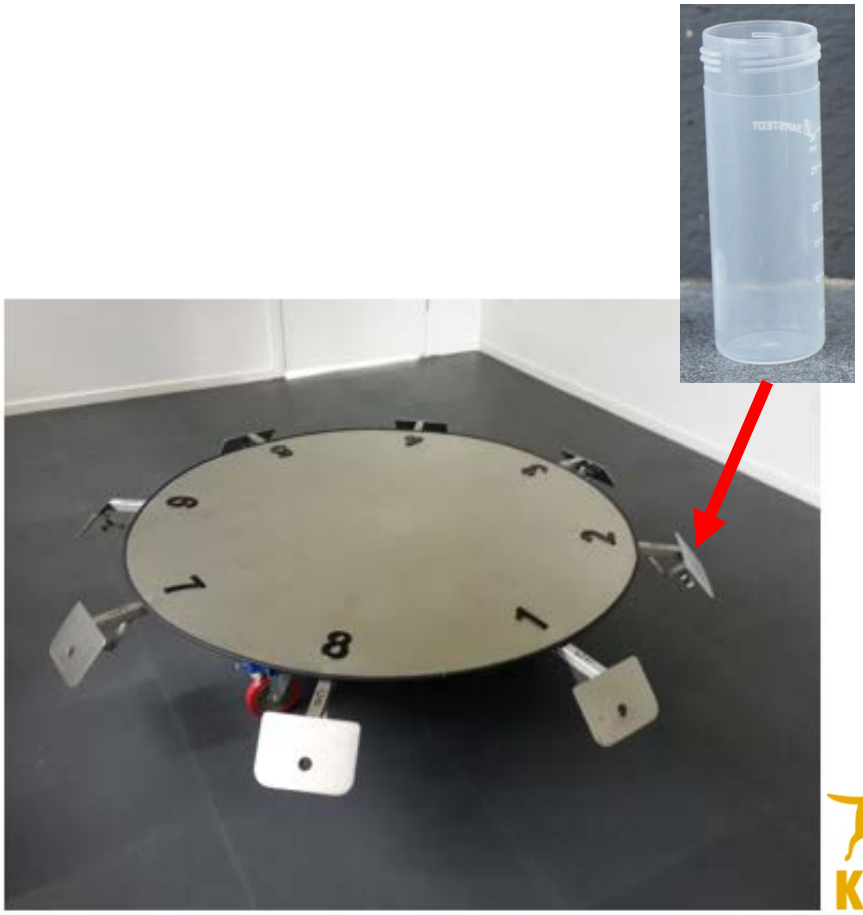
Training on Kong in carousel:

- Develop systematic working procedure in carousel room (hatch, anti-clockwise, all arms)
- Gradual disappearance of handler from view
- Sessions of 4 runs with 2-4 targets

KNGF GELEIDE HONDEN

# Training room and carousel



KNGF GELEIDE HONDEN

# Introducing stool samples

- Combine tiny piece of Kong with scent sample taken from colorectal cancer (CRC) stool sample
- Discrimination from control stool samples
- Fade the piece of Kong to odour of Kong with the CRC sample

KNGF GELEIDE HONDEN

# Protocol – sample preparation

Samples:

- Stool samples stored frozen in 1ml Eppendorf tubes
- Selected stool samples defrosted for 1 hr
- 1/4 cotton pads for 15 minutes with stool sample
- Cotton pads in containers, containers in carousel
- Stool samples re-frozen

KNGF GELEIDE HONDEN

# Sample preparation


KNGF
GELEIDE
HONDEN

# Protocol – training sessions

Dogs trained 2-3 times per week:

- 5 dogs analyse all samples sequentially
- Order of dogs is rotated
- Carousel is cleaned between dogs
- 2 handlers work in rotation
- Each dog has own reward

KNGF GELEIDE HONDEN

# Protocol – training sessions

Training session consists of 3-4 runs

Each run of 8 samples:

- Lab assistant places containers in carousel
- Handler enters room and stands behind screen
- Dog is released through hatch, enters and searches the carousel
- Observer signals results to handler using lights and records

KNGF GELEIDE HONDEN

# Possible outcomes

- Correct indication
- Zero run
- False positive
- False negative
- Praise-off

KNGF GELEIDE HONDEN

# Topics today

- Training methods and procedures – Danielle
- Training results – Adee

KNGF GELEIDE HONDEN

# Results: logging training

CD-Lims:

- Computer program used to select cancer patients and controls
- Determine number of runs (usually 4-5) and which dogs
- Random placing of each sample
- Registration sheets during training
- Registration of results in database for analysis

KNGF GELEIDE HONDEN

# Results

- Results shown based on sessions after the Kong was completely faded out
- Situation: limited number of cancer patients (10) and controls (60)
- Goal: could dogs generalize? i.e.: hit on new cancer patients, and ignore new controls?
- Impossible to obtain more samples that had been prepared in the same manner
- So: we decided on another approach

KNGF GELEIDE HONDEN

# Results

- Initially: dogs trained with samples from 1 cancer patient and 15 controls
- Each introduction of a new control or a new cancer patient was then carefully monitored to observe generalisation
- This showed a gradual increase in detection of new patients, and a gradually lower respons to new controls

KNGF GELEIDE HONDEN

# Results

Analysis of false alarms

- Patient population did not match control population very well (on average older, more males, sometimes presence of blood in stool)
- So an analysis was done to see of dogs are using any of these cues

KNGF GELEIDE HONDEN

# Possible role in diagnostics

- A single dog can have an “off day”
- Use of several dogs can enhance validity
- 2 samples of each new patient/control analysed by 5 dogs = 10 sniffs
- Looking at the results in this way allows to determine cut-off points for a group “positive indication”

KNGF GELEIDE HONDEN

# Conclusions

Promising results, continued process

- 3 new dogs in training – reliability of method
- New, fresh stool samples

Major challenges:

- Finding a sufficient number of matching patients and controls
- Opening the minds of medical doctors to the use of dogs in diagnostics

KNGF GELEIDE HONDEN

# Questions?


KNGF
GELEIDE
HONDEN