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«History and social extensions of Magnetic Resonance Imaging»

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AIMS

Study of the evolution of Magnetic Resonance Imaging - MRI

The social situation prevailing at the time it was first used

MRI machines in Greece, their use, cost and safety practices followed

LEAD SCIENTISTS

Raymond Damadian

Paul Lauterbur

Peter Mansfield

TIMELINE

1971 — **First full-body scan of a human body and image of the thoracic cavity**

1981 — **Installation of the first standard MRI machine in a hospital**

1998 — **Allowance by the FDA to market devices up to 4T**

First Machines

- **Visual & numerical information → disagreement about the department that they should be placed**
- **Colorful images to represent the inside of the body**

The field of radiology prevailed and so

The representation of results was only in image form, and more specifically,a monochrome image in grey tones (as in radiology)

1980s

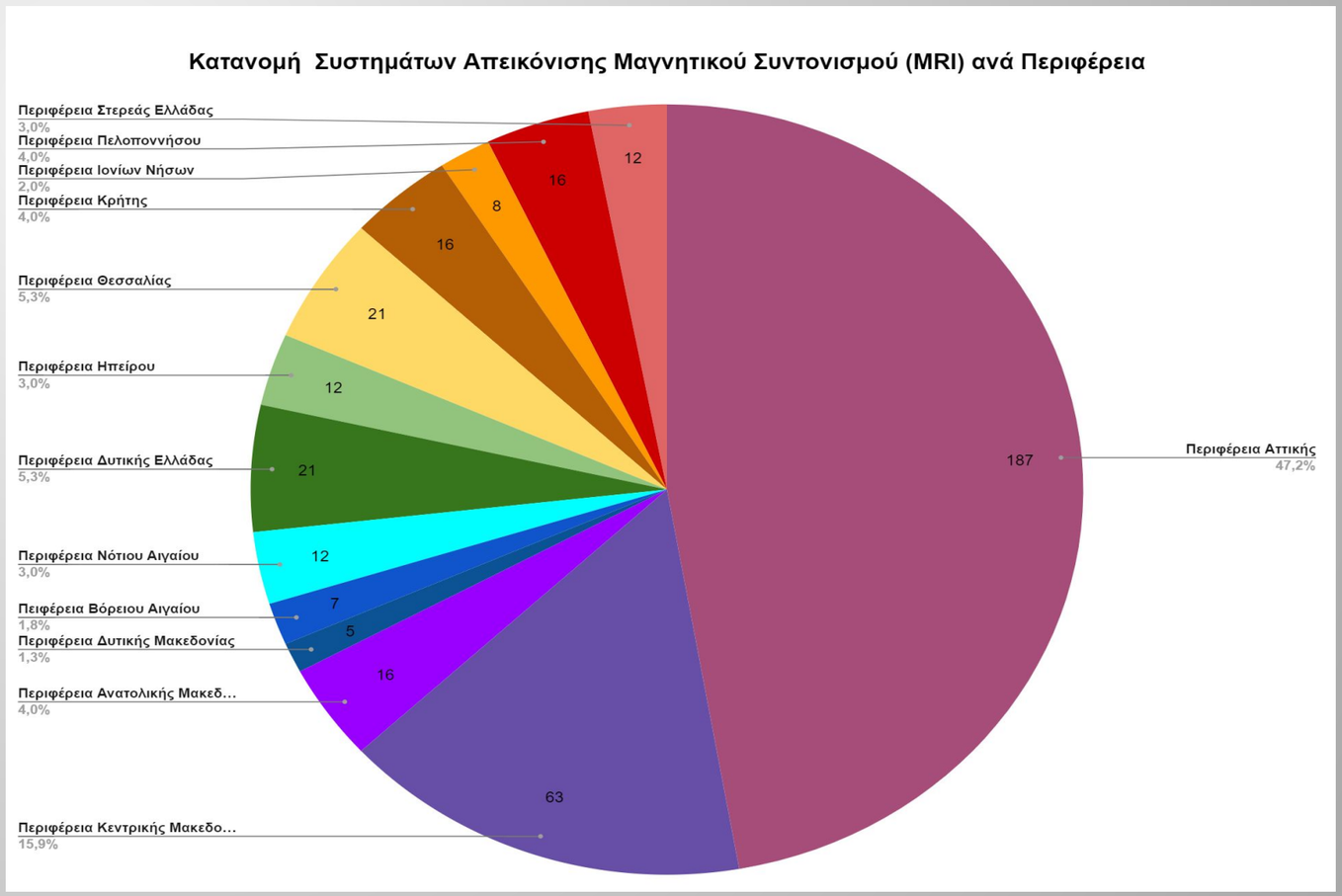
- **Sensitivity about nuclear weapons and nuclear power plants in the US**
- **Movements against nuclear power plants since the 1970s**
- **Fear that the word "nuclear" in "Nuclear Magnetic Resonance Imaging" is associated with nuclear power and weapons → New name, "Magnetic Resonance Imaging - MRI"**

Nobel Prize in Physiology/Medicine

- Award winners 2003 : Paul C. Lauterbur and Sir Peter Mansfield "For their discoveries on magnetic resonance imaging".
- Strong reaction from Raymond Damadian because of his exception.
- Disruption of the scientific community

MRI UNITS IN GREECE

- 389 MRI (91 public & 298 private) as of 2022
- ~65% are in Athens & Thessaloniki
- 12 regional units: no MRI machines
- 2013-2016: 10% of examinations were performed in public sector
- Greece: twice as many machines compared to EU members of similar population



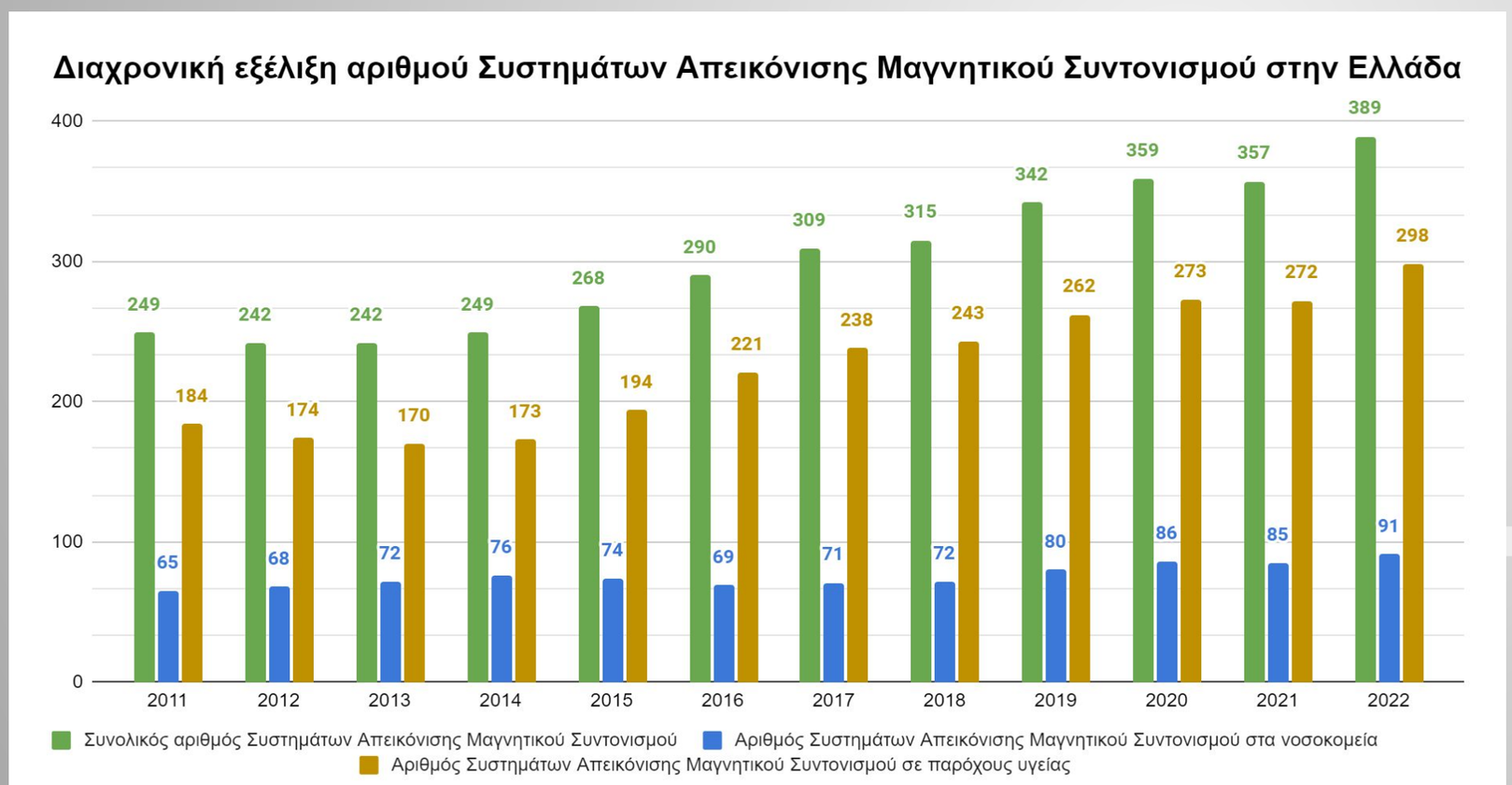
Long Waiting Lists

Lack of Modern Equipment

Shift towards Private Sector

Lack of Staff

Problems In Dealing With Public Funds

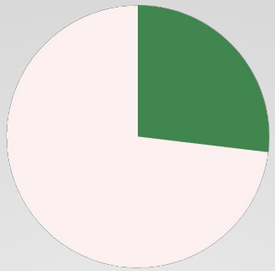


MRI Evolution in Greece

SAFETY PRACTICES

Of the MRI units that took part in a survey

93,3% provide patients with a written questionnaire

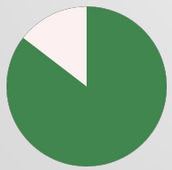


26,9% implement a preliminary screening of patients prior to the examination

93,3% do not use metal detection systems

Regarding Emergency Equipment

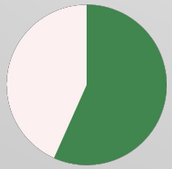
81.7% lack sufficient equipment



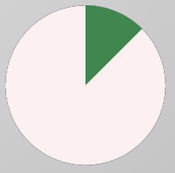
85.6% do not have fire extinguishers

65.4% have MRI compatible stretchers

40.4% have MRI compatible wheelchairs

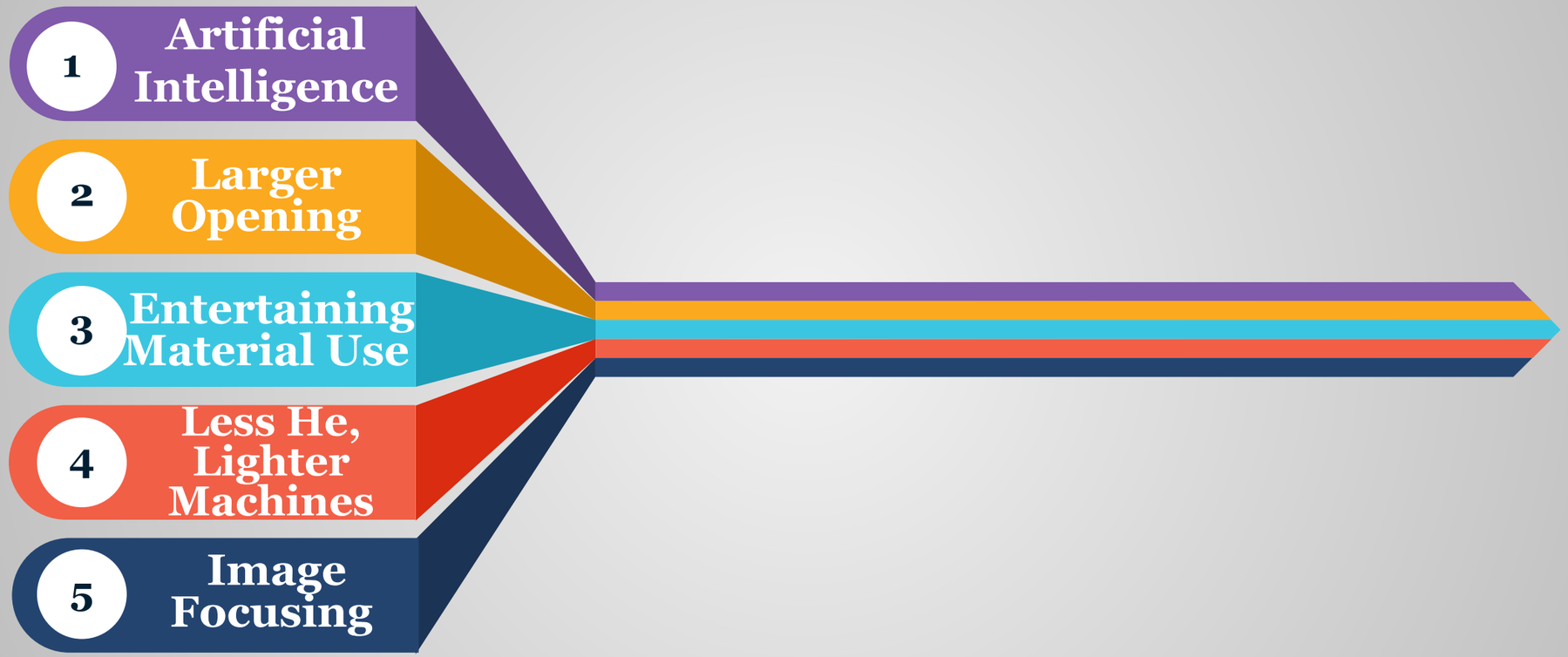


56.7% have an alternative to a power cut



12.5% perform emergency exercises

FUTURE DEVELOPMENTS



CONCLUSIONS

Change in award rules if research is carried out by teams and not individuals

Strict protocols with guidelines

Discoveries are the result of the collaboration of many scientists

Better organisation of public sector and distribution of magnetic resonance imaging systems

Existence of inspection body to ensure compliance with rules & regulations

REFERENCES

- Filler, A. (2009) The History, Development and Impact of Computed Imaging in Neurological Diagnosis and Neurosurgery: CT, MRI, and DTI, Nature Precedings [online] Available from: https://www.nature.com/articles/npre.2009.3267.1
- Prasad, A. (2007). The (Amorphous) Anatomy of an Invention: The Case of Magnetic Resonance Imaging (MRI). Social Studies of Science [online] Volume 37, Issue 4, Available from: https://journals.sagepub.com/doi/abs/10.1177/0306312706075334
- Kelly A. Joyce (2006) "From numbers to pictures: The development of magnetic resonance imaging and the visual turn in medicine", Science as Culture, volume 15, issue 1, Available from: https://www.tandfonline.com/doi/full/10.1080/09505430600639322 pp 1-22,
- Burri, R. V. (2008). "Doing Distinctions: Boundary Work and Symbolic Capital in Radiology" Social Studies of Science, [online] volume 38, issue 1, Available from: https://journals.sagepub.com/doi/abs/10.1177/0306312707082021 pp.35–62.
- Dreizen, P. (2004) 'The nobel prize for MRI: A Wonderful Discovery and a sad controversy', The Lancet [online] vol 363, issue 9402, Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(03)15182-3/fulltext pp. 78.
- Breitzman, A. (2017) An empirical look at the controversy surrounding The nobel prize for magnetic resonance imaging, Faculty Scholarship for the College of Science & Mathematics [online] Available from: https://rdw.rowan.edu/csm_facpub/80/?utm_source=rdw.rowan.edu%2Fcsm_facpub%2F80&utm_medium=PDF&utm_campaign=PDFCoverPages
- Harris, R.F. (2003) 'Nobel grudge', Current Biology, [online] vol 13, issue 22, Available from: https://www.sciencedirect.com/science/article/pii/S0960982203008078

REFERENCES

- Healthcare Resources, Organisation for Economic Co-operation and Development (OECD). Available at: https://stats.oecd.org/viewhtml.aspx?datasetcode=HEALTH_REAC&lang=en
- Ιατρικά εργαστήρια ακτινοβολιών - Συγκεντρωτικοί Πίνακες ανά Περιφέρεια (2023) Ελληνική επιτροπή ατομικής ενέργειας. Available at: https://eeae.gr/%CE%B9%CE%B1%CF%84%CF%81%CE%B9%CE%BA%CE%AC-%CE%B5%CF%81%CE%B3%CE%B1%CF%83%CF%84%CE%AE%CF%81%CE%B9%CE%B1-%CE%B1%CE%BA%CF%84%CE%B9%CE%BD%CE%BF%CE%B2%CE%BF%CE%BB%CE%B9%CF%8E%CE%BD
- Ινστιτούτο Βιοϊατρικής Τεχνολογίας (INBIT) (2017) ΕΞΟΡΘΟΛΟΓΙΣΜΟΣ ΤΗΣ ΚΑΤΑΝΟΜΗΣ ΚΑΙ ΤΗΣ ΧΡΗΣΗΣ ΤΟΥ ΥΨΗΛΗΣ ΑΞΙΑΣ ΚΕΦΑΛΑΙΟΥΧΙΚΟΥ ΙΑΤΡΙΚΟΥ ΕΞΟΠΛΙΣΜΟΥ ΣΤΗΝ ΕΛΛΑΔΑ.[online] Available at:https://www.efie.gr/index.php/gr/informations-3/announcements/item/340-eksorthologismos-tis-katanomis-kai-tis-xrisis-tou-ypsilis-aksias-kefalaiouxikou-iatrikou-eksoplismou-stin-ellada
- Stogiannos, N. and Westbrook, C. (2020) 'Investigating MRI safety practices in Greece. A national survey', Hellenic Journal of Radiology, [online] volume 5, issue 2, Available from: https://www.hjradiology.org/index.php/HJR/article/view/347 pp. 24–35.
- What's New in MRI Technology — 2024 Edition' (2024), 17 November Available at: https://www.cassling.com/blog/whats-new-in-mri-technology-2024-edition
- Fujifilm Launches New MRI System, ECHELON Synergy with Deep Learning Reconstruction Technology (2023) Imaging Technology News. Available from: https://www.itnonline.com/content/fujifilm-launches-new-mri-system-echelon-synergy-deep-learning-reconstruction-technology
- Hendrix, K., Innovative MRI Machine Makes Imaging Possible For More Patients, Medical University of South Carolina. Available from: https://muschealth.org/patients-visitors/about-us/2020-year-in-review/innovative-mri-machine