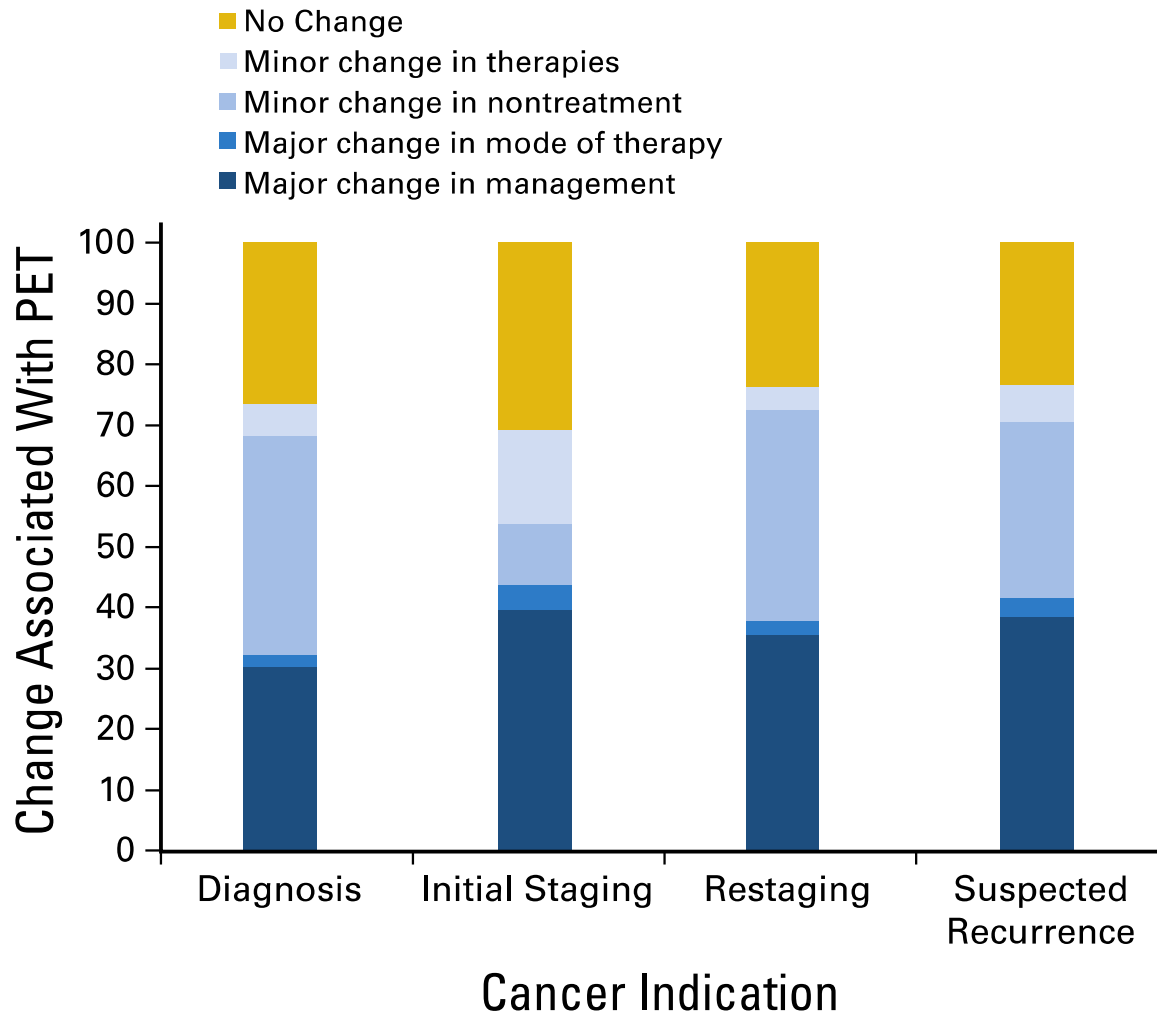# Summary: CERN Medical Applications

- Radioisotopes for diagnostic and therapeutic applications

- Production and distribution of radioisotopes

- Novel instrumentation (whole-body, organ-dedicated)

- Fundamental radiobiology: tool for dosimetry

- Multidisciplinary work → ERANET initiative on medical imaging and radioisotopes 2015

CHUV

Personalized Medicine: Change in treatment after a ^{18}F-FDG PET/CT

Legend:
- No Change
- Minor change in therapies
- Minor change in nontreatment
- Major change in mode of therapy
- Major change in management

Y-axis: Change Associated With PET

X-axis: Cancer Indication — Diagnosis, Initial Staging, Restaging, Suspected Recurrence

Hillner et al., JCO 2008

N=22'976

Radioisotopes for medical applications

- Diagnostic + therapeutic applications: many areas of medicine (oncology, neurodegenerative & cardiovascular diseases, infectious diseases…)
- Increasingly used (+10–20%/year vs. radiology 2-3%/year), because it allows "personalized medicine"
- Determine most promising radioisotopes, taking into account
  – Tumour biology
  – Clinical application (now & in the future)
  – Existing radiochemistry and radiopharmacy

CHUV

Radioisotope Production

- Determine most promising radioisotopes taking into account
    - Production methods
    - Existing solutions
    - Distribution/chain supply
    - Manufacturing price
- But "out-of-the-box" thinking and innovative solutions required
    - Generators
    - Auger electrons

CERN and Medical Applications

- Great potential to successfully address today's challenges in medicine

- Multidisciplinary field → collaboration of physicists, engineers, radiochemists, radiopharmacists, biologist, physicians, …

- Long-term strategy (research), but also short-term solutions to clinical problems

- CERN: home of an ERANET-2015 initiative on medical imaging and radioisotopes (MEDICIS, ENDOTOF-PET/US, and others)

Immediate actions plan for CERN

- Capitalize on ISOLDE & MEDICIS
- Approach ESS (Lund) for joint technology development
- Create/join networks for interdisciplinary training (H2020-ITN deadline 9 April 2014)
- Create an ERANET to federate (legal framework) the medical imaging and therapy with radioisotopes