Saul Hertz
80th Anniversary of Radioiodine Therapy

Reflections on International Connections
By Morton Z. Hoffman

What are some ways to deal with workplace conflict?

April Monthly Meeting Presentation Cancelled
The Nucleus April 2021

Saul Hertz and the 80th Anniversary of Radioiodine Therapy

By Barbara Hertz

On March 31, 1941, Elizabeth D., a patient at Massachusetts General Hospital (MGH) with Graves’ disease, was treated with the first therapeutic use of radioactive iodine (RAI), which had been produced at the M.I.T. Markle Cyclotron. The therapy was administered by Saul Hertz, M.D., the Director of the MGH Thyroid Unit, who had proposed the original hypothesis for the medical use of RAI in 1936; Hertz, together with his collaborator from M.I.T., Arthur Roberts, had obtained the first experimental data for application to the clinical setting.

The researchers witnessed and documented their initial success in the treatment of hyperthyroidism, most commonly caused by Graves’ disease with its severe consequences, that was, at that time, difficult to treat. This early success in the use of RAI was further expanded by Dr. Hertz for the diagnosis and treatment of thyroid carcinoma.

In the eighty years since that time, countless generations of patients worldwide have been treated effectively with RAI for both benign and malignant thyroid diseases. Although great progress in radiobiology and dosimetry has been made over the years, patients continue to be treated in much the same way as Dr. Hertz treated his patients. Subsequently, radionuclide therapy has been introduced for other diseases, with radioiodine remaining the “Gold Standard” of targeted therapies.

The term, “theranostic drugs,” describes those that provide images with diagnostic information in addition to possessing a therapeutic modality; RAI is the first of such drugs. The use of targeted theranostic radionuclide therapy has expanded, offering the promise of being a mainstay for the treatment of neuroendocrine tumors and prostate cancer.

Radionuclides are the technological backbone for much of the biomedical research being done today. They are used to identify how genes work, and the research on AIDS depended upon their use. Monoclonal antibodies, which are produced in the laboratory and engineered to bind to a specific protein on a patient’s tumor cells, can be labeled with radionuclides. When such labeled antibodies are injected into a patient, they bind to the tumor cells, which are then killed by the attached radioactive nuclide, but the nearby normal cells are spared. This targeted approach has produced encouraging success in the treatment of patients with leukemia, neuroendocrine tumors, and prostate cancer, and, hopefully, others. Dr. Hertz’s prediction that a targeted radionuclide approach “would hold the key to the larger problem of cancer in general,” is rapidly coming to fruition, as precision oncology expands.

Saul Hertz was born in Cleveland, Ohio, on April 20, 1905. His parents, Aaron and Bertha Hertz, were immigrants from the city currently known as Golub-Dobrzyń, Poland. Saul, the third of their seven sons, graduated from the University of Michigan in 1924 with Phi Beta Kappa honors. He graduated from Harvard Medical School in 1929, which had at that time strict admissions quotas for minorities; afterwards, he completed his internship and residency at Cleveland’s Mount Sinai Hospital. From 1931-43, he headed the MGH thyroid unit; his research included assay testing, developing the medical uses of RAI, as well as other significant contributions to medicine.

After serving in World War II as an officer in the U.S. Navy, he joined the staff of Boston’s Beth Israel Hospital (1946-49), where funding from the Navy provided him with the opportunity to expand his research in the safe and effective use of RAI in the diagnosis and treatment of thyroid carcinoma. He became focused on the use of radionuclides to diagnose and treat other forms of cancerous conditions.

In 1946, he founded the Radioactive Isotope Research Institute, with clinical and research facilities in Boston and New York City. The mission of the Institute was to develop the application of fission products from nuclear transformations to diagnose and treat thyroid cancer, other malignant growths, and coronary conditions. He taught at both Harvard Medical School and M.I.T.; his groundbreaking research was a direct collaboration of both MGH and M.I.T. In 1949, Dr. Hertz established the first Nuclear Medicine Department at the Massachusetts Women’s Hospital, where he served as the Director, until his untimely passing from a heart attack, in 1950.

Saul Hertz overcame institutional politics, financial pressures, continued on page 4
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Cover: Saul Hertz, M.D., the Director of the MGH Thyroid Unit, who had proposed the original hypothesis for the medical use of RAI in 1936. Photo from Saul Hertz Archives

Editorial Deadlines: May 2021 Issue: April 15, 2021
Summer 2021 Issue: June 15, 2021
episodes of stolen intellectual property, a world war that interrupted his clinical trials, as well as the pervasive discrimination of his time, to bring his paradigm-changing work to fruition. His legacy is a profound and enduring scientific discovery of the 20th century, whereby his work with RAI established the field of Nuclear Medicine, and serves as the foundation of precision targeted oncology. Like the “shot heard around the world,” RAI gave birth to a revolution in medicine.

Continued from page 2

NESACS is planning to hold a symposium in honor of Saul Hertz, at which the current uses of radiopharmaceuticals in medicine will be discussed. In addition, ACS has designated MGH as the Saul Hertz and the Medical Uses of Radioidine” National Historic Chemical Landmark; installation is planned for October, 2021. ACS Landmarks commemorate seminal achievements in the history of the chemical sciences, and provide a record of their contributions to chemistry and society in the United States. Each landmark shines a light on the chemists and their chemistry discoveries that have profoundly transformed our lives.

https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/about.html

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A Sample of Radiopharmaceuticals in Clinical Use in the United States:

<table>
<thead>
<tr>
<th>RADIOPHARMACEUTICAL</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc-99m methylene diphosphonate MDP</td>
<td>Skeletal imaging – metastasis, osteomyelitis, fracture</td>
</tr>
<tr>
<td>Tc-99m Macro Aggregated Albumin (MAA)</td>
<td>Lung imaging – acute pulmonary emboli</td>
</tr>
<tr>
<td>Technetium99m (Tc99m) hepatic iminodiacetic acid (HIDA)</td>
<td>Acute cholecystitis</td>
</tr>
<tr>
<td>F-18 fluoroexoxyglucose</td>
<td>Tumor imaging</td>
</tr>
<tr>
<td>Ga-68 Prostate-Specific Membrane Antigen (PSMA)</td>
<td>Prostate cancer</td>
</tr>
<tr>
<td>Ga-68 Dotatate</td>
<td>Neuroendocrine tumors</td>
</tr>
<tr>
<td>Iodine-131</td>
<td>Hyperthyroidism and Thyroid Carcinoma</td>
</tr>
<tr>
<td>Lu-177 Dotatate</td>
<td>Neuroendocrine tumors</td>
</tr>
<tr>
<td>Yttrium-90 ibritunomab tiuxetan</td>
<td>Non-hodgkin lymphoma</td>
</tr>
</tbody>
</table>

In Clinical Trials:

| Lu-177 PSMA | Prostate cancer |

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“"I am among those who think that science has great beauty."”

-Marie Curie

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Saul Hertz (right) and Arthur Roberts

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The Nucleus April 2021
Abstracts for ACS Fall 2021
Submit your abstracts for oral and poster presentations for ACS Fall 2021. The theme of the meeting, Resilience of Chemistry, will be at the core of the programming. Sessions for the hybrid meeting (in-person/virtual) will be held in Atlanta and online on August 22-26.

Although ACS Fall 2021 is being planned as a hybrid event, the COVID-19 situation will continue to be carefully monitored with regard to its potential impact on the meeting. ACS will provide additional updates about the meeting as they become available.

Visit the website <https://www.acs.org/content/acs/en/meetings/acs-meetings/abstract-submission/call-for-abstracts.html> to find a list of the programming divisions and planned symposia, and submit your abstracts by Monday, April 12.

Call for Nominations
The Theodore William Richards Award for Excellence in Teaching Secondary School Chemistry
The deadline for nominations for the 2021 Richards Award (https://www.nesacs.org/awards_richards.html) is Friday, May 1, 2021. Please fill out the nomination form and send it to Steve Lantos (steve_lantos@psbma.org) by that date. The selected teacher will be officially honored and will receive a $1,500 prize and a Certificate of Recognition at the NESACS virtual monthly meeting on May 13, 2021.

NERM 2021 Postponed
By Hicham Fenniri, General Chair
NERM 2021, h.fenniri@northeastern.edu
After an extensive review and many discussions about all our options, the Local Organizing Committee of NERM 2021 and the NESACS Board of Directors have decided to postpone NERM 2021 from October 8-11, 2021, to June 2023, with the exact dates to be established.

Unfortunately (for us), the 2021 Boston Marathon has been scheduled for the same time as NERM 2021, which made it essentially impossible for us to reserve hotel space for our conference. Inasmuch as the Rochester Local Section will host NERM 2022, which had been moved from October 2020 due to the pandemic, the next year available to us to host NERM in Boston is 2023.

I wish to convey my heartfelt thanks to all the volunteers who worked so hard to get NERM 2021 up to a great start, and we look forward to working with you again in 2023. Stay tuned for further announcements.

Take care and be well.

April 2021 Monthly Meeting Cancelled
As the ACS Spring 2021 National Meeting is overlapping with the usual time of the April Monthly meeting, there will be no presentation this month.

The next presentation will occur during the regularly scheduled May Monthly Meeting on Thursday, the 13th.
Reflections on International Connections

Morton Z. Hoffman, Professor Emeritus of Chemistry, Boston University

In the summer of 1960, as a newly minted Ph.D. from the University of Michigan, whose travels in previous years had mainly been between his home in New York City and the Catskill Mountains, Atlantic City, and Ann Arbor, I left to spend a postdoctoral year at Sheffield University in England with Prof. George Porter (Nobel Prize, Chemistry, 1967). I returned a year later to begin a career at Boston University, which involved international collaborations and conferences over more than 55 years that took me to many locations in Europe, Asia, Latin America, the Middle East, and Northern Africa, and also Mauritius, a small island in the Indian Ocean at 20° South Latitude.

On my way to and during my postdoc in England, I had the opportunity to visit countries in Western and Eastern Europe, including the German Democratic Republic, Poland, and the Soviet Union. As a young faculty member at B.U., I developed research collaborations in inorganic photochemistry (“Excited State Behavior of Cobalt, Rhodium, and Iridium Chelates”) with Vincenzo Balzani (University of Bologna) and Franco Scandola (University of Ferrara), which, with a grant from NATO, continued through 1979. During a visit to Italy in 1973, I made a connection with Giuliano Mulazzani (National Research Council, Bologna), which started a more than 30-year collaboration on free radical reactions of metal complexes, the chemistry of coordinated radicals, metal-center redox reactions, and pulse radiolysis that resulted in 21 publications, many reciprocal visits, often accompanied by members of our families, eight-week research experiences in Bologna for two of my graduate students, and a lifelong friendship.

In the mid-1970’s, I developed a collaboration with Nick Serpone (Concordia University, Montréal) on picosecond excited-state studies of metal complexes at the Canadian National Centre for Fast Laser Spectroscopy that resulted in many publications over 10 years, and multiple visits from Boston to Montréal and vice versa. Additional NATO grants in the ‘80s and the ‘90s resulted in more travel and more publications: “Photo- and Radiation Chemistry of Heteropoly Compounds” with Elias Papaconstantinou (National Research Council, Athens), and “Photoinitiation of Polymerization by Transition Metal Coordination Complexes” with Michèle Bolte (Université Blaise Pascal, Clermont-Ferrand).

In the mid-1980’s, I received an international collaborative research grant from NSF to work with Takeshi Ohno (Osaka University) on “Effect of Solution Medium on the Efficiency of Excited-State Electron-Transfer Reactions.” The grant resulted in five trips for me to Japan, a year-long visit to my lab by one of Prof. Ohno’s associates, and two six-week visits to Japan for one of my postdocs, all of which were scientifically and personally rewarding.

In addition, over the years I attended hundreds of international chemistry research and chemistry education conferences in many very interesting places around the world, such as Beijing, Hong Kong, Seoul, Cairo, Jerusalem, and Rabat.

After my retirement in 2005, I was actively engaged in the creation and development of the science study abroad programs for B.U. in Dresden, Grenoble, and Madrid, which I had the opportunity to visit many times; served as the U.S. National Representative to the Committee on Chemistry Education of IUPAC at its meetings around the world; was an educational consultant for a U.S. State Department-funded Chemical Safety and Security Officers’ Training Workshop in Bangkok during the International Year of Chemistry; continue to serve on the Steering Committee of the German Exchange Program between NESACS and the Gesellschaft Deutsche Chemiker; and remain a Member of the Board of Directors of the Malta Conferences Foundation, which strives to use science diplomacy as a bridge to peace in the Middle East, Northern Africa, and Pakistan.

My international connections were a very important part of my professional and personal life, providing me with new views on chemistry, wonderful friends and extended families, and deep insights into history, culture, and language. And, lots and lots of frequent flyer miles! Franco Scandola was absolutely correct when he told me once, “Traveling and seeing friends around the world makes all the research we do worthwhile.”

I wish to dedicate this article to the memory of Giuliano Mulazzani (May 11, 1941–January 31, 2010); scientific collaborator, co-author, and dearest friend. ♦
What Are Some Ways To Deal With Workplace Conflict?

By Natalie LaFranzo,  Industry Matters Newsletter  August 6, 2020

Workplace conflict is inevitable. A diverse workplace, where people come together from different backgrounds, motivations, and work styles, is a breeding ground for innovation and progress but can also result in misunderstandings. Establishing a culture in your organization where differences in opinion are healthy, respect and professionalism are paramount, and there is an openness to learn from others is ideal.

In addition, normalizing ways to address conflict head-on rather than avoiding, can be powerful. In the book, *Power Up: Transforming Organizations Through Shared Leadership* the term *supportive confrontation* is introduced and discussed. This is a direct communication style that is intended to empower both leaders and team members to resolve interpersonal disputes. The process is described as providing strong feedback focused only on what you can control – the impact of the other person’s behavior. The authors describe a serious barrier in conflict resolution: defensiveness. Defensiveness is often a result of people overstepping their own knowledge and experiences, and making assumptions about the intent and motives of others. It is important to recognize that your own experiences may not be the best lens to apply to other’s actions and in fact, can cause great confusion. The *supportive confrontation* method encourages raw honesty in expressing your reality and experience, rather than trying to explain what you can only (and often incorrectly) guess about the other person. The book advocates for four main approaches:

**Approach 1:** “This Is The Effect Of Your Behavior On Me”

**Approach 2:** “Your Behavior Is Not Meeting Your Apparent Goals or Intentions”

**Approach 3:** “Your Behavior May Meet Your Goals, but It Is Very Costly To You”

**Approach 4:** “In What Ways Am I Part of the Problem?”

By considering each of these independently, or in combination, you can facilitate a discussion that is more disarming and productive. Importantly, these work well regardless of whether you have a strong relationship or a contentious relationship with a coworker, whether you are in a position of authority or not, and you can authentically tailor them for each scenario. The book advocates for using these in a structure where there is joint problem solving which results in mutual agreement and most importantly, appropriate follow up and/or changed behavior.

Shout out to my boss and mentor, Jarret Glasscock, for recommending this book!

*This article has been edited for length and clarity. The opinions expressed in this article are the author’s own and do not necessarily reflect the view of their employer or the American Chemical Society.*

ACS Career Consultants are experts and leaders working in the field of chemistry who have volunteered to support other ACS members’ career development through one-on-one career counselling. They can stimulate your thinking, ask important career planning questions to help clarify goals, provide encouragement, teach strategies for making meaningful career decisions, and aid you in your job search. Connect with an ACS Career Consultant today!

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22nd Annual Northeast Student Chemistry Research Conference
April 24, 2021

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Crystal Shih, PhD
Director at Ascidian Therapeutics

Questions? Contact Meredith Ward,
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**Speaker:** Jayshree Seth, Corporate Scientist and Chief Science Advocate, 3M Company  
**Moderator:** Glenn Ruskin, Director, ACS External Affairs and Communications  
**Overview:** What the world thinks of science during the global pandemic, and has skepticism gone up or down? What does the global public care about the most as it relates to science? What specific actions can we all take to advocate for science?  

Among the topics discussed:  
- **The Image of Science** – Around the world, the image of science is on the rise.  
- **Sustainability** – Sustainable solutions remain an important focus.  
- **STEM Equity** – Gender and race equity are barriers that impact our future.  
- **Leadership and Responsibility** – Science leadership provides an opportunity for collaboration and shared responsibility.

Dr. Seth advocated for us to give our **VOICE** to STEM: Volunteer, Organize, Inspire, Coordinate, and Engage for Science of Health for the Health of Science, Technology and Sociology of Trust, Engineering of Sustainable Solutions, and Mathematics of Equality and Accountability.

The webinar, which was broadcast on February 4, 2021, is available in edited form at <https://www.acs.org/content/acs/en/acs-webinars/popular-chemistry/stem-advocacy.html>.

**Science Policy Opportunities for Early-Career Scientists**

If you are interested in exploring career opportunities in science advocacy or science diplomacy, consider applying for the following policy fellowships from the American Association for the Advancement of Science (AAAS) and the ACS:  
**AAAS Science and Technology Policy Fellowships**<https://www.aaas.org/programs/science-technology-policy-fellowships>  
Providing opportunities for outstanding scientists and engineers to learn first-hand about federal policymaking, while using their knowledge and skills to address today’s most pressing societal challenges.  
**ACS Public Policy Fellowship Programs**<https://www.acs.org/content/acs/en/policy/policyfellowships/programs.html>  
The ACS offers two public policy fellowships:  
- The **ACS Congressional Fellowship** is a one-year opportunity; two ACS members per year are placed on Capitol Hill as part of the larger, AAAS-administered program.  
- The **ACS Science Policy Fellowship** is a one-year opportunity that is renewable for a second year; one Science Policy Fellow position is available at a time.

The same application is used for both fellowships; applicants are asked to identify if they are applying for one or both programs. Fellowships start in September; however, the Congressional Fellowship start date may be delayed until January at the Fellow’s request. ◇

“Science can flourish only in an atmosphere of free speech.”  
- Albert Einstein
Attention all ACS Members! You are invited to participate in the 2021 Member-Get-A-Member Campaign that offers current members a free Periodic Table of the Elements blanket.

How do you get a PTE blanket?

1. Nominate a Candidate
2. Candidate applies and pays for membership
3. Nominator receives an ACS Periodic Table of the Elements Blanket

Start Recruiting Today!

There is no better time to recruit a new member than before, during, or after our ACS Spring 2021 Meeting that starts April 5th. Learn about the MGM Campaign by visiting www.acs.org/memberGetmember.

Thank you for being a part of ACS, and for helping us grow and thrive. ACS Membership

Please write to MGM@acs.org with any questions you may have.

Q. Exactly, how many awards and scholarships does NESACS sponsor?

A) One  b) Two  c) Many

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Note also the Chemistry Department web pages for travel directions and updates.

These include:

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https://www.bc.edu/content/bc-web/schools/mcas/departments/chemistry/news-and-notes.html#events

Boston University
https://www.bu.edu/chemistry/seminars/colloquium/

Brandeis University
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Harvard University
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MIT
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Tufts University
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UMass Lowell
https://www.uml.edu/Science/chemistry/colloquium.aspx

University of New Hampshire
https://ceps.unh.edu/chemistry/seminars/spring-2021-seminar-series

April 1
Prof. Catherine L. Grimes (Univ. Delaware)
Understanding the Innate Immune System with Designer Jackets and Synthetic Treads
Harvard, 3:00 pm

Prof. George Fytas (Max Plank Inst., Germany)
A Glance to Dynamic Light Spectroscopy Using Selected Applications
Umass Lowell, 3:30 pm

April 5
Prof. Omowunmi Sadik (NJ institute of Technology)
Brandies, 4:00 pm

April 6
Prof. Lars Konerman (Wenstern Univ. Canada)
Studying Protein Structure, Function, and Dynamics by Mass Spectrometry
UNH, 11:10 am

April 7
Prof. Rebecca Scheck (Tufts)
Boston College, 4:00 pm

April 8
Prof. Jean-Sabin McEwen (Washington State Univ.)
Boston College, 2:00 pm
Prof. Timothy Berkelbach (Columbia Univ.)
Harvard, 3:00 pm

April 12
Prof. Suwei Dong (Peking Univ.)
Brandies, 4:00 pm

April 13
Prof. Julia Stahler (Humboldt Univ. Berlin)
MIT, 12:00 pm

April 14
Prof. Emrah Altindis (BC)
Boston College, 2:00 pm
Prof. Leslie J. Murray (Univ. Florida)
Harvard/MIT, 4:15 pm
Prof. Susan Solomon (MIT)
MIT, 4:00 pm
Dr. Marie Pierre Krafft (Univ. Strasbourg, France)
Some aspects of perfluorocarbon-based nano- and micro therapeutics
Tufts, 12:00 pm

April 15
Prof. Antonis Mikos (Rice Univ.)
Biomaterials for tissue engineering and disease modeling
Umass Lowell, 3:30 pm
Prof. Nicole M. Becker (Univ. Iowa)
Analysis of Students’ Interpretation and use of Graphical Representations in General Chemistry
UNH, 11:10 am

April 20
Dr. Domenic di Mondo (GreenMantra Tech.)
MIT, 3:30 pm
Prof. Elizabeth Elaqua (Penn State)
UNH, 11:10 am

April 22
Prof. Eric Bloch (Univ. Delaware)
Harvard, 3:00 pm
Prof. Richom Sarpong (UC Berkeley)
Harvard, 3:00 pm

April 26
Prof. Jinsang Kim (Univ. Michigan)
Brandies, 4:00 pm

April 27
Prof. Todd Hyster (Cornell)
Boston College, 4:00 pm
Prof. Tamar Schlick (New York Univ.)
Chromatin structural transitions by mesoscale modeling
MIT, 3:00 pm
Prof. Kelly Elkins (Townson Univ.)
DNA Recovery and NGS DNA Typing Profiles of Historic Human Remains
UNH, 11:10 am

April 28
Dr. RandallJ. Meyer (ExxonMobil Corp.)
Tufts, 12:00 pm

May 3
Prof. Bryan Dickinson (Univ. Chicago)
Brandies, 4:00 pm

May 5
Prof. Jeremy Baskin (Cornell)
Boston College, 4:00 pm

May 6
Dr. Jonathan Fontalvo (Zapata Computing)
Harvard, 3:00 pm
Prof. Alison Narayan (Univ. Michigan)
MIT, 4:00 pm

May 11
Prof. Cathy Wong (Univ. Oregon)
In situ transient absorption spectroscopy during materials formation
MIT, Rm 6-120, 3:00 pm

May 13
Prof. Tianming Diao (New York Univ.)
Harvard, 3:00 pm

May 18
Dr. Parisa Mehrkhodavandi (UBC)
MIT, 3:30 pm

May 20
Prof. Bryan Dickinson (Univ. Chicago)
Harvard, 3:00 pm

May 27
Prof. Pamela Chang (Cornell)
Harvard, 3:00 pm

Notices for The Nucleus Calendar of Seminars should be sent to: Samurdi Wijesundera,
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