



Research findings in "Chemo-brain"

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Research findings in “Chemo-brain”

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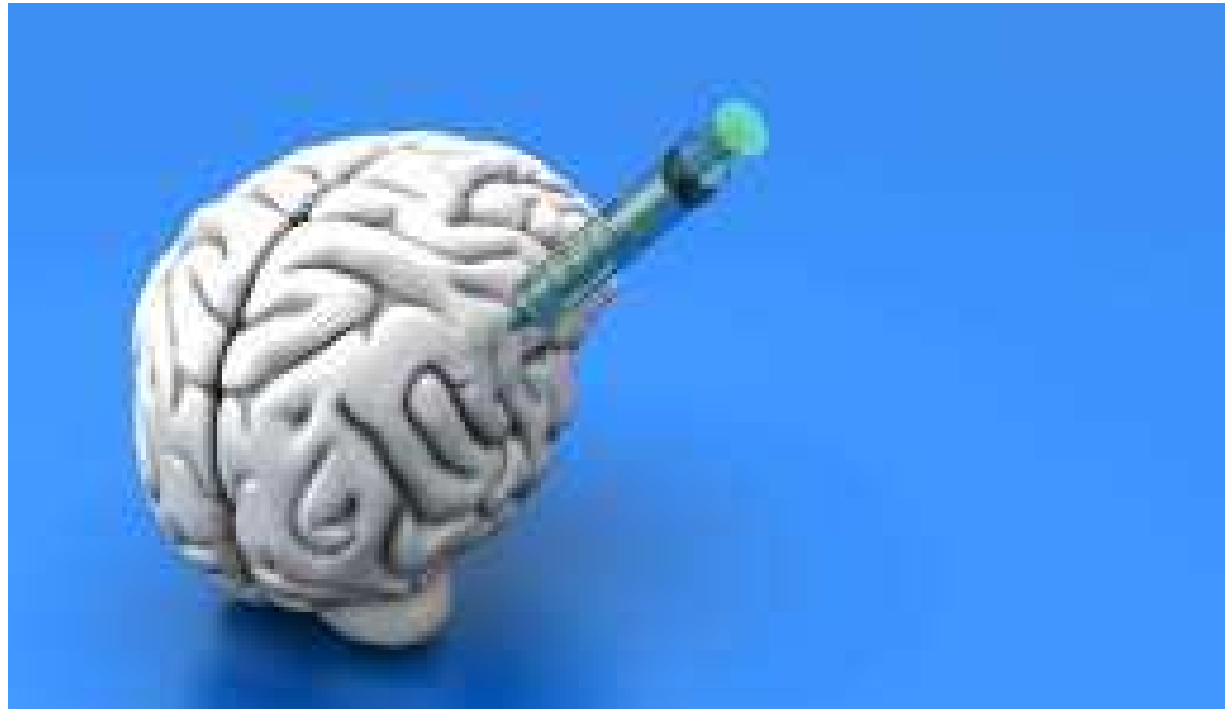


@LindnerOana

Outline

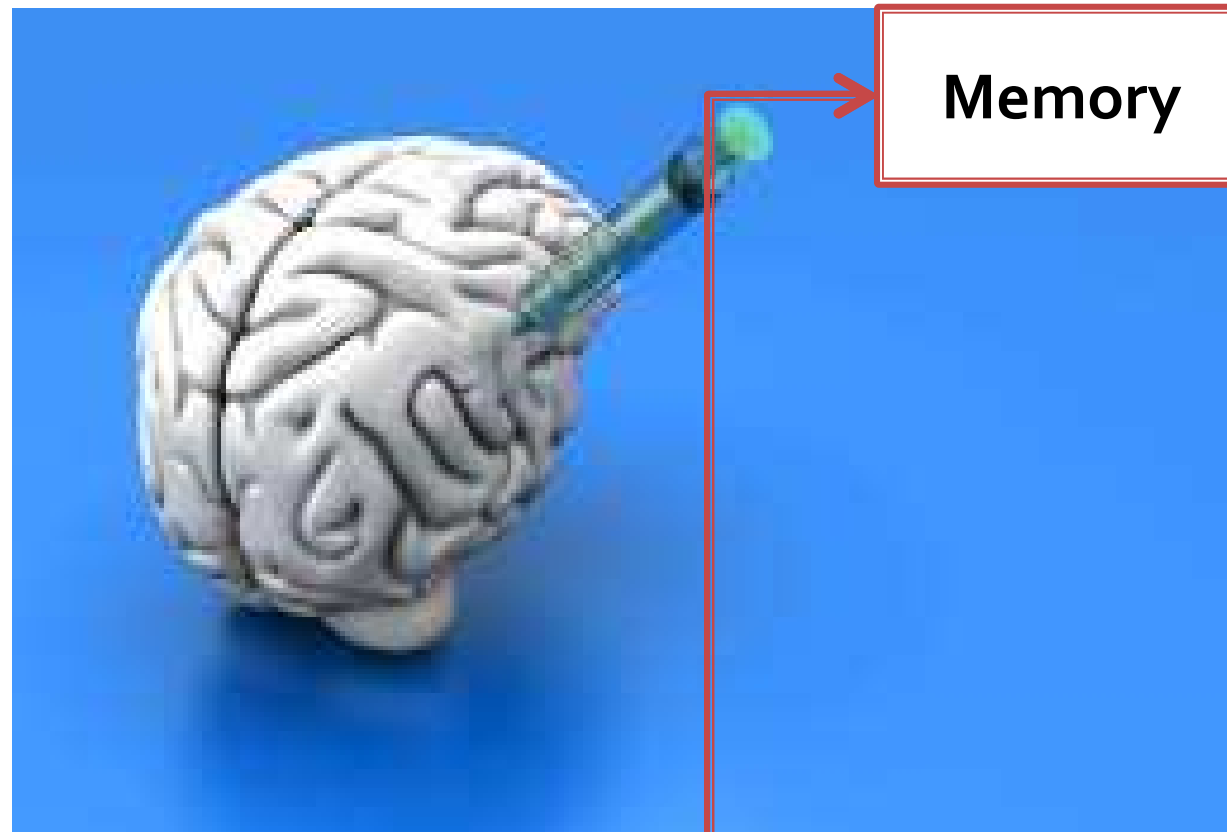
- Background
- Our preliminary results:
 - Cognitive functioning in Post-treatment patients
 - Cognitive functioning in Pre-treatment patients
 - Psycho-social functioning
- Future directions

Chemo-brain



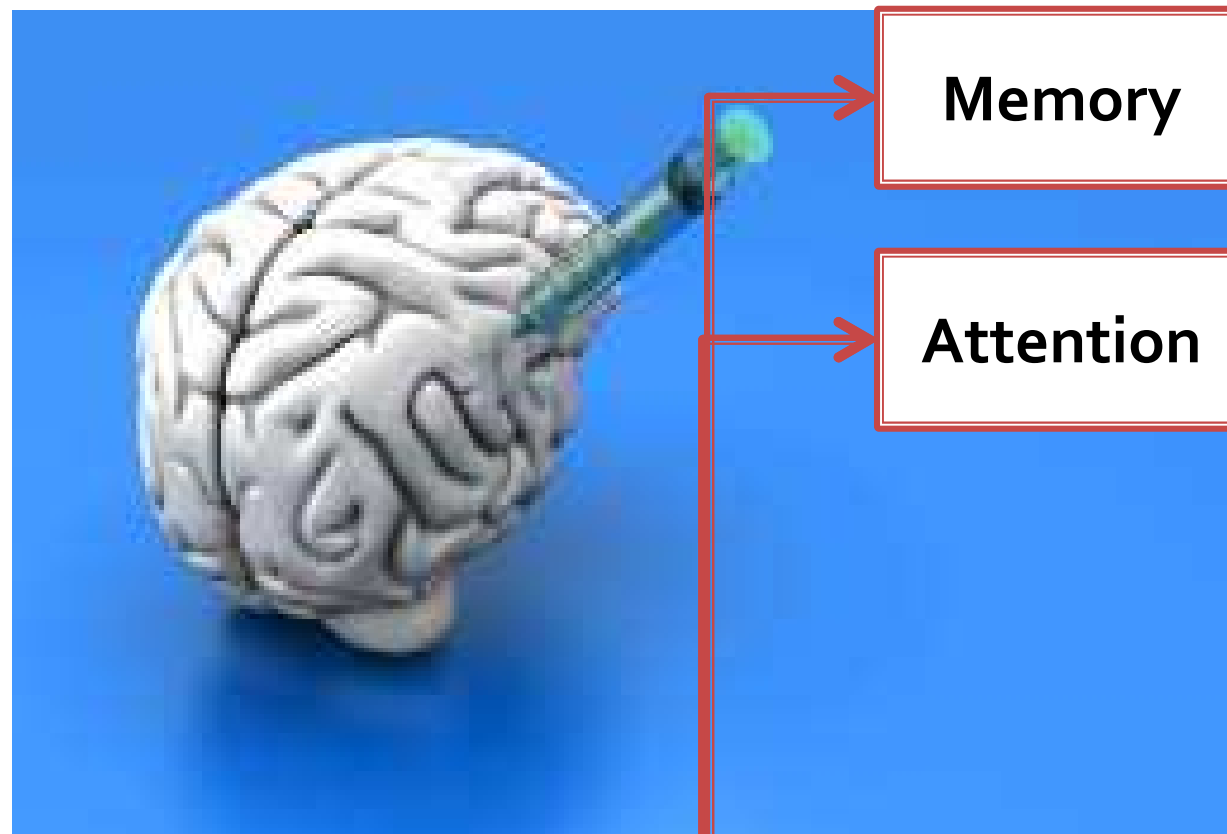
Effect of chemotherapy on cognitive functioning

Chemo-brain



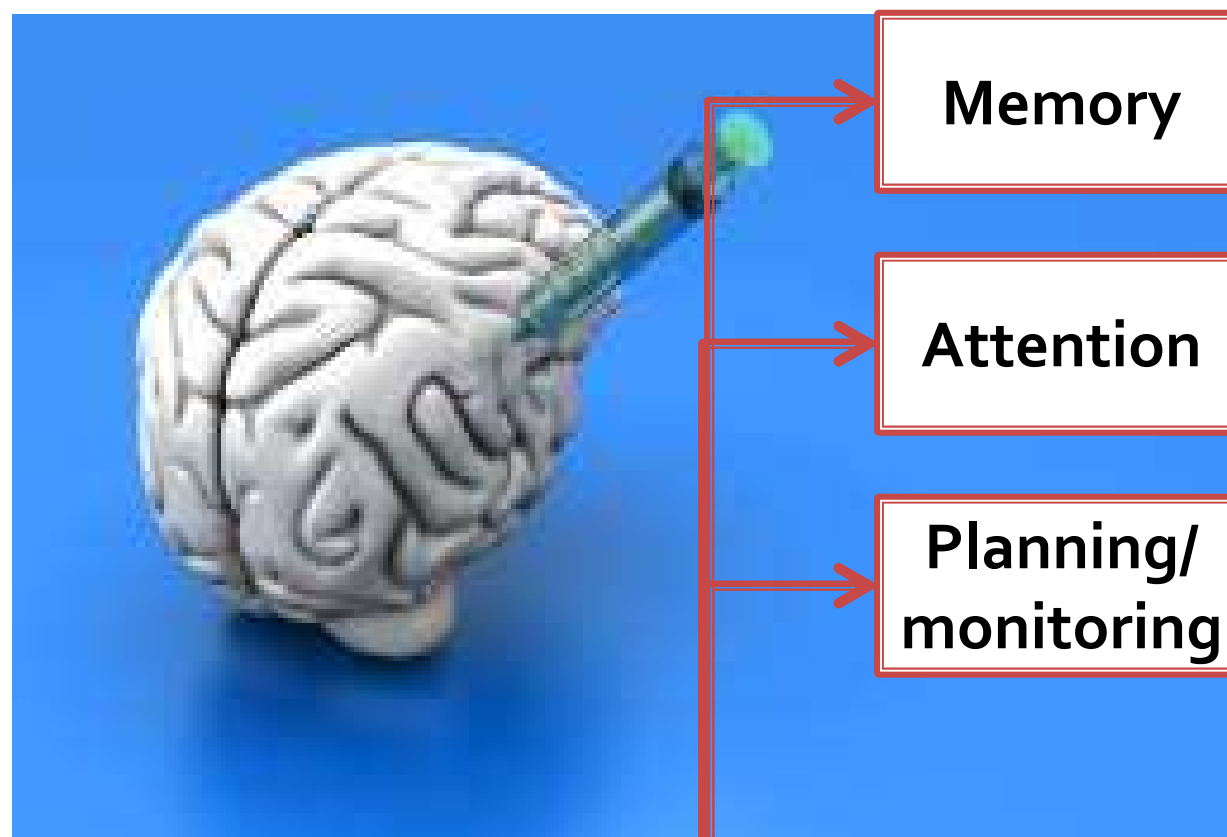
Effect of chemotherapy on **cognitive functioning**

Chemo-brain



Effect of chemotherapy on **cognitive functioning**

Chemo-brain



Effect of chemotherapy on **cognitive functioning**

Chemo-brain

No central nervous
system treatments



Chemo-brain

No central nervous
system treatments

No brain tumours



Chemo-brain

No central nervous
system treatments

No brain tumours

No cranial
irradiation



Chemo-brain

Everyone?



Chemo-brain

Everyone?



Risk factors?

Chemo-brain

Everyone?

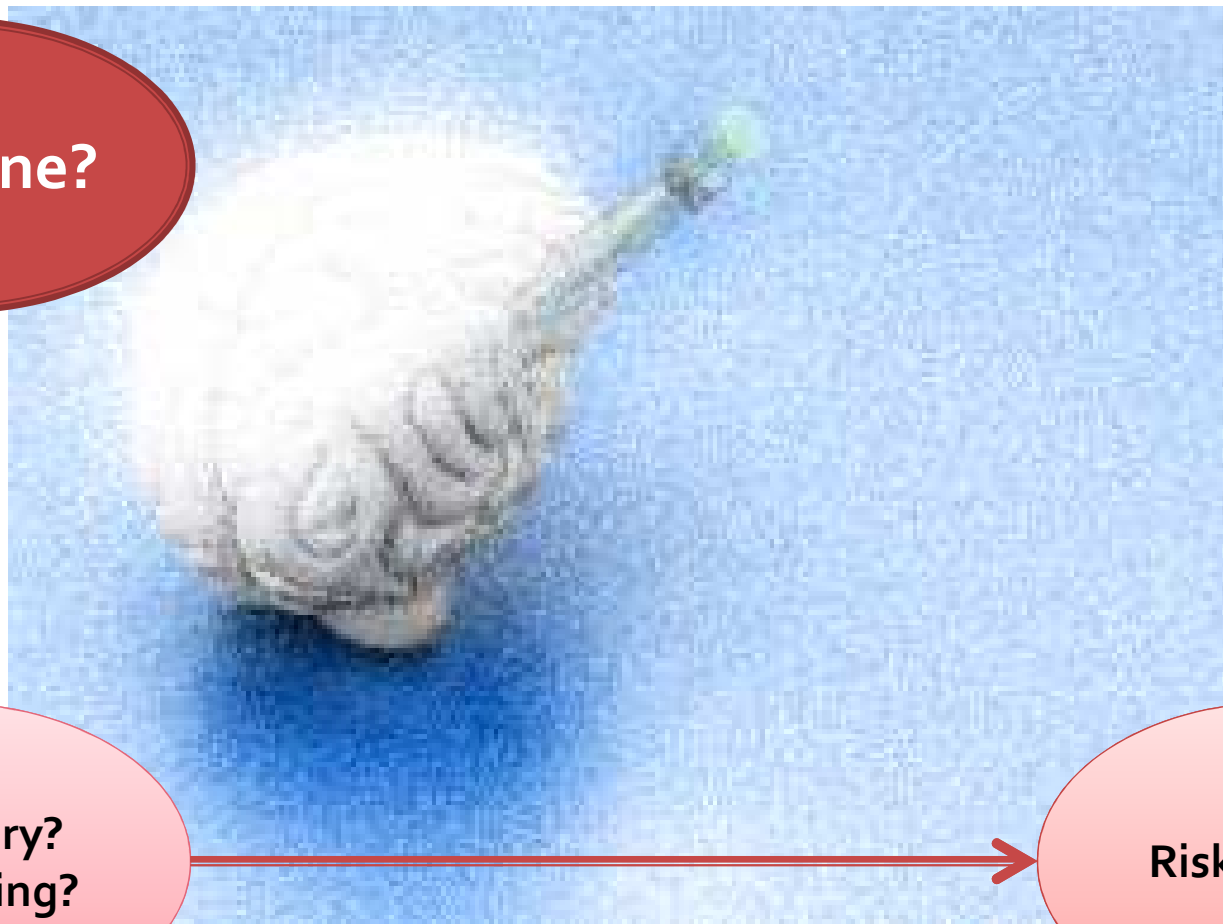


Temporary?
Long lasting?

Risk factors?

Chemo-brain

Everyone?



Temporary?
Long lasting?

Risk factors?

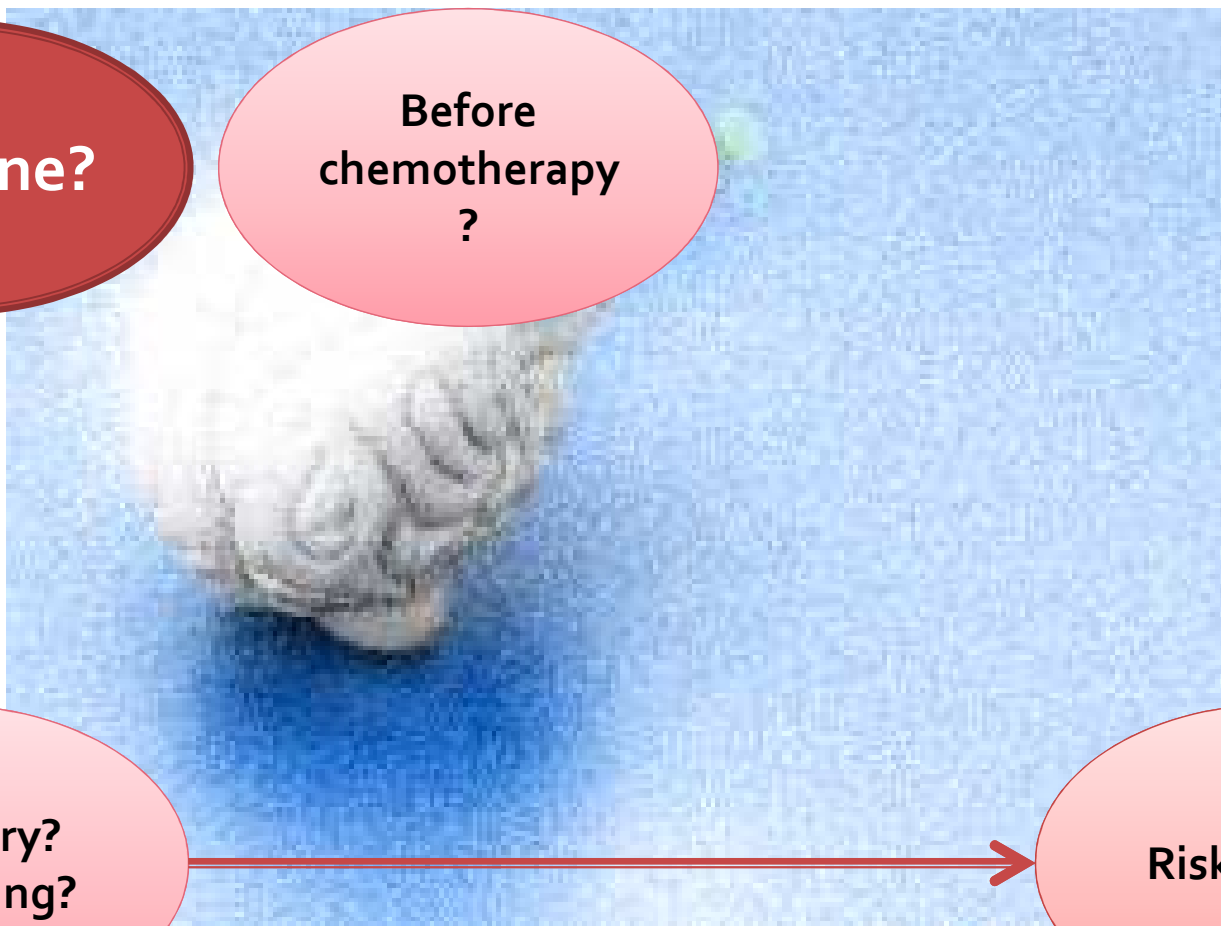
Chemo-brain

Everyone?

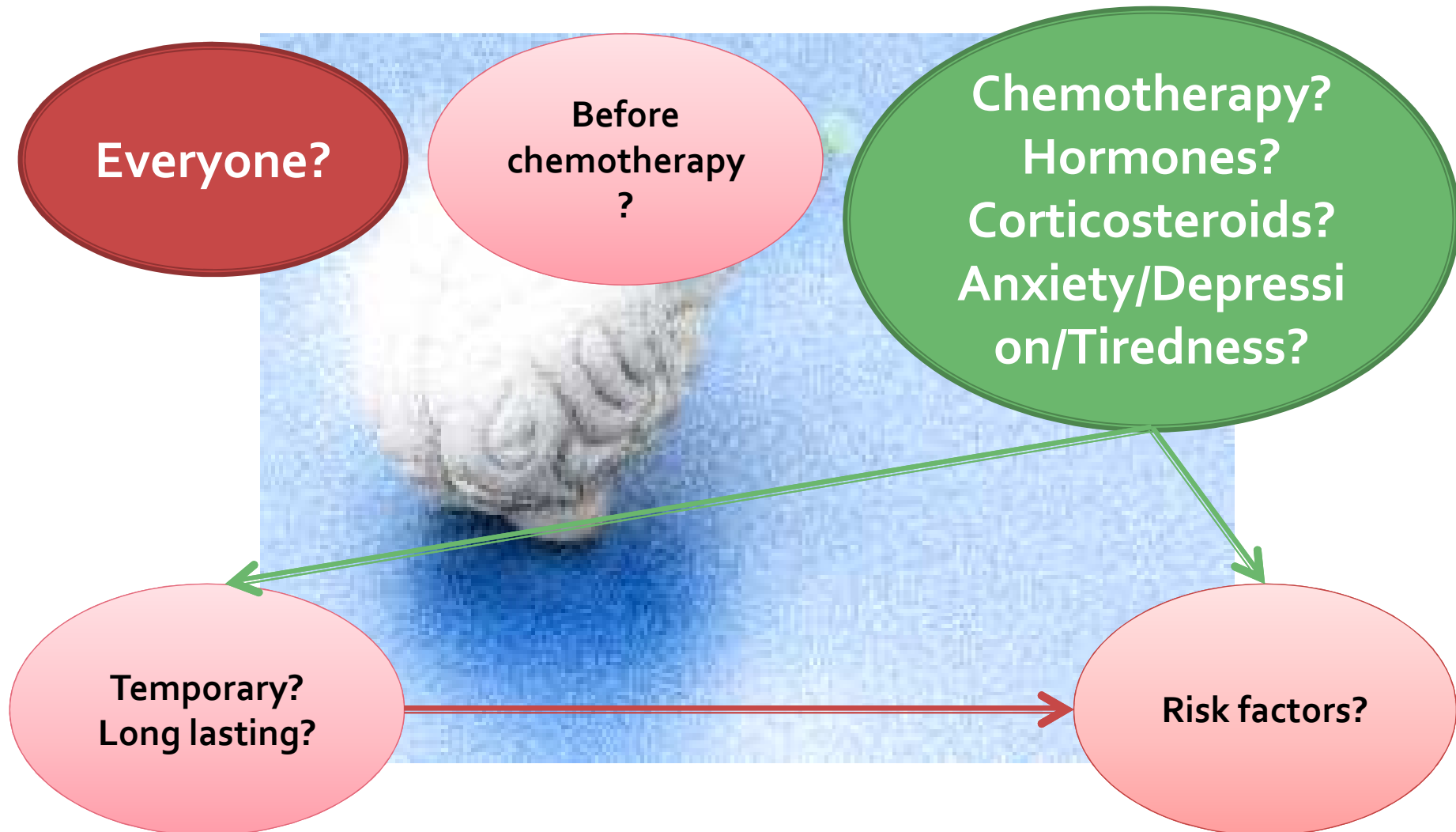
Before
chemotherapy
?

Temporary?
Long lasting?

Risk factors?



Chemo-brain



Paediatric patients



Mean age = 10

Paediatric patients



Acute
lymphoblastic
leukaemia

Mean age = 10

Paediatric patients



Acute
lymphoblastic
leukaemia

Wilms'
tumour

Mean age = 10

Paediatric patients



Acute
lymphoblastic
leukaemia
29-59% impaired

Wilms'
tumour

Mean age = 10

Adult patients



Mean age = 55

Adult patients



Breast cancer

Mean age = 55

Adult patients



Breast cancer

**Testicular
cancer**

Mean age = 55

Adult patients



Breast cancer

Testicular
cancer

Other: lung,
colorectal,
lymphoma

Mean age = 55

Adult patients



Breast cancer

Testicular cancer

Other: lung, colorectal, lymphoma

Up to 80% complain of poor cognitive performance

Mean age = 55

Our group



16-50 year old patients

Our group

Lymphoma



16-50 year old patients

Our group

Lymphoma

Sarcoma



16-50 year old patients

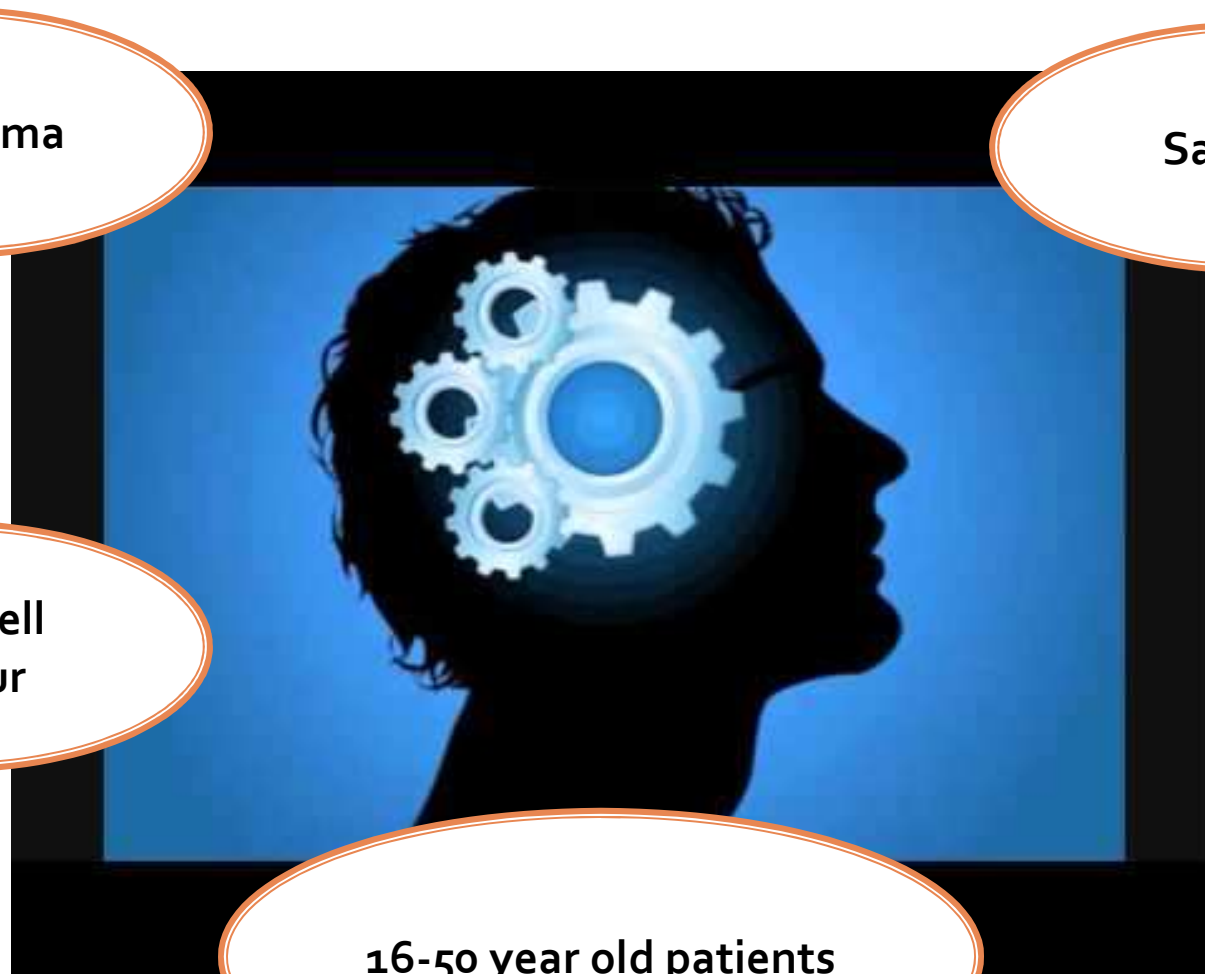
Our group

Lymphoma

Sarcoma

Germ cell
tumour

16-50 year old patients



Our group

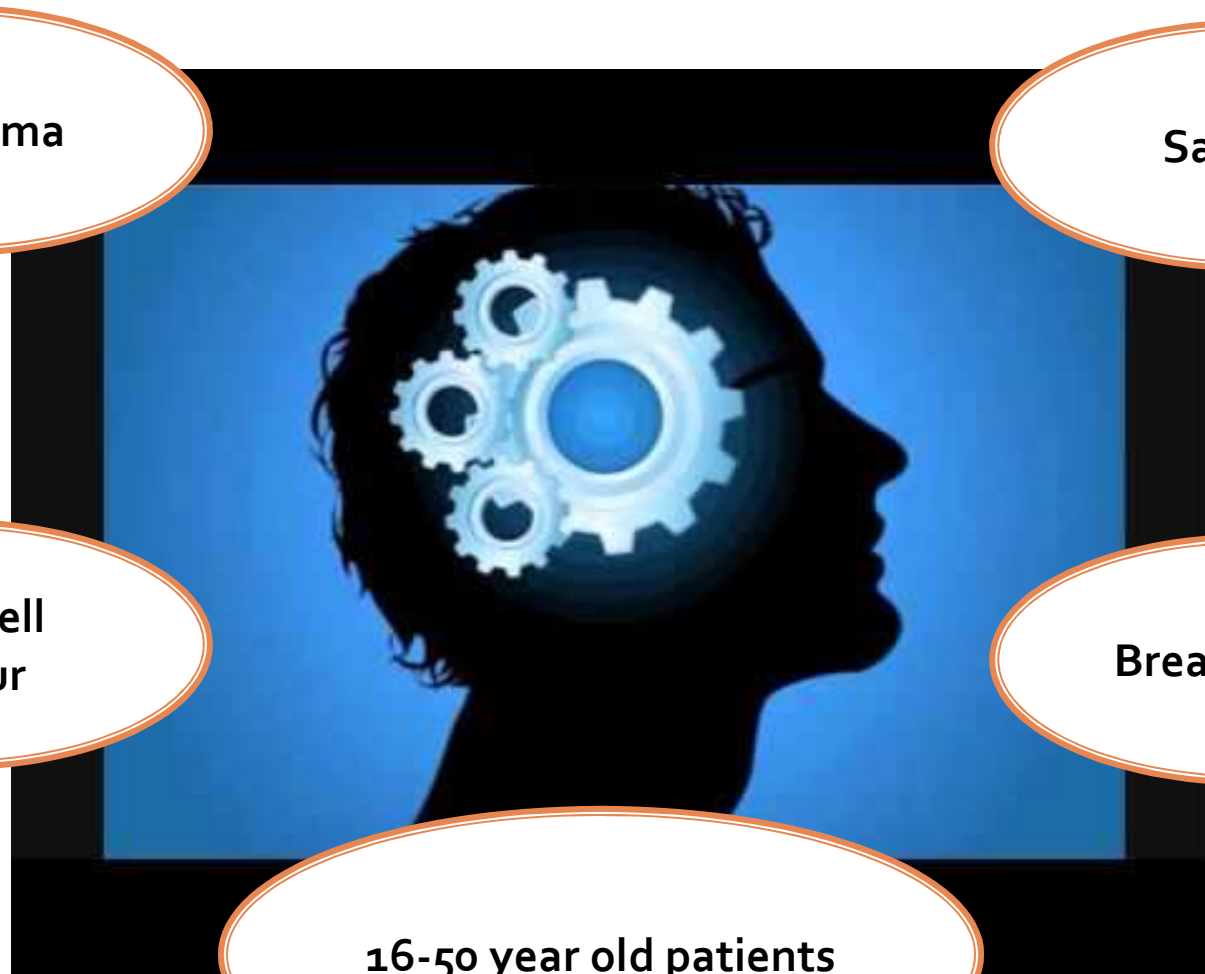
Lymphoma

Sarcoma

**Germ cell
tumour**

Breast cancer

16-50 year old patients



Our group

Before
treatment
N=30

Control
N=96

After
treatment
N=75



Our group



Before
treatment
N=30

Control
N=96

After
treatment
N=75

Effects?
Which ones?
Other factors?

Instruments

- 12 neuropsychological tests: attention, memory, planning/self-monitoring.
- Psycho-social questionnaires: cognitive complaints, symptoms, anxiety, depression, tiredness, quality of life.

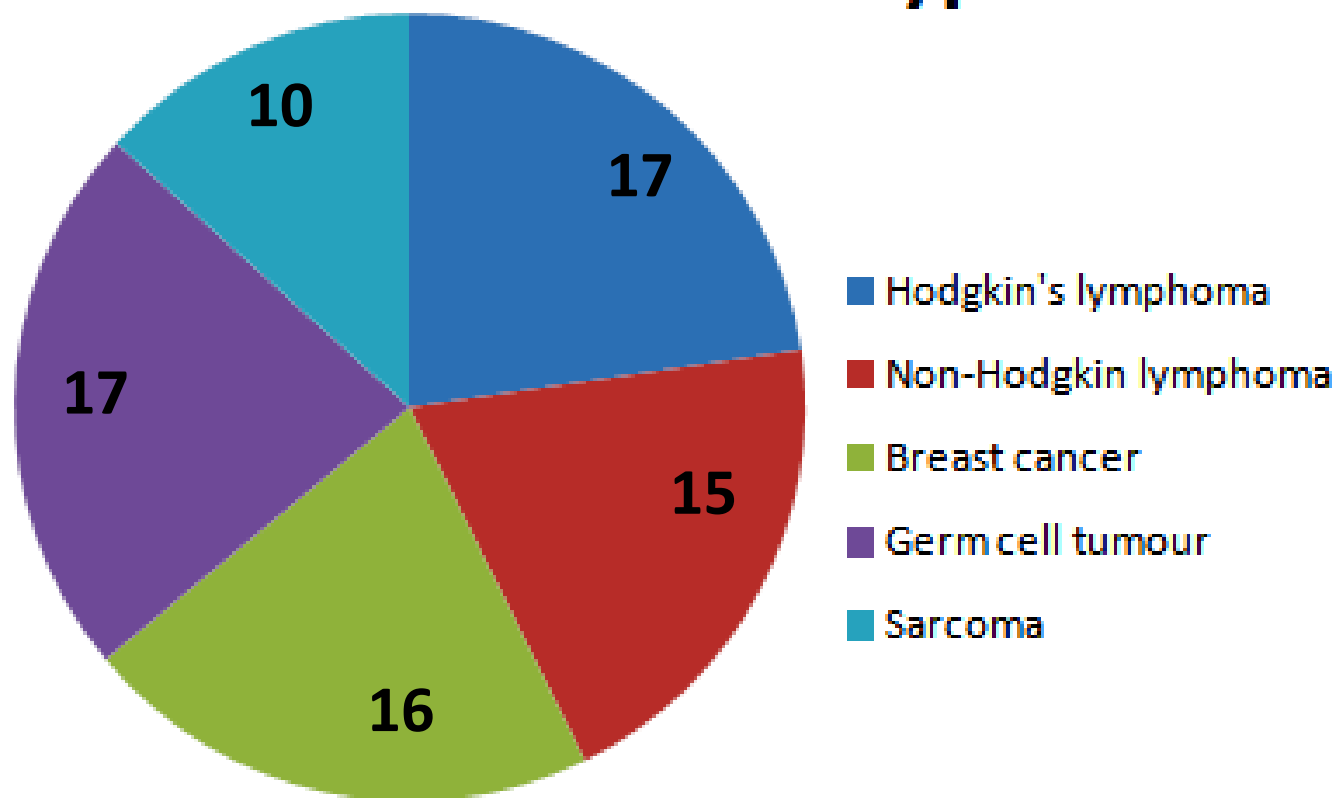
Post-treatment patients

- 75 patients versus 75 healthy matched controls
- 6 months to 5 years post-treatment (mean=2.5 years)

	Variable	Survivors	Controls
✓	Age (m/sd)	35.55 (9.49)	29.62 (9.84)
✓	Sex (m/sd)	0.48 (0.50)	0.53 (0.50)
✓	Years of education (m/sd)	14.20 (2.22)	15.15 (2.14)

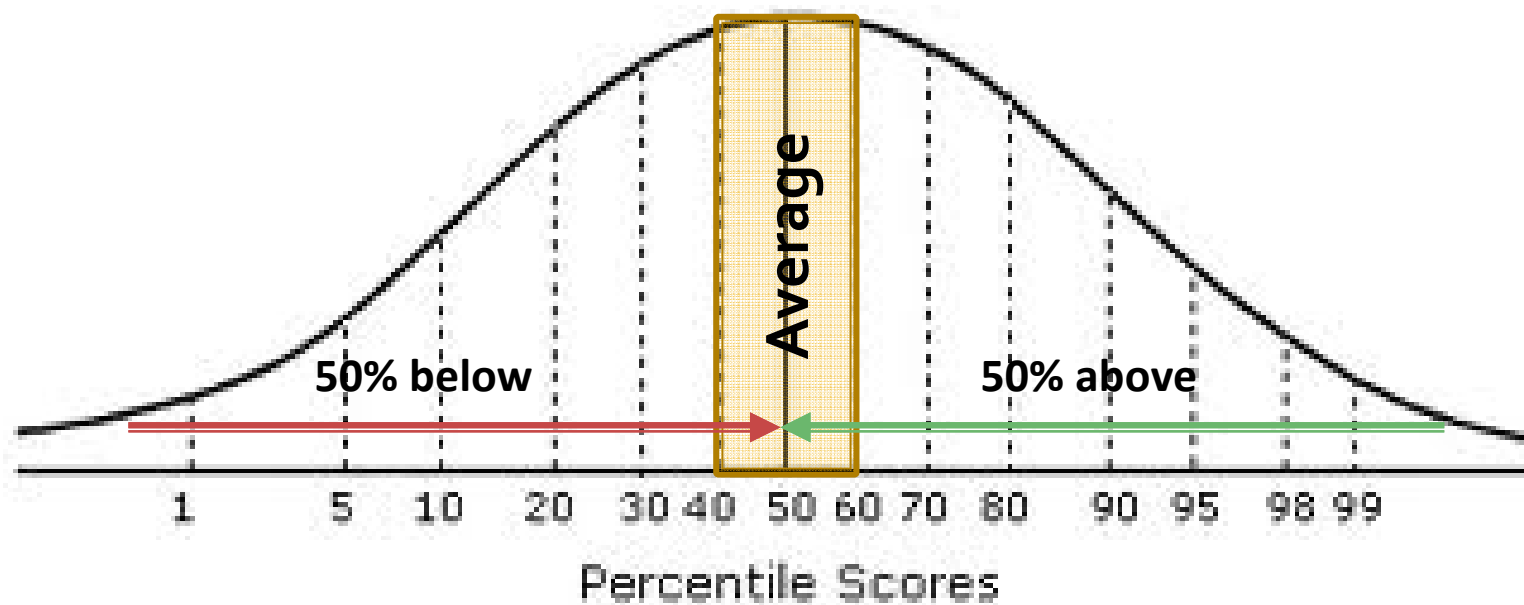
Post-treatment patients

Survivors - cancer type



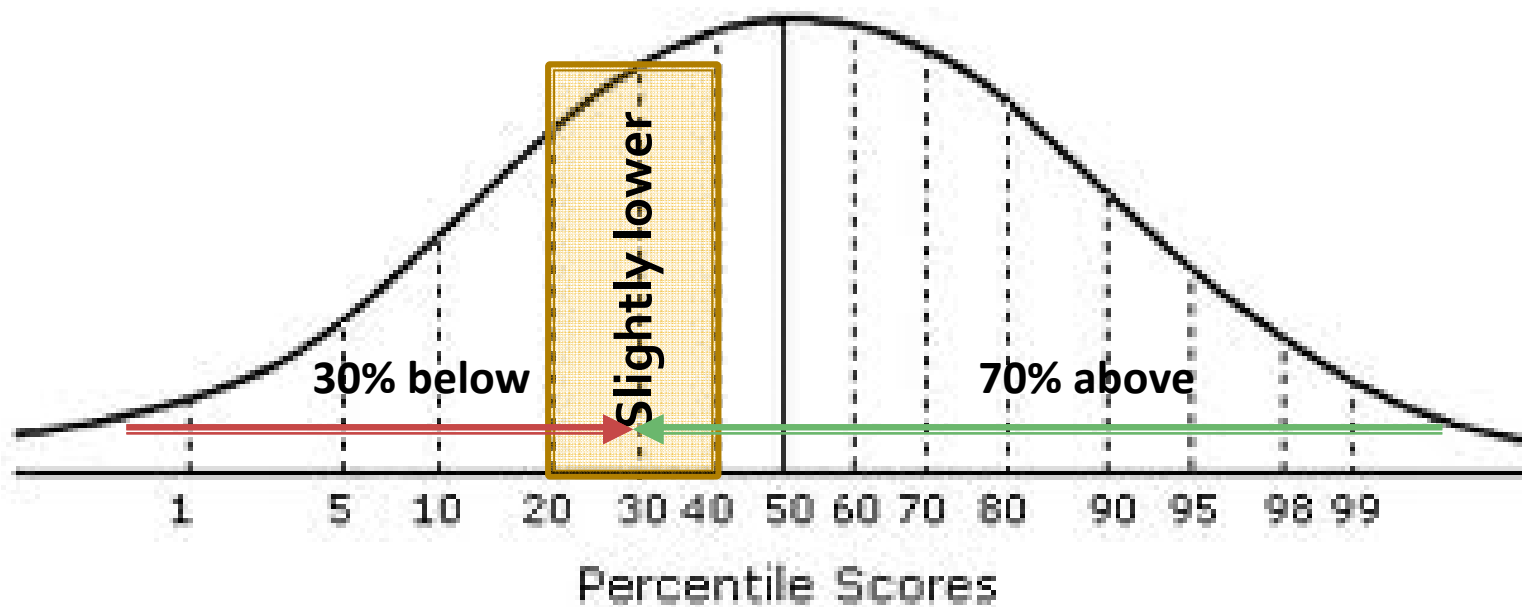
Results

Post-treatment patients



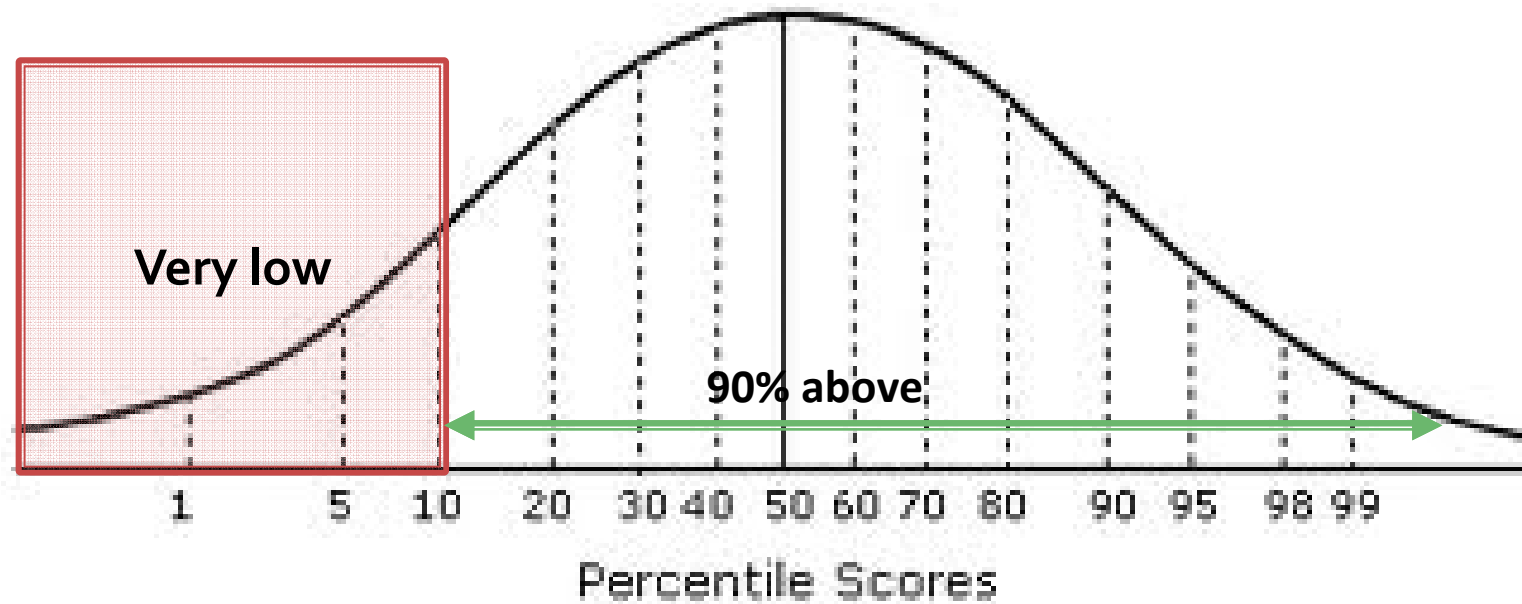
Results

Post-treatment patients



Results

Post-treatment patients



Verbal memory

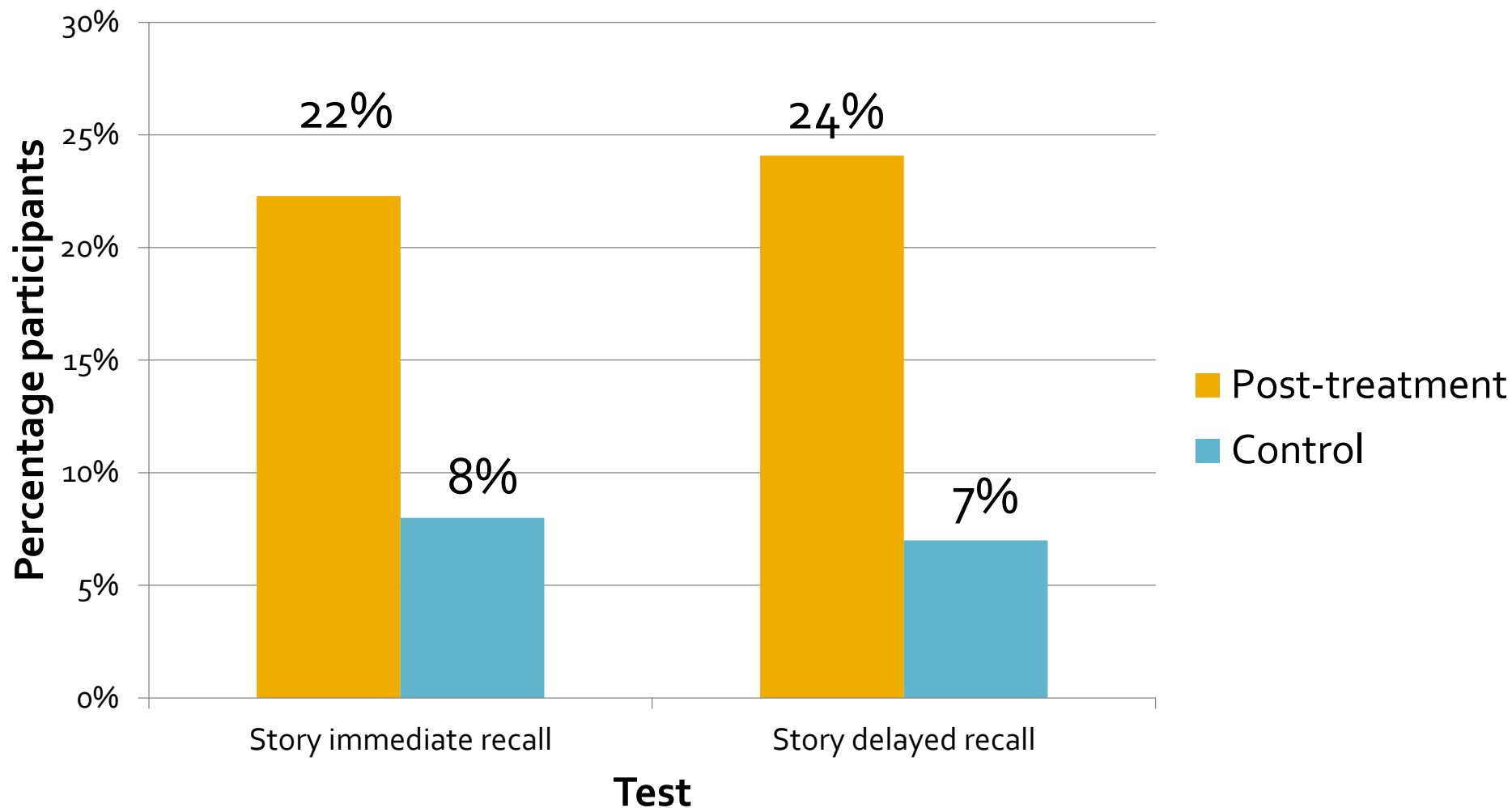
Post-treatment patients

- Remembering a story:

“On Wednesday afternoon/ Mr. Jones was waiting for his train/ in the local station/. The train was delayed/ and he had to wait for an additional 20 minutes. “

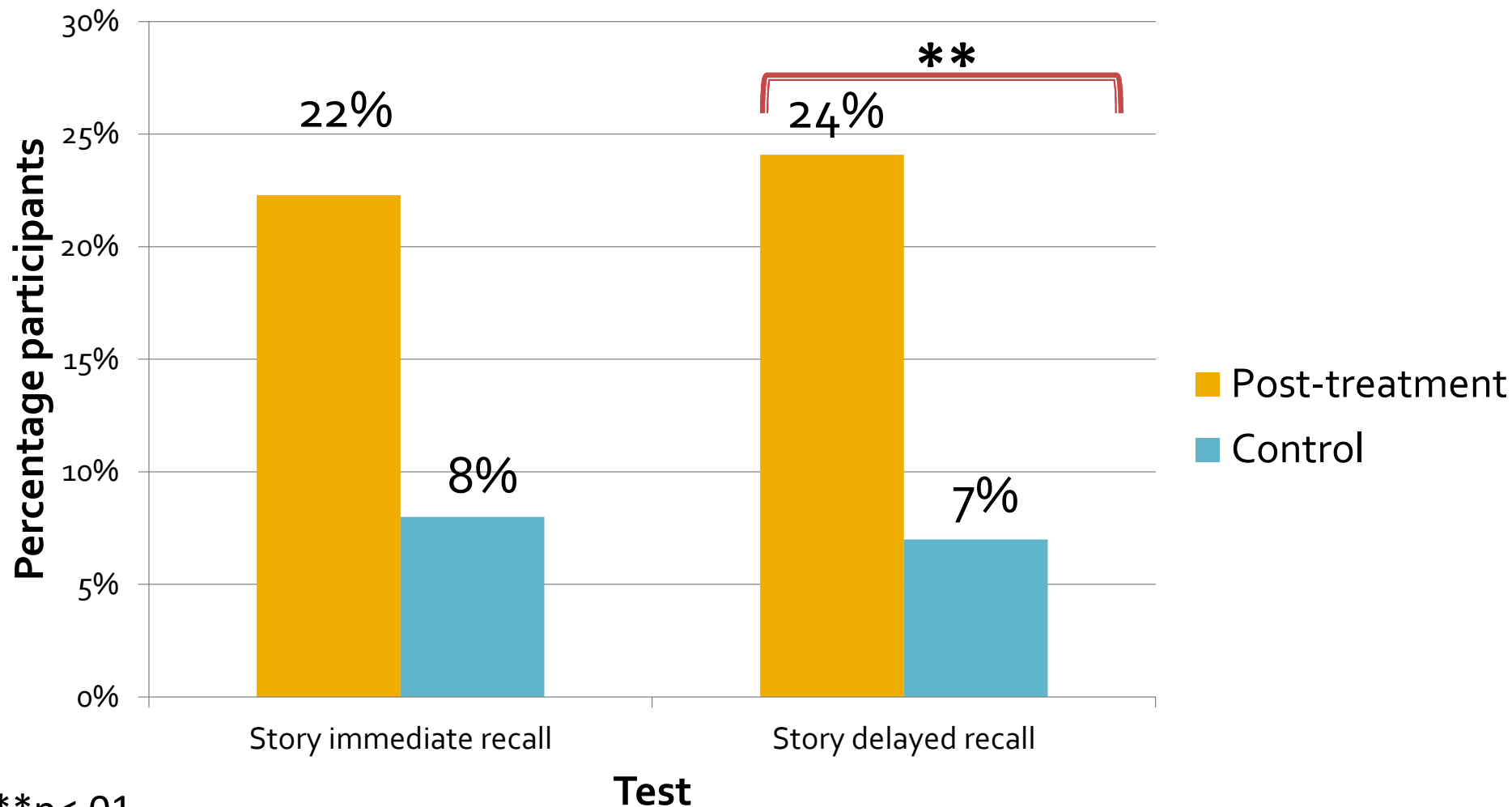
Verbal memory

Post-treatment patients



Verbal memory

Post-treatment patients



Verbal memory

Post-treatment patients

- Recognising two lists of words

List A

Dog
Plate
Pencil
Skate

Read and
recall
5 times

Verbal memory

Post-treatment patients

- Recognising two lists of words

List A

Dog
Plate
Pencil
Skate

**Read and
recall
5 times**

List B

Pigeon
Book
Sand
Mug

**Read and
recall
once**

Verbal memory

Post-treatment patients

- Recognising two lists of words


List A	List B	List A
Dog Plate Pencil Skate	Pigeon Book Sand Mug	?
Read and recall 5 times	Read and recall once	Recall

Verbal memory

Post-treatment patients

- Recognising two lists of words

<p>List A</p> <p>Dog Plate Pencil Skate</p> <p>Read and recall 5 times</p>	<p>List B</p> <p>Pigeon Book Sand Mug</p> <p>Read and recall once</p>	<p>List A</p> <p>?</p> <p>Recall</p>	<table border="1"><tr><td>Dog</td><td>Horse</td></tr><tr><td>Paper</td><td>Sand</td></tr><tr><td>Phone</td><td>Skate</td></tr><tr><td>Pigeon</td><td>Train</td></tr><tr><td>Rabbit</td><td>Plate</td></tr><tr><td>Mug</td><td>Apple</td></tr><tr><td>Pencil</td><td>Guitar</td></tr><tr><td>Kettle</td><td>Book</td></tr></table> <p>Which word? From which list?</p>	Dog	Horse	Paper	Sand	Phone	Skate	Pigeon	Train	Rabbit	Plate	Mug	Apple	Pencil	Guitar	Kettle	Book
Dog	Horse																		
Paper	Sand																		
Phone	Skate																		
Pigeon	Train																		
Rabbit	Plate																		
Mug	Apple																		
Pencil	Guitar																		
Kettle	Book																		




Verbal memory

Post-treatment patients

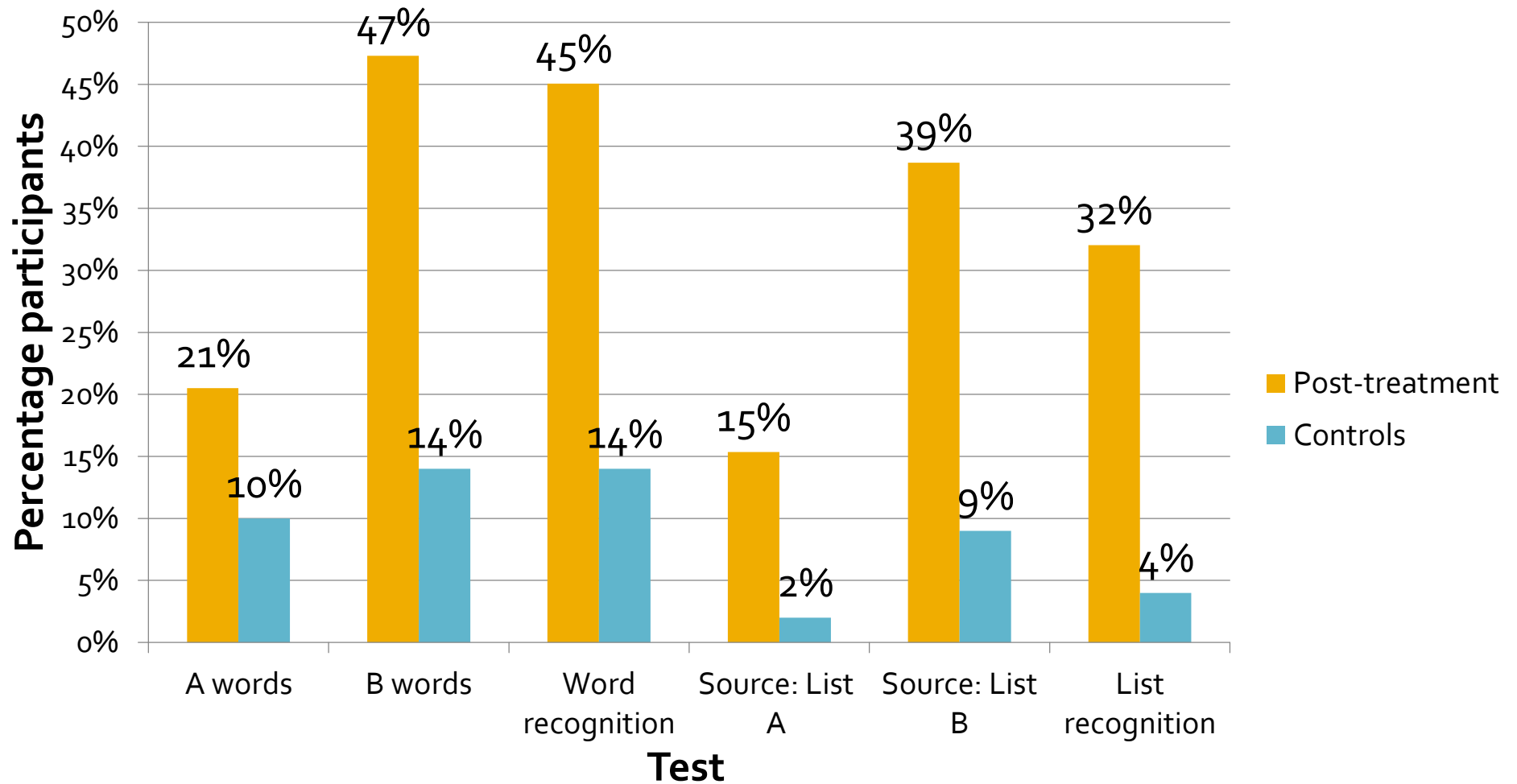
- Recognising two lists of words

<p>List A</p> <p>Dog Plate Pencil Skate</p> <p>Read and recall 5 times</p>	<p>List B</p> <p>Pigeon Book Sand Mug</p> <p>Read and recall once</p>	<p>List A</p> <p>?</p> <p>Recall</p>	<table border="1"><tr><td>Dog</td><td>Horse</td></tr><tr><td>Paper</td><td>Sand</td></tr><tr><td>Phone</td><td>Skate</td></tr><tr><td>Pigeon</td><td>Train</td></tr><tr><td>Rabbit</td><td>Plate</td></tr><tr><td>Mug</td><td>Apple</td></tr><tr><td>Pencil</td><td>Guitar</td></tr><tr><td>Kettle</td><td>Book</td></tr></table> <p>Which word? From which list?</p>	Dog	Horse	Paper	Sand	Phone	Skate	Pigeon	Train	Rabbit	Plate	Mug	Apple	Pencil	Guitar	Kettle	Book
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Rabbit	Plate																		
Mug	Apple																		
Pencil	Guitar																		
Kettle	Book																		



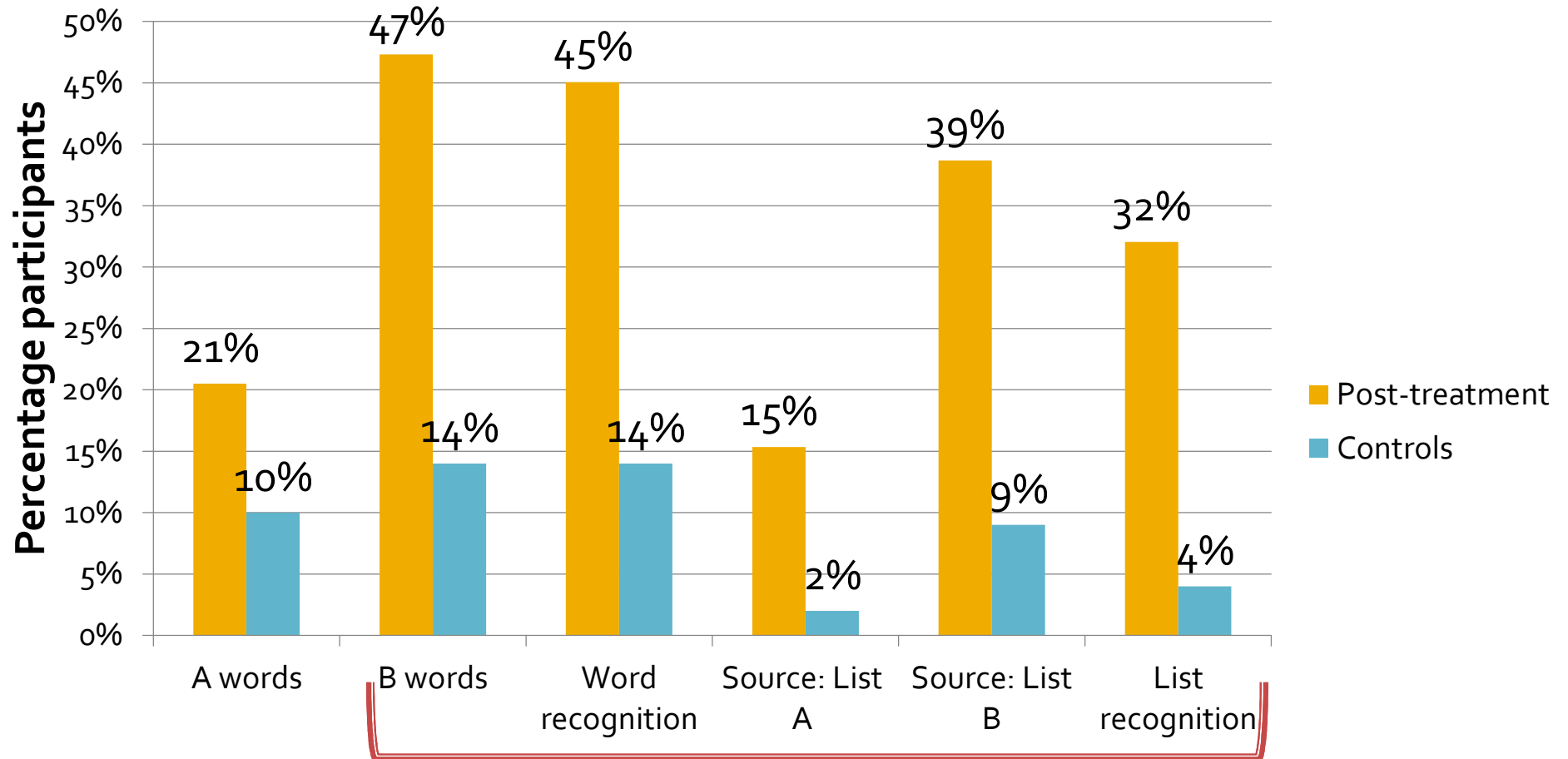
Verbal memory

Post-treatment patients



Verbal memory

Post-treatment patients

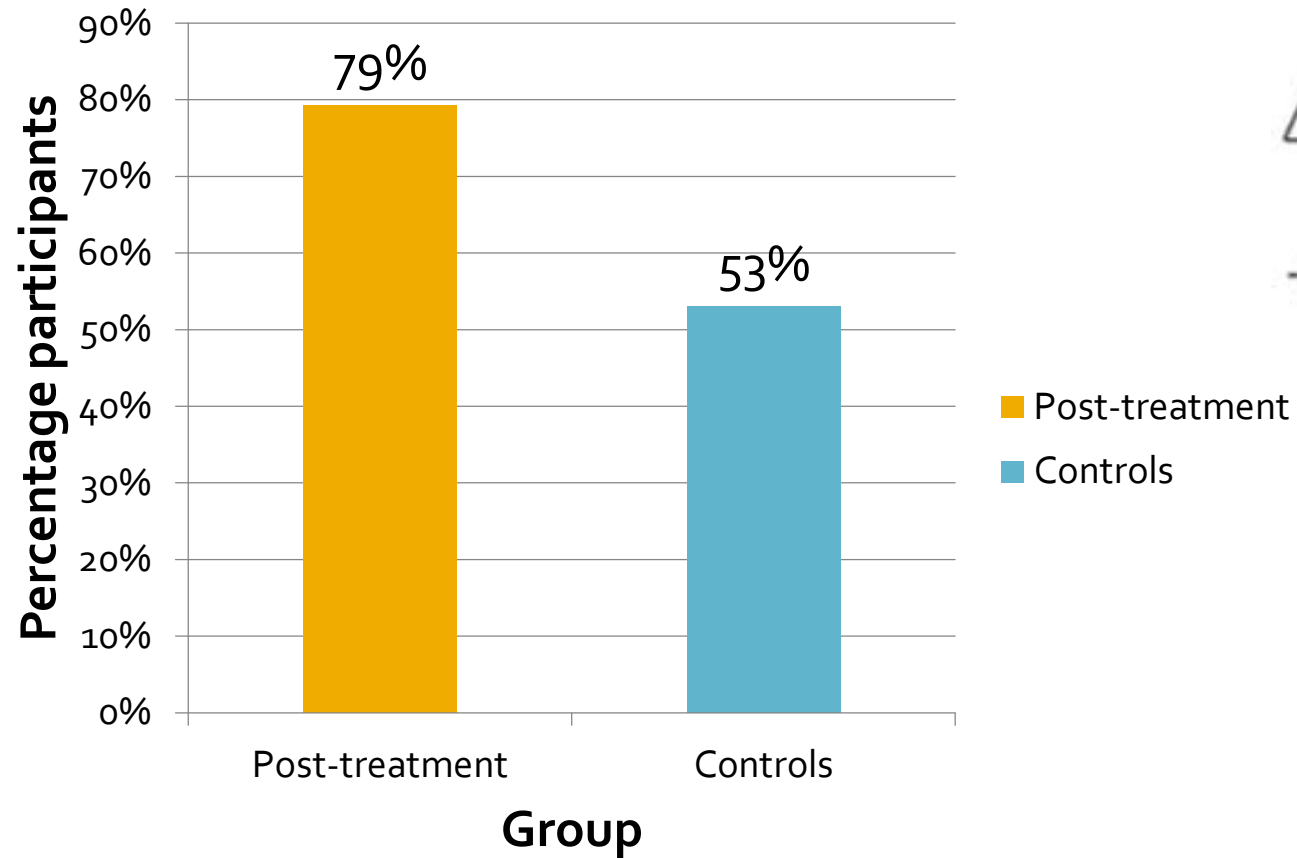


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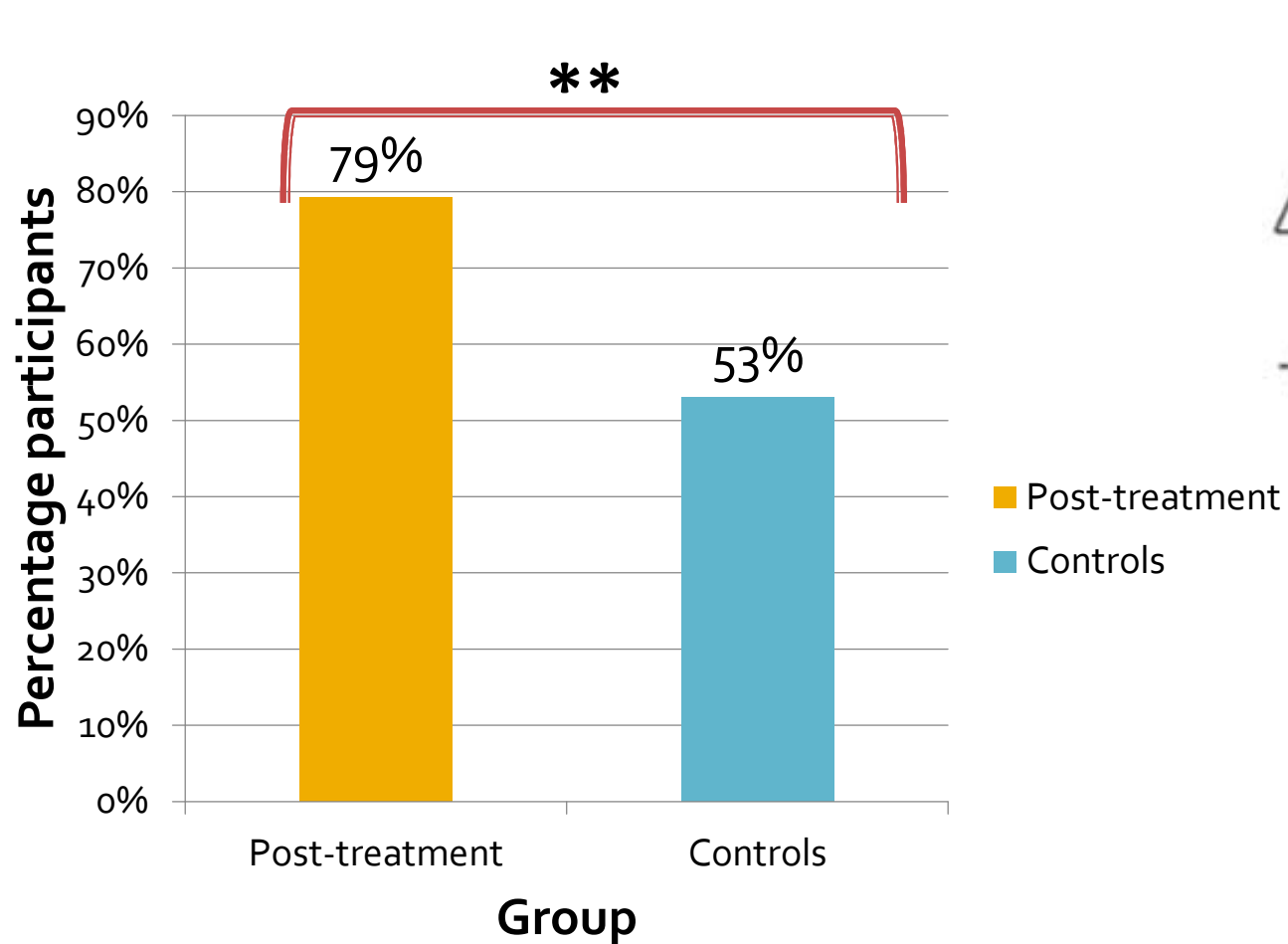
Visuo-spatial abilities

Post-treatment patients



Visuo-spatial abilities

Post-treatment patients



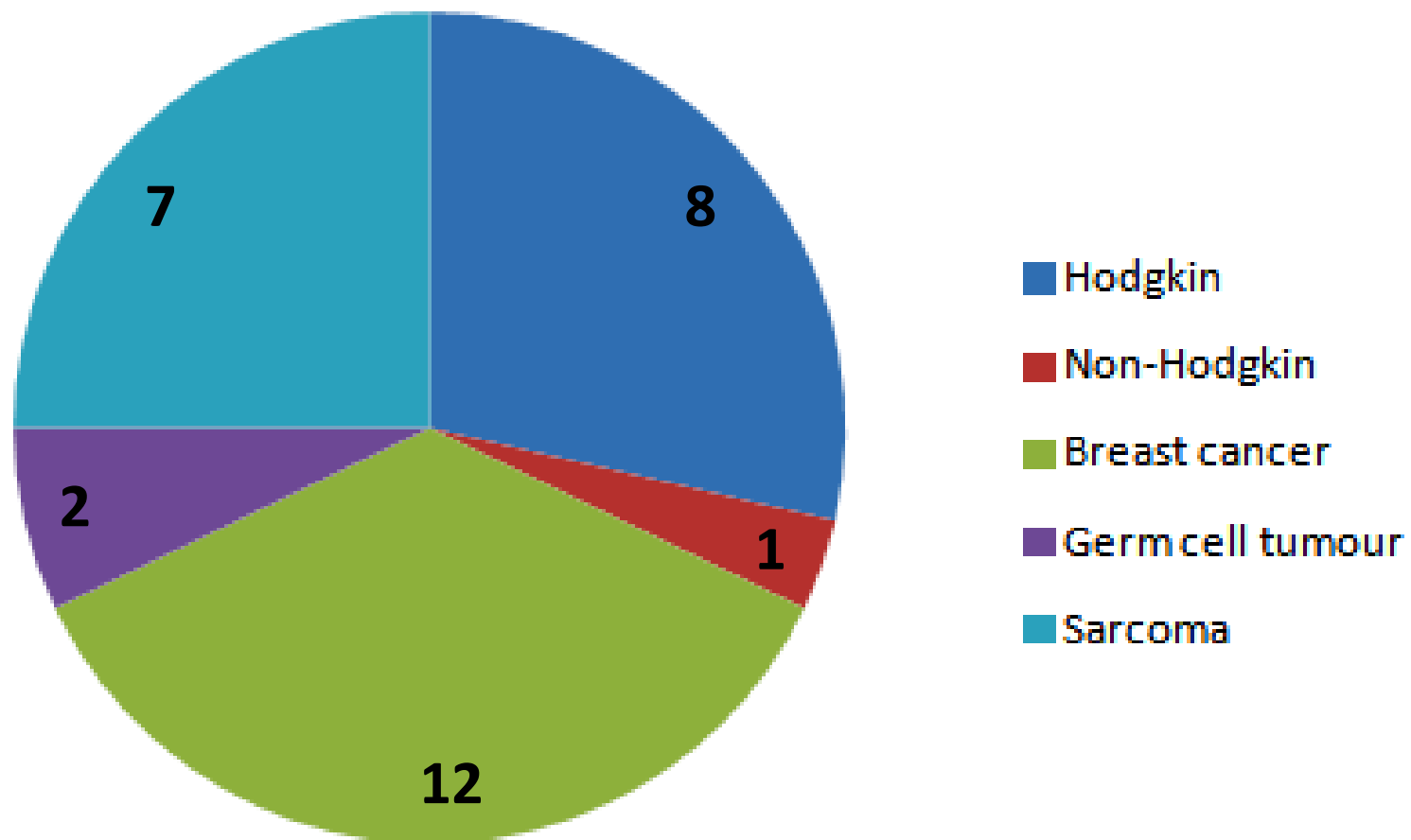
**<.001

Pre-treatment patients

- 30 pre-treatment patients versus 30 healthy matched controls

	Variable	New patients	Controls
✓	Age (m/sd)	30.92 (13.01)	30.57 (12.38)
✓	Sex (m/sd)	0.71 (0.46)	0.67 (0.47)
✓	Years of education (m/sd)	13.57 (1.81)	14.96 (2.65)

Pre-treatment patients



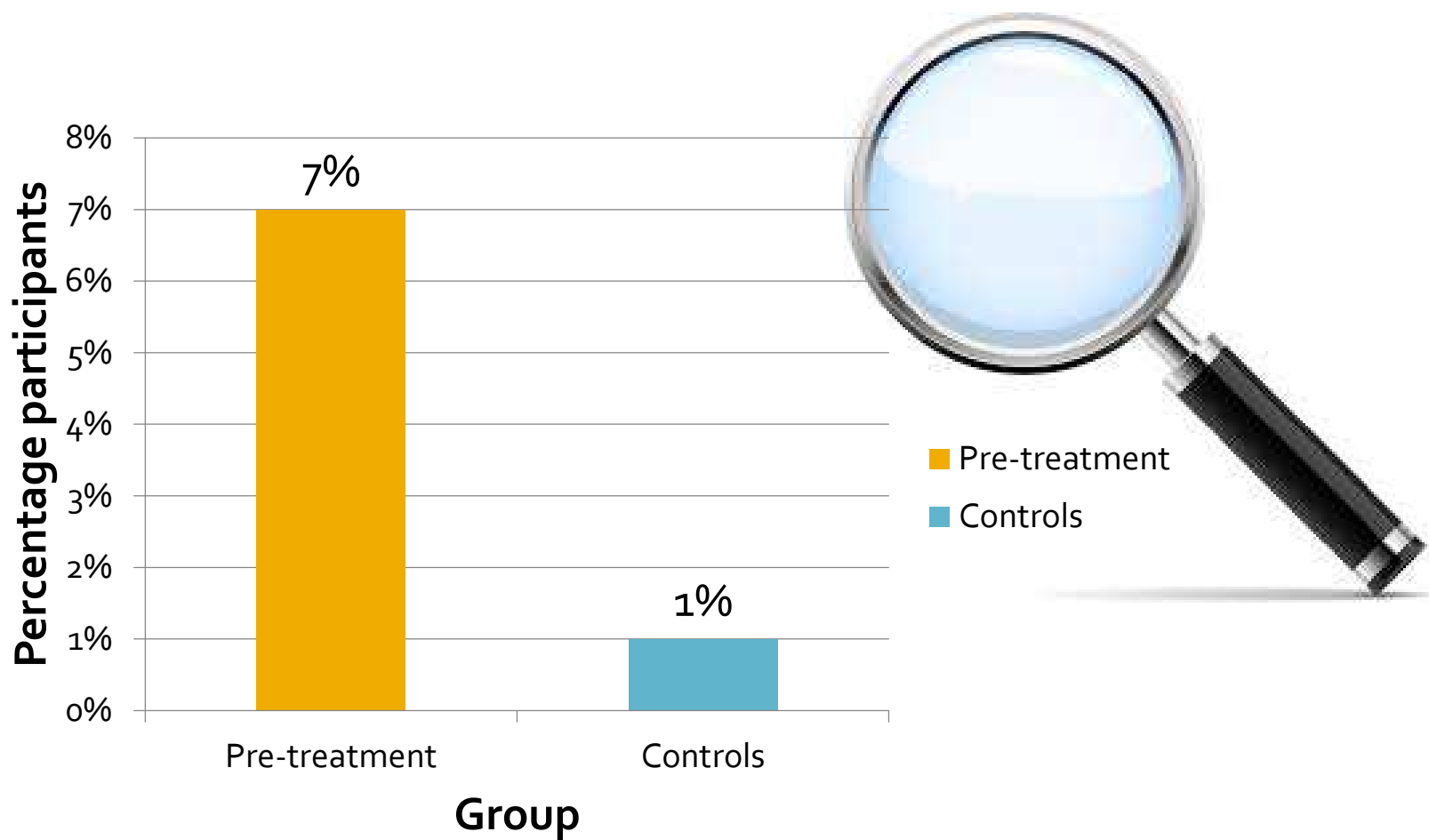
Attention

Pre-treatment patients



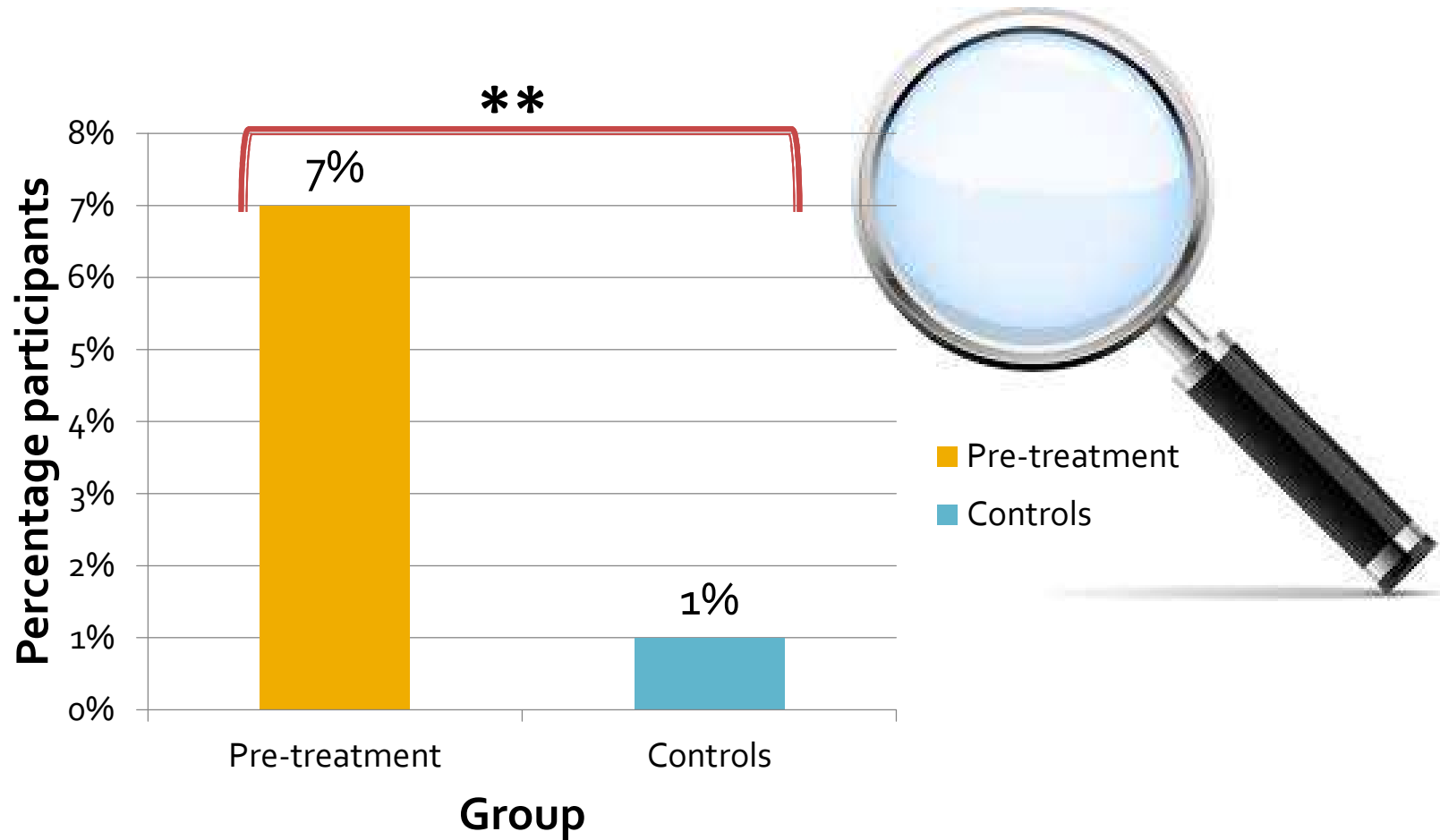
Attention

Pre-treatment patients



Attention

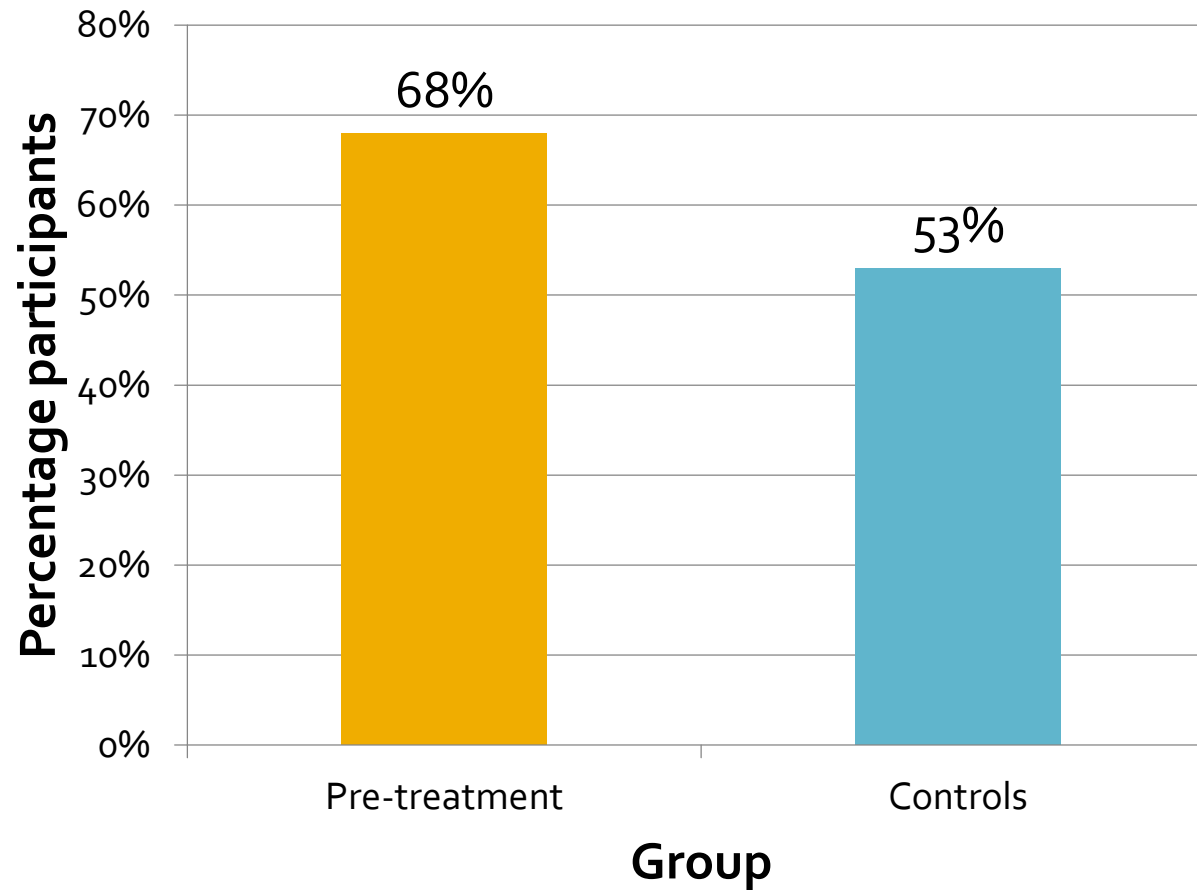
Pre-treatment patients



**p<.01

Visuo-spatial abilities

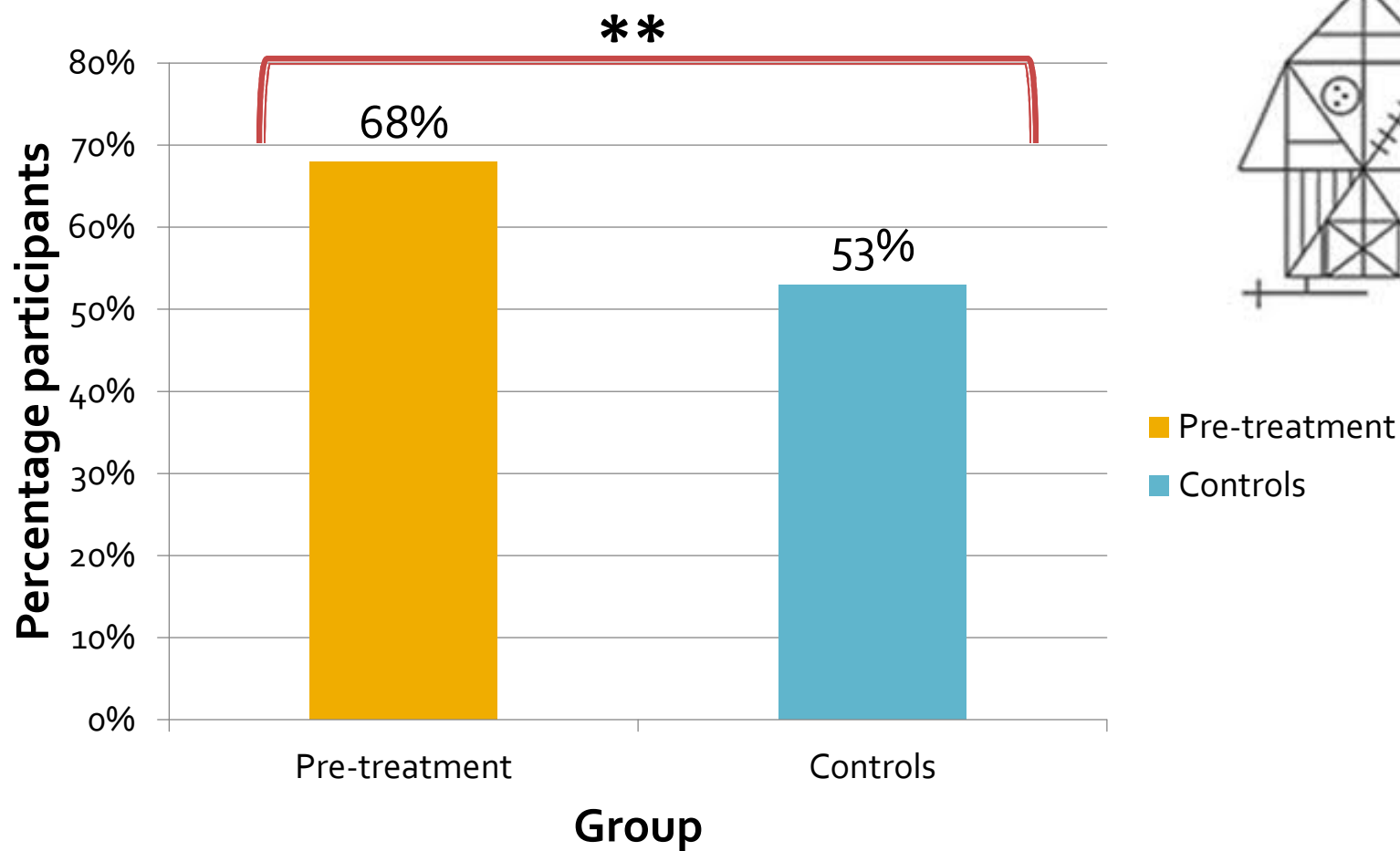
Pre-treatment patients



■ Pre-treatment
■ Controls

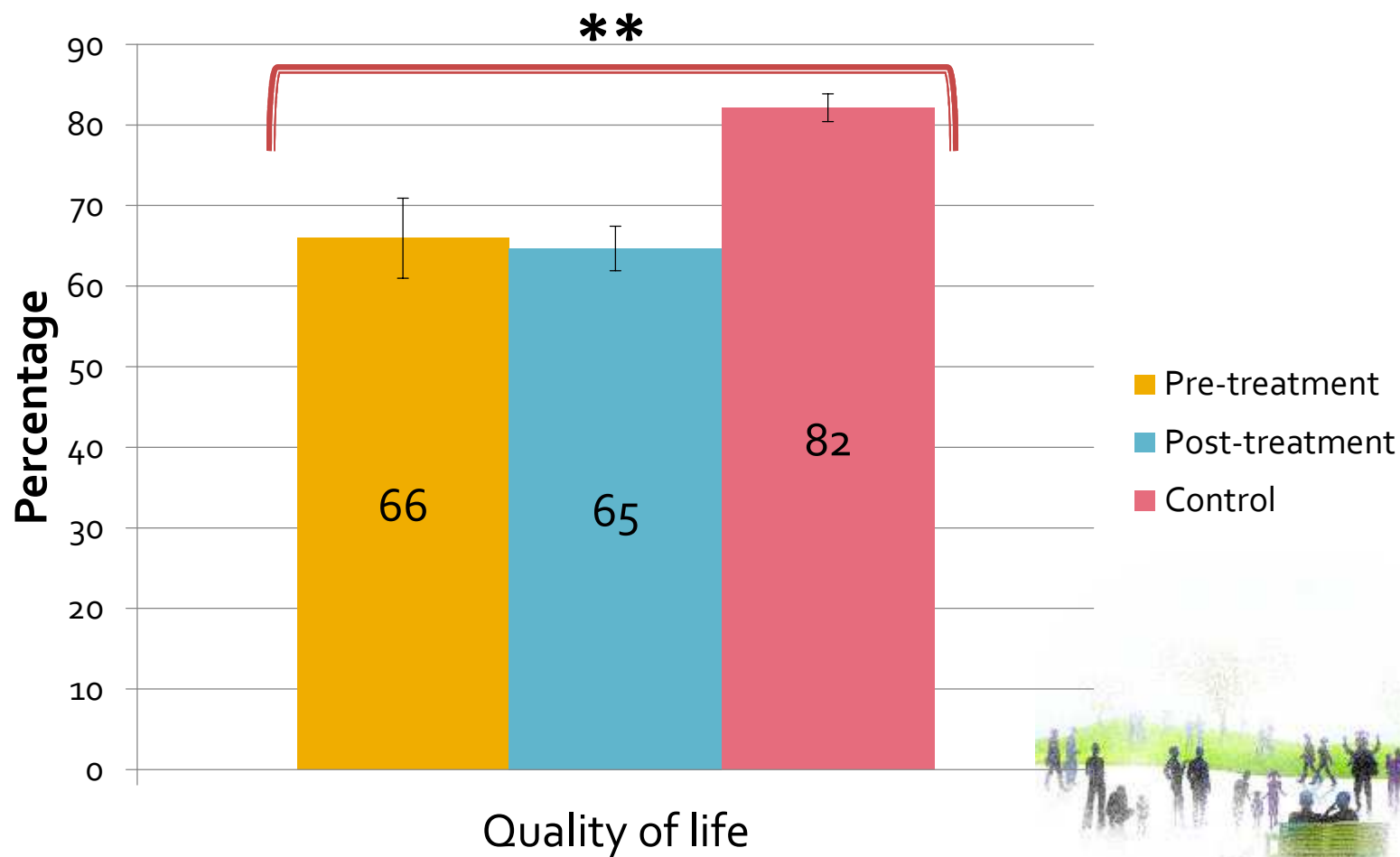
Visuo-spatial abilities

Post-treatment patients



**p<.01

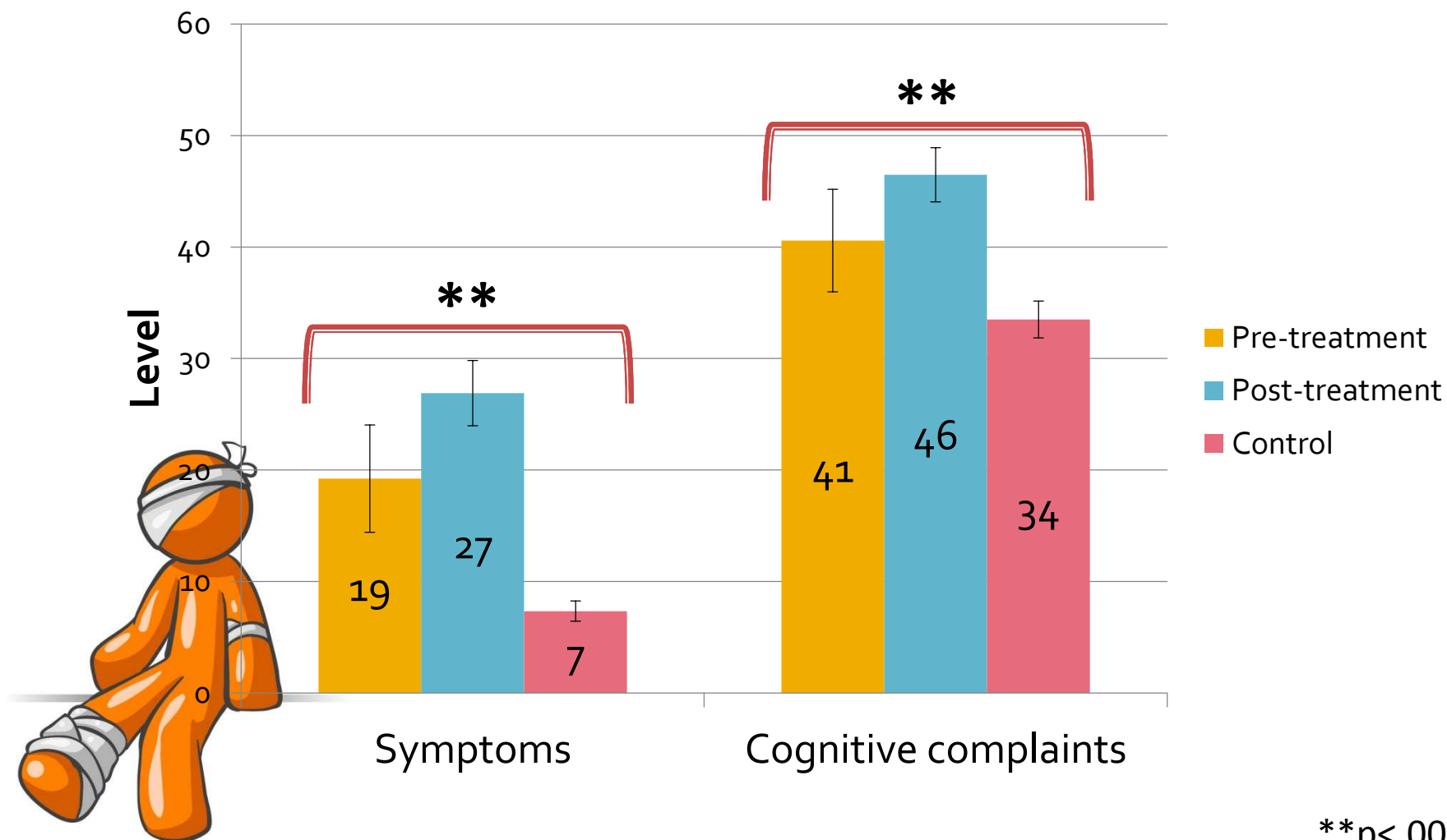
Quality of life



**p<.001

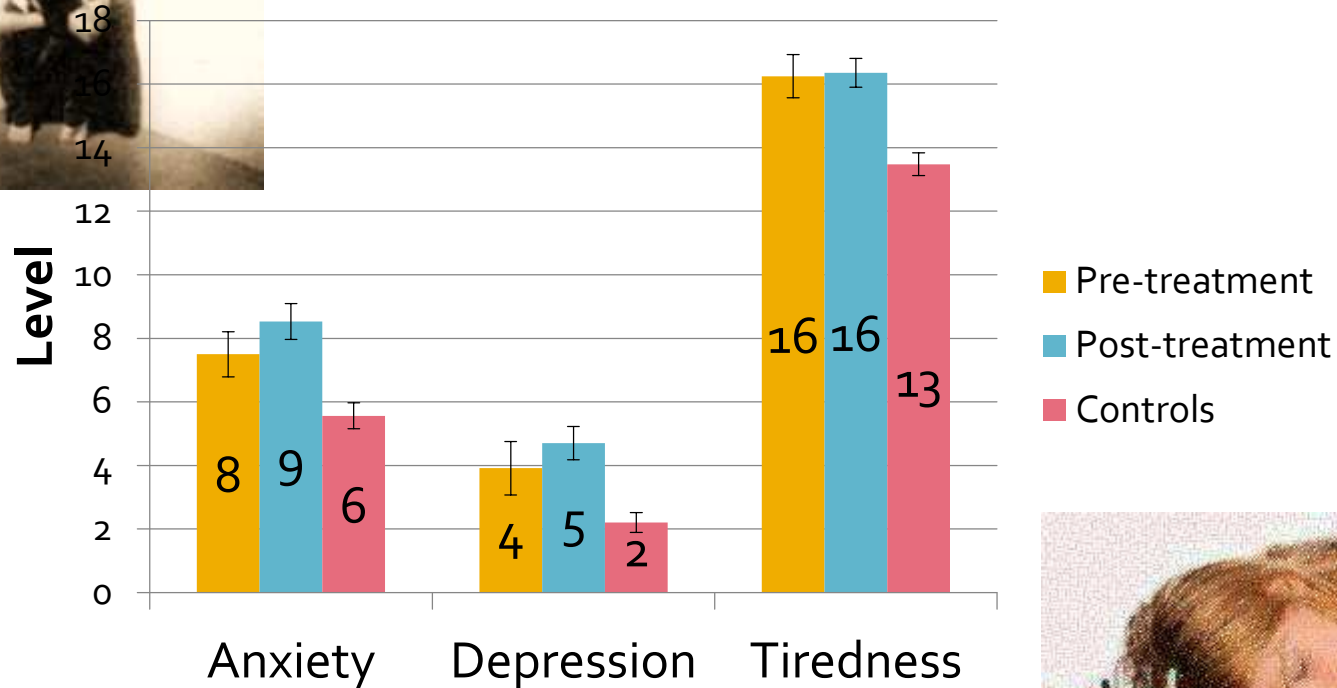
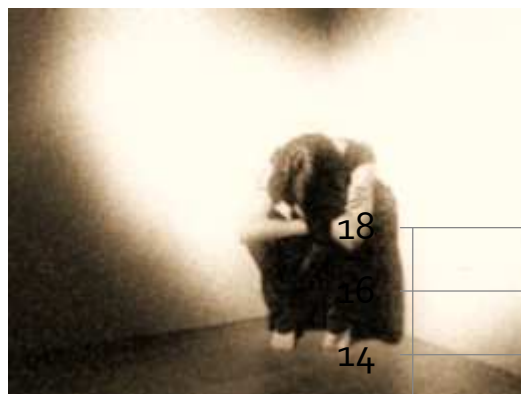


Symptoms



**p<.001

Distress and tiredness



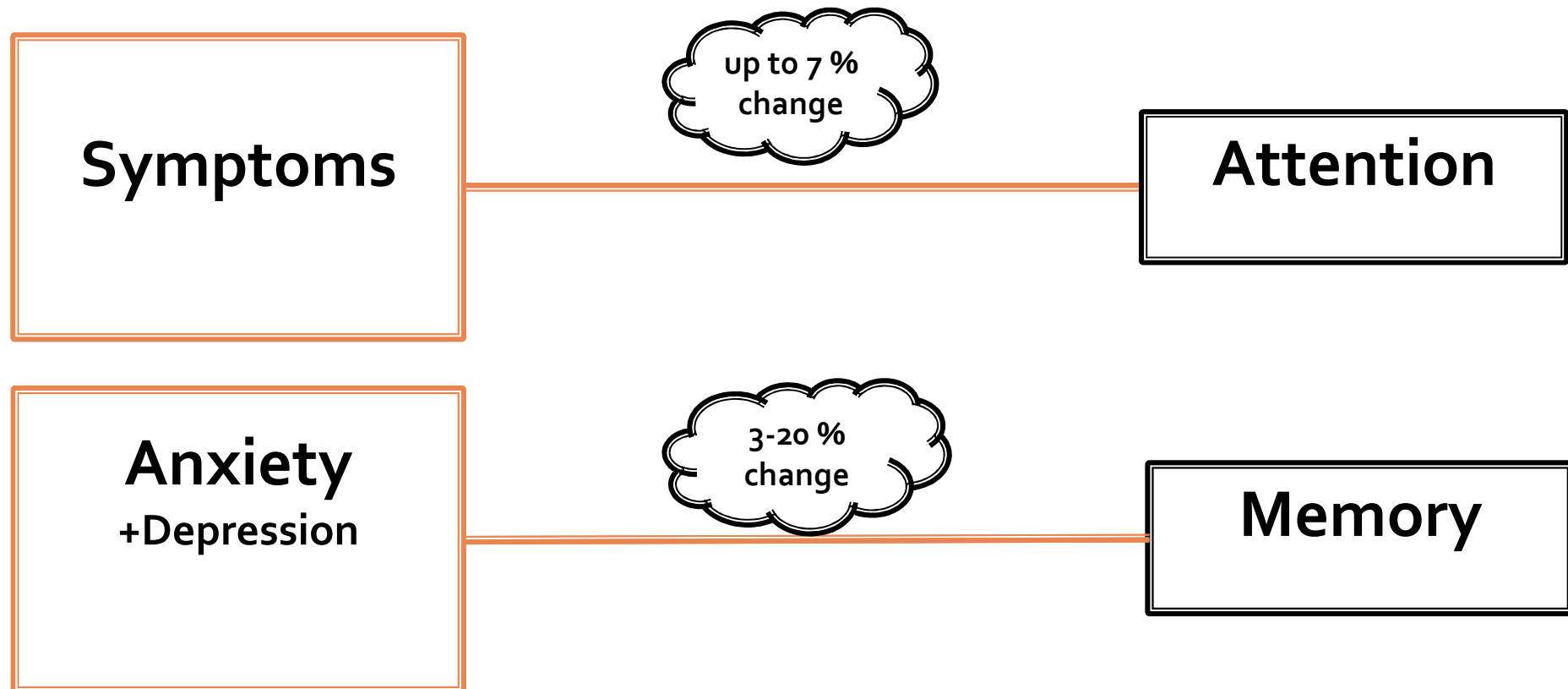
Influence on cognition

Pre-treatment patients



Influence on cognition

Post-treatment patients



Summary

- **Post-treatment patients** - poor memory for verbal information and find it difficult to represent visuo-spatial information.
- **Pre-treatment patients** - lower attention and poor performance on visuo-spatial tests.
- All patients - **lower psycho-social functioning.**
- **They explain a part, but not all of the cognitive issues.**

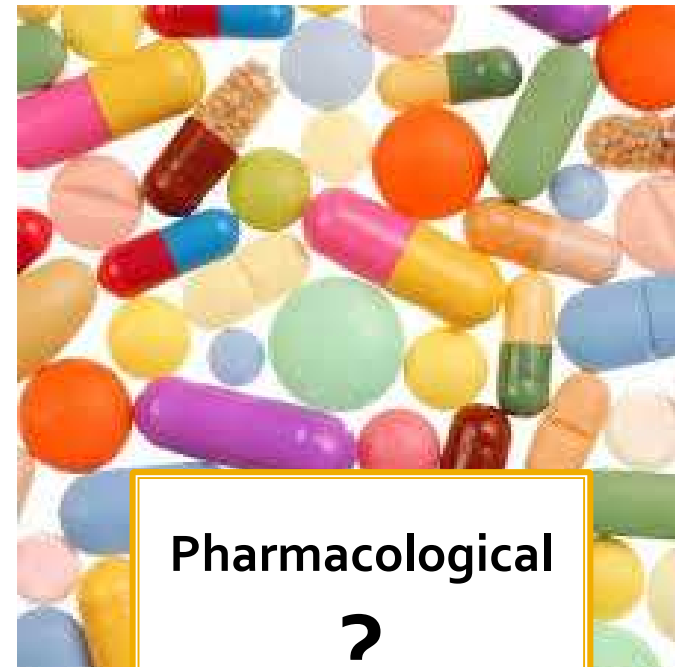
Future directions

- More research on potential mechanisms



Future directions

- More research on potential mechanisms
- To inform potential treatments



Pharmacological

?

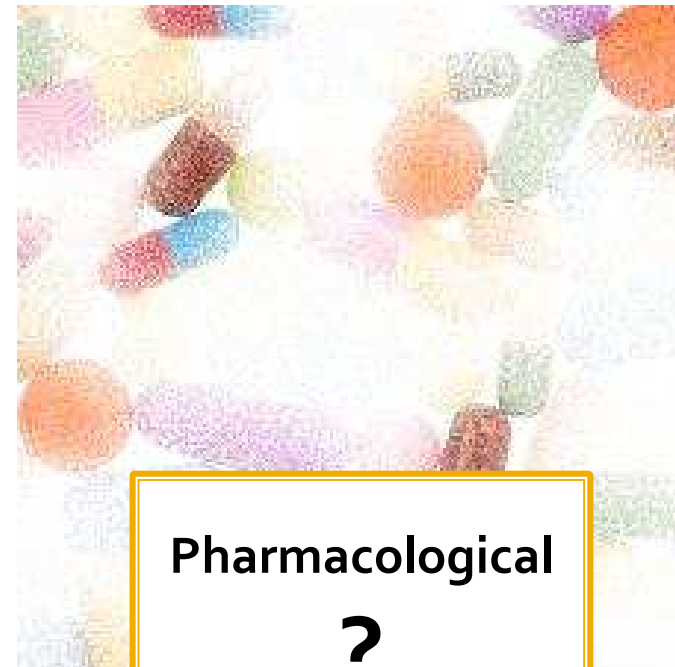
Future directions

- More research on potential mechanisms
- To inform potential treatments



Cognitive training

?



Pharmacological

?

Future directions

- More research on potential mechanisms
- To inform potential treatments

Physical exercise

?



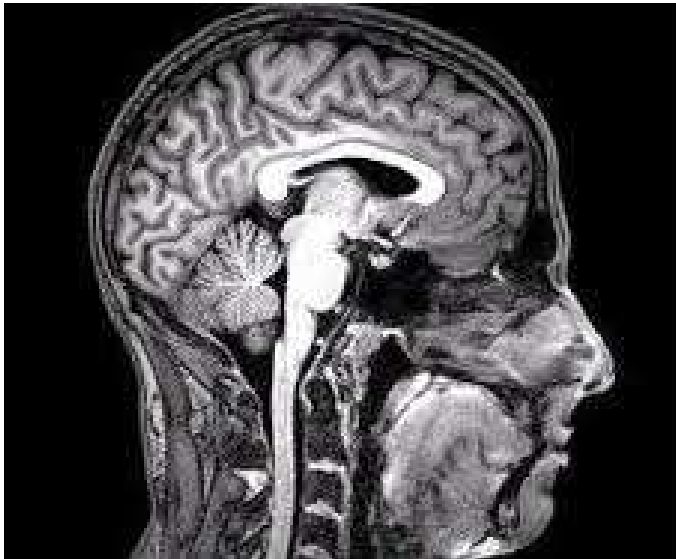
Future directions

- Clinical trials



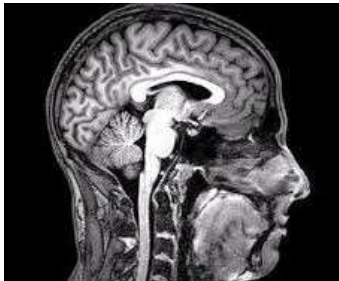
Future directions

- Clinical trials
- Extend to imaging studies



Future directions

- Clinical trials
- Extend to imaging studies



- And translational studies



Thank you for your attention!

Acknowledgements

- All the participants who took part in our study
- The Medical Research Council for funding this project
- My supervisors : Dr. Martin McCabe, Prof. Andrew Mayes, Prof. Alison Wearden, and Dr. Deborah Talmi)
- My advisor: Prof. Linda McGowan
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