



UNIVERSITY OF  
EASTERN FINLAND

KUH  
NEUROCENTER



## CyberKnife therapy of 50 vestibular schwannomas

ISRS Educational Course / Kuopio 2018

Olli-Pekka Kämäräinen MD PhD Lecturer  
Neurosurgery of KUH NeuroCenter  
Neuro-Oncology Group with CyberKnife  
Microsurgery Training & Research Lab  
Kuopio University Hospital  
[olli-pekka.kamarainen@kuh.fi](mailto:olli-pekka.kamarainen@kuh.fi)

## Olli-Pekka Kämäräinen – disclosures

Member of KUH Neuro-Oncology Group  
using CyberKnife in neurosurgical indications

No other connections to ACCURAY

# Logistics of CK therapy of *vestibular schwannomas* KUH ENT & Neurosurgery & Cancer Center

KUH Acoustic Neurinoma Group

ENT Heikki Löppönen, Antti Hyvärinen and Arno dietz  
Neurosurgery – Arto Immonen

Clinical Neurophysiology – Intraoperative Monitoring Group

CK Outpatient Clinic – *CK neurosurgeon*  
mask – CT – MRI

Image fusion – *CK medical physicist*

Drawing of target and eloquent structures – *CK neurosurgeon*

Dose plan – *CK medical physicist*

Final dose plan – *CK neurosurgeon* and *CK medical physicist*

Outpatient CK therapy / single vs fractions – *CK therapists*

MRI follow up – KUH Acoustic Neurinoma Group

# KUH experience 2012 – 2017

## Vestibular schwannoma patients

- n = 50
- median age 63 years (21–85)
- 60% female
- surgery prior to CK in 50% (n=25)
- primary SRT in 50% (n=25)
- NF2 in 12% (n=6)

# CyberKnife dose plans

- SRS radiosurgery n = 42 (84%)
  - ❖ 13 Gy margin dose in one session
- SRT fractionated therapy n = 8 (16%)
  - ❖ 30 Gy margin dose (5 x 6 Gy)



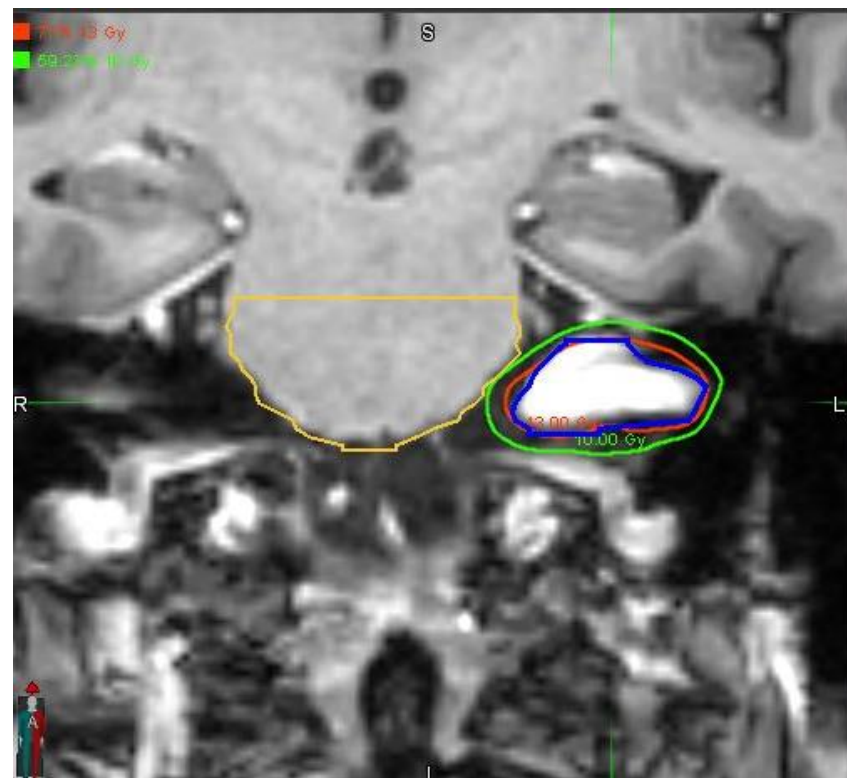
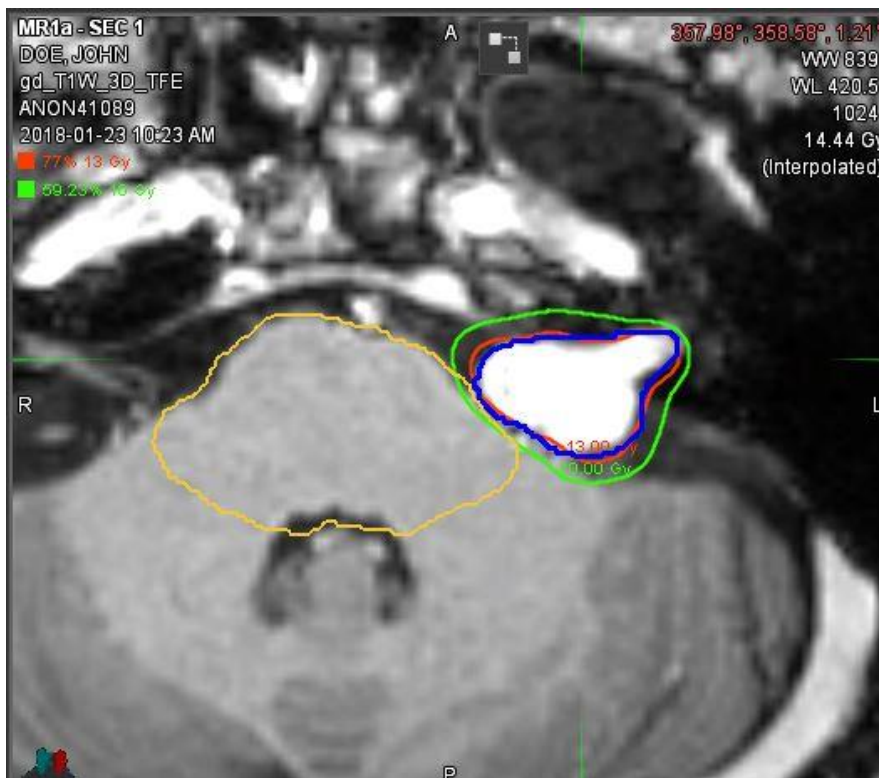
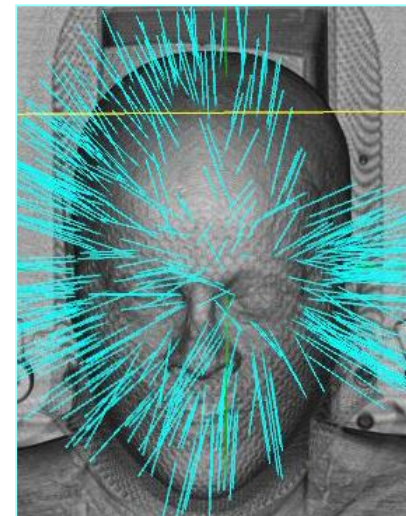
# Typical dose plan

blue line – tumor margins

red line – margin dose 13 Gy

green line – 10 Gy

yellow line – pons



Recurrent vestibular schwannoma  
CyberKnife stereotactic radiotherapy  
in one session

Overall price of the therapy  
3.700 euros

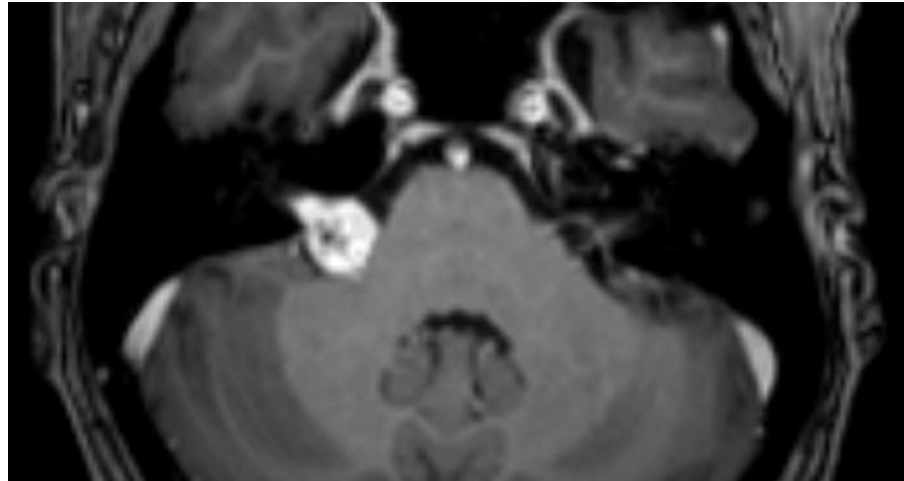
The patient gave  
a written permission to present the video

# Results

- MRI at 1 year after CK therapy
    - ❖ decreased tumor volume in 43%
    - ❖ unchanged tumor volume in 36%
    - ❖ increased tumor volume in 21%
- favourable outcome in 79%



Small vestibular schwannoma  
SRS margin dose 13 Gy  
reduced volume at 12 months

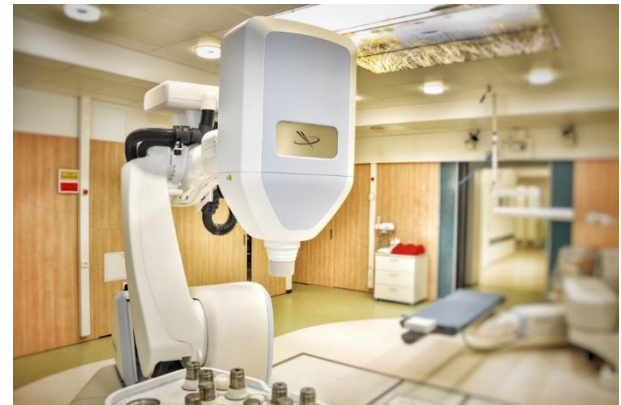


# Results

- MRI at **3** years after CK therapy
    - ❖ decreased tumor volume in 50%
    - ❖ unchanged tumor volume in 25%
    - ❖ increased tumor volume in 25%
- favourable outcome in 75%

# CK therapy of 50 vestibular schwannomas side effects and complications

- no side effects 48%
  - nausea 24%
  - vertigo 17%
  - other discomfort 37%
- 
- facial nerve paresis 0%
  - impaired hearing 6% (n=3)



# CyberKnife therapy of *vestibular schwannomas*

KUH ENT & Neurosurgery & Cancer Center

[www.finnhealth.fi](http://www.finnhealth.fi)



## CK Physicists

Janne Heikkilä / Jan-Erik Palmgren / Tuomas Virén / Jan Seppälä

## CK Therapists in Charge

Aija Juutilainen / Henna Rissanen / Kari Tervo

## CK Neurosurgeons

Olli-Pekka Kämäräinen

Mikael von und zu Fraunberg

