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Does persistent inflammation present in the thyroid gland and affect the quality of life after radioiodine therapy in Graves' disease?

Submission date
03/01/2026

Recruitment status
No longer recruiting

Registration date
13/01/2026

Overall study status
Ongoing

Last Edited
13/01/2026

Condition category
Nutritional, Metabolic, Endocrine

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
Radioiodine therapy is a highly effective method of treatment for Graves' disease (GD) and is now being offered as the first-line definitive treatment. A recent study by Dr Torring and colleagues (2019) observed that patients who received radioiodine therapy for GD have worse quality of life 6 to 10 years later, compared to people treated with thyroidectomy surgery: the reason for this is not obvious. This study and reports from peers have raised concerns for some patients and put them off from having radioiodine treatment. While one of the causes of having worse quality of life following radioiodine therapy could be under-replacement with levothyroxine, the effects of the radiation damaging the thyroid and producing inflammation (manifest, in part, by persisting thyroid autoantibodies in the blood) following radioiodine therapy has yet to be investigated. Graves' disease is an autoimmune condition where the immune system turns against the thyroid gland, making it over-active. During the process, the immune system produces proteins called thyroid autoantibodies. These autoantibodies disappear after thyroid surgery but persist for many years in >50% of patients receiving radioiodine therapy for Graves' disease. There could be a link between persistent thyroid antibodies and poorer quality of life after radioiodine therapy. The aim of the clinical observational study is to investigate whether persistent thyroid inflammation explains poor quality of life after radioiodine therapy in Graves' disease.

Who can participates?
Patients with Graves' disease treated with radioiodine therapy and others treated with thyroid surgery.

What does the study involve?
The study will use blood tests, two sets of quality-of-life questionnaires and thyroid PET scans to study the relationship between thyroid inflammation and the quality of life. The blood tests will comprise thyroid autoantibodies, blood markers of inflammation and measurement of small proteins involved in inflammation and immune processes (cytokines). Participants will have three visits in total; baseline, 6 and 12-months. Half of the patients treated with radioiodine will have PET scans at baseline and 12 months.

What are the possible benefits and risks of participating?
There will be no direct benefits to participants. The findings from this study will provide key information for future studies to look into ways to reduce the risk of poor quality of life in patients receiving radioiodine therapy for Graves' disease.

Some participants are also exposed to a small amount of radiation from 18F-FDG-PET. Ionising radiation may cause cancer many years or decades after the exposure. However, everyone is at risk of developing cancer during their lifetime. 50% of the population is likely to develop one of the many forms of cancer at some stage during their lifetime. Taking part in this study may increase the chance of this happening to participants from 50% to about 50.16%.

Where is the study run from?
A single centre at the Benign Thyroid Disorder Clinic in Newcastle upon Tyne Hospitals NHS Foundation Trust in the UK.

When is the study starting and how long is it expected to run for?
December 2024 to June 2027.

Who is funding the study?
The British Thyroid Foundation (BTF) funds this study from the BTF research award, UK.

Who is the main contact?
Dr Earn Gan, Principal Investigator, earn.gan3@nhs.net

Contact information

Type(s)
Principal investigator, Public, Scientific

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Additional identifiers

Integrated Research Application System (IRAS)
340093

Central Portfolio Management System (CPMS)
63586

Protocol number
10655

Study information

Scientific Title
Radioiodine therapy and thyroid inflammation (RAIN study)

Acronym
RAIN

Study objectives
1. Is there persistent thyroid and systemic inflammation in patients with GD after RAI, which correlate with poorer quality of life?
2. Are serum cytokine profile and thyroid autoantibodies valid biomarkers in evaluating persistent systemic inflammation in patients treated with radioiodine therapy?

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 19/08/2024, Yorkshire & The Humber - South Yorkshire Research Ethics Committee NHS (NHSBT Newcastle Blood Donor Centre Holland Drive, Newcastle, NE2 4NQ, United Kingdom; +44 020 7104 8000; southyorks.rec@hra.nhs.uk), ref: 24/YH/0161

Primary study design
Observational

Secondary study design
Longitudinal study

Study type(s)

Health condition(s) or problem(s) studied
Patients with Graves disease

Interventions
This is a pilot study to investigate if patients with Graves' disease treated with radioiodine therapy are more likely to have thyroid and systemic inflammation at 12 months, and worse quality of life, as compared to those treated with thyroid surgery. A total of 30 patients with established Graves’ disease will be recruited from the Benign Thyroid Disease Clinic of the Newcastle upon Tyne NHS Hospitals (20 from the radioiodine group; 10 from thyroid surgery). After agreeing to participate in this study and written informed consent are obtained, participants will have baseline assessments which include blood tests for thyroid autoantibodies, inflammatory response markers serum cytokine assays (saved serum) and QoL questionnaires (ThyPRO39 and SF-36). Ten of the participants who are going to have Radioiodine therapy will have thyroid imaging by 18F-FDGPET at baseline, chronologically selected based on their

willingness to have the scan. Participants will have 2 further visits at 6 and 12 months after RAI or thyroid surgery. QoL questionnaires, blood markers for immuno-inflammation and cytokine assays (saved serum) will be performed on all visits. The 10 participants who have 18F-FDG-PET at baseline will have a repeat scan at 12 months.

Intervention Type
Other

Primary outcome(s)
1. Quality of life measured using the Thyroid-Specific Patient-Reported Outcome-39 (ThyPRO-39) and 36-Item Short Form Survey (SF-36) at baseline, 6 and 12 months

Key secondary outcome(s)
1. Thyroid autoantibodies, blood markers of inflammation and inflammatory cytokines profile measured using standard blood tests and serum cytokine assays at baseline, 6 and 12 months

Completion date
01/06/2027

Eligibility

Key inclusion criteria
1. Confirmed TRAb positive Graves' disease
2. Undergoing thyroid surgery or radioiodine therapy for Graves' disease
3. The ability to give written informed consent

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
16 Years

Upper age limit
100 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
1. On immunomodulatory or immunosuppression
2. Chronic inflammatory or autoimmune disease (e.g inflammatory bowel disease, chronic rheumatological or neurological conditions)

Date of first enrolment

08/10/2024

Date of final enrolment
01/06/2026

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
The Newcastle upon Tyne Hospitals NHS Foundation Trust
Freeman Hospital
Freeman Road
High Heaton
Newcastle upon Tyne
England
NE7 7DN

Sponsor information

Organisation
Newcastle upon Tyne Hospitals NHS Foundation Trust

ROR
https://ror.org/05p40t847

Funder(s)

Funder type

Funder Name
British Thyroid Foundation

Alternative Name(s)
The British Thyroid Foundation, BTF

Funding Body Type
Private sector organisation

Funding Body Subtype
Trusts, charities, foundations (both public and private)

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study will be available upon request from earn.gan1@ncl.ac.uk. Individual participant data that underlie the results reported in the article, after deidentification, could be shared upon request. The researchers who provide a methodologically sound proposal will be considered. The data requestors will need to sign a data access agreement. Data are available for 5 years from the date of consent, available from the date of article publication.

IPD sharing plan summary
Available on request