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INFLUENCE



How
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growing
POWER
is shaping
the Middle East
and beyond

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FEATURES

22

Arabian Might

Saudi Arabia's increasing strength means it now has much more clout with its partners, including the U.S.

by TOM O'CONNOR

30

Best Specialized Hospitals Asia Pacific 2024

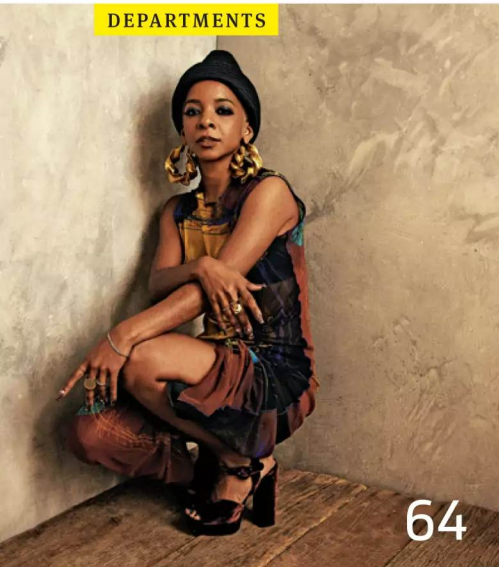
Newsweek and partner Statista highlight the region's leading medical facilities, across nine key specialties.

TAKING CARE As the aging population grows in the Asia Pacific region, the importance of specialized hospitals increases as well. Knowing where to seek treatment can improve care and outcomes.

COVER Illustration by Newsweek



DEPARTMENTS



64

▼ In Focus

- 04 New York City**
First Felon
- 06 Johannesburg**
Political Shift
- Yambali Village, Papua New Guinea**
Deadly Ground
- Athens, Greece**
Height of Success

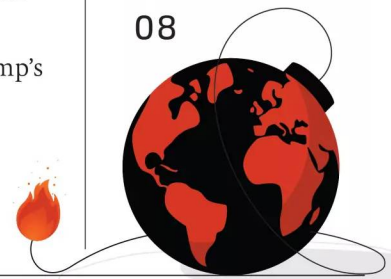
▼ Periscope

- 08 Environment**
Climate
Conviction at
What Price?
- 14 Geopolitics**
Iran Examines the
Nuclear Option
- 20 U.S. Politics**
Bringing Trump's
Trial to Life

▼ Culture

- 56 Spotlight**
Ian Karmel
- 64 Parting Shot**
Kara Young

08



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Newsweek is where diverse voices and opinions meet — a place where curious and open minds come to get a broader understanding of the key issues shaping our world. We provide a forum that enables you to find common ground by participating in good-faith debate with others across political, social and cultural divides.



The image shows three devices displaying Newsweek content. The laptop screen shows a news article titled "Liberated Kherson in Photos, as Zelensk Visits After Russian Retreat" with a photo of a man holding a Ukrainian flag. The tablet shows the "SPECIAL ISSUE" cover of Newsweek dated May 14, 2022, featuring a man in a suit and the headline "DISRUPTOR". The smartphone shows the "THE Kristal Knight SHOW" with a photo of a woman. To the right of the devices is a white starburst graphic with the text "ONLY 94p PER WEEK".

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In Focus

THE NEWS IN PICTURES



GETTY



NEW YORK CITY

First Felon

President Donald Trump leaves the Manhattan Criminal Courthouse on May 30, just after the jury delivered a guilty verdict for falsifying business records on all 34 counts of which he was accused in his hush money trial. Trump is the first former president to be tried for or convicted of a felony. Disputing the outcome, he said the trial was “rigged.” The historic ruling comes in the midst of his reelection campaign as the presumptive Republican presidential nominee. Sentencing will occur on July 11, four days before the Republican National Convention. What effect the unprecedented conviction will have on the election is still unknown.

📷 • SETH WENIG-POOL





JOHANNESBURG

Political Shift

Voters line up outside City Hall for South Africa's general election on May 29. Four days later it was revealed the African National Congress had lost its majority with 40.2 percent of the vote, ending its 30-year reign and marking a change in post-apartheid politics. It is now in negotiations with smaller parties to form a coalition. President Cyril Ramaphosa said: "We must respect [people's] choices and their wishes."

📷 ▶ CELINE CLERY/AFP



YAMBALI VILLAGE, PAPUA NEW GUINEA

Deadly Ground

Enga Province residents observe rescue efforts on May 29 after a deadly landslide four days earlier. With rescuers struggling to access the remote location due to the destruction of the main highway, the nation's government estimated up to 2,000 people could be buried beneath debris. PNG Prime Minister James Marape attributed the disaster to severe weather and climate change.

📷 ▶ EMMANUEL ERAHIA/AFP



ATHENS, GREECE

Height of Success

David Colturi of the U.S. dives from an 89-foot platform on May 25 at the first stop of the Red Bull Cliff Diving World Series. Michigan-born Colturi, 35, was one of five wildcards in the men's category at the three-day competition in Athens. The eight-stage contest, featuring 12 male and 12 female daredevils, headed for Boston on June 8 then on to Italy, Northern Ireland, Norway, Canada, Turkey and Australia.

📷 ▶ ROMINA AMATO/RED BULL




“I’m still pinching myself. I can’t believe it happened.” ▶ P.64



ENVIRONMENT

Climate Conviction at What Price?

Fifty years ago experts doubted Americans would pay to save the environment. Only some of their fears are still true

 IN 1972, *NEWSWEEK* PUBLISHED A COVER story warning the world about the need to clean up the Earth. A little more than 50 years later, some of those warnings are still being issued—and ignored.

When the article was first published on June 12, 1972, the environment was at the top of many Americans’ minds. The Environmental Protection Agency was not yet two years old, the third Earth Day had just been celebrated, and a slew of federal policies with promises to protect the environment were beginning to take hold. What came next was decades of progress chartered by those early labors.

President Joe Biden has a lofty aspiration of reducing U.S. emissions by up to 52 percent in 2030, achieving a carbon pollution-free power sector by 2035 and a net zero emissions economy by 2050.

However, some experts argue that Biden’s goals are only that—aspirational—

and that more change is needed if the U.S. hopes to make a real difference.

Some Prioritize Sustainability

A half century ago, experts doubted Americans would be willing to pay more money and disrupt their lives to help save the planet, according to the 1972 *Newsweek* report. They also wondered if company sustainability efforts would help build brand loyalty.

“Yet even with environmentalism an established fact of American life, many experts are beginning to wonder just how far the public—not business or government—is willing to go,” the *Newsweek* report said. “For whether he likes the notion or not, the consumer will pay the lion’s share of the tab for a cleaner environment, either in higher prices, higher taxes or—more likely—both.”

Time has shown that they needn’t

by
**ANNA
SKINNER**

have worried on either front: modern Americans are more than willing to change their ways to save the environment.

In 2021, a study conducted by Simon-Kucher & Partners examined purchasing patterns among 10,000 people in 17 countries and found that 85 percent of people have changed their purchase patterns to more sustainable options. In the U.S., the study found that 61 percent of Americans felt that sustainability was an important factor when deciding where to purchase goods, but that number dropped when it came to spending money. According to the research, despite their good intentions, only 34 percent of people surveyed spent more money on a sustainable product.

SOUNDING THE ALARM *Newsweek* published an extensive report delving into the state of the environment in its issue dated June 12, 1972.

In 2023, a survey by the *Harvard Business Review* found that younger generations—such as Gen Z and millennials—are 27 percent more likely to purchase goods from a brand if the company indicates it cares about the planet. The Simon-Kucher & Partners study also found that younger generations are the ones actively driving the effort to invest in eco-friendly products. Nearly a quarter of people in the older generations, such as baby boomers and Generation X, admitted to significantly adjusting their efforts toward being more sustainable, but that number rises to 32 percent for millennials. A third of millennials surveyed also said that they will purchase a sustainable alternative to a product when one is available, compared to 24 to 29 percent

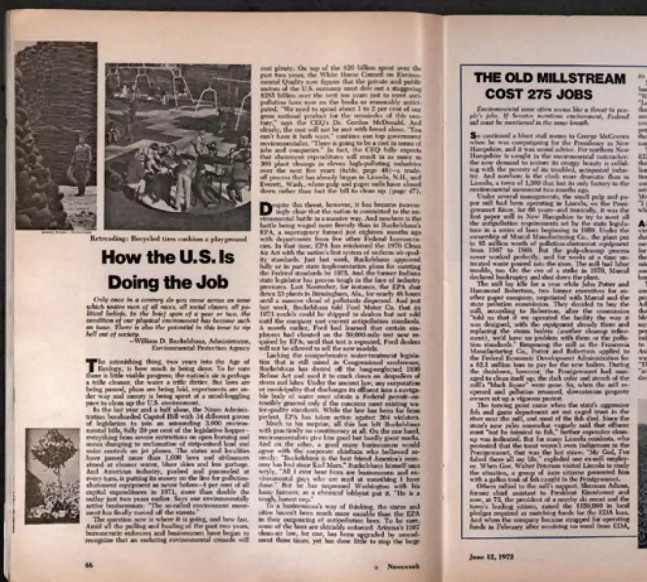
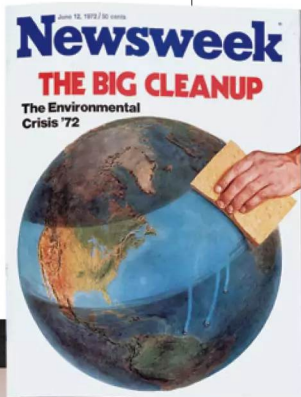
of older generations making the same effort.

In some ways, protecting the environment has gotten easier with time. Recycling is the norm, reusable water bottles are a \$9 billion global industry according to Grand View Research, and Americans have largely adapted to the crackdown on plastic straws and single-use bags. More people are changing their diet to more environmentally friendly options, such as veganism, and companies specializing in meat alternatives, such as Beyond Meat, have seen their revenue increase by millions since 2017 according to data from Statista.

More households than ever are consciously reducing their electric use and investing in alternate energy sources, such as solar panels. Residential solar power installations jumped by 34 percent from 2020 to 2021 according to the U.S. Energy Information Administration.

However, despite the growth, the research found that the current rate of solar installations isn't fast enough to decarbonize America's grid by 2035. Nor is the widely touted electric vehicle industry growing fast enough to create a significant impact on climate change, with cost serving as a substantial hurdle to many Americans.

The average cost to outfit a home to solar power is \$31,000 before tax incentives, according to a report by Bankrate. Most new electric vehicles cost more than \$30,000 for the car, not including the upfront investment needed for infrastructure to accommodate them. The Inflation Reduction Act made some electric vehicles more affordable by enhancing regulations for tax credits, but many popular models are still far outside the parameters allowing the \$7,500 rebate.



THE OLD MILLSTREAM COST 275 JOBS

Environmental news shows some life in the past few days. It's a positive environmental, Federal aid must be increased in the near future.

Environmental news shows some life in the past few days. It's a positive environmental, Federal aid must be increased in the near future.

Environmental news shows some life in the past few days. It's a positive environmental, Federal aid must be increased in the near future.





ASSET OR LIABILITY? The Diablo Canyon nuclear power plant supplies about 9 percent of California's electricity. Its closure was recently extended until 2030.

No Compromises on Quality

While some consumers are eager to spend more money with companies offering sustainable options, they aren't always willing to sacrifice quality or comfort for the cause.

Nike came out with the Considered line in 2005—a shoe made with sustainable practices—but critics weren't a fan of the design. Eventually, the product gave way to the Flyknit line, a shoe that uses recycled materials, reduces reliance on agricultural products and is much more popular with consumers today.

McDonald's swapped its plastic straws for paper ones in the United Kingdom in 2018, but consumers complained that the straws disintegrated in their beverages and circulated a petition with thousands of signatures demanding the return of plastic straws. A year later, McDonald's replaced the paper straws with a sturdier version, which continued to face backlash from the community after it was revealed that the straws couldn't be recycled because of their new thickness.

Resisting Clean Energy

Compared to 1972, though, there are more options for clean energy. In the '70s, people were protesting nuclear power with fervor, alleging that it dirtied the air and water, and posed a fatal risk should operations fail.

The mindset of the time was that nuclear plants "pose at least some hazards of radioactivity and dump excessive heat into the rivers," the 1972 *Newsweek* article said.

"Browns Ferry, Fort St. Vrain, Turkey Point, Diablo Canyon, Indian Point, Peach Bottom and Oyster Creek—they sound like a regimental history of battles, and well they might," *Newsweek*

reported in 1972. "For they are the sites of nuclear power plants across the U.S., and all of them have been the targets of environmentalist coalitions that have tried to stop their construction or operation."

Michael Golay, a professor in nuclear science and engineering at Massachusetts Institute of Technology, told *Newsweek* that nuclear was a popular form of energy until around 1963, when nuclear protests began to increase. However, the protests were not a critique borne out of true concern for the environment, but they were the "use of a politically important symbol as a way of advancing a different political agenda," according to Golay.

In the 1960s and early '70s, nuclear power was an "organized point" that protesters rallied around in opposition of the Vietnam War, Golay said. Rather than protest the war directly, Golay said that Americans chose to push back against the government by rallying around popular political points of the time, such as the approval of nuclear power plants. The public also voiced concern about the safety of nuclear energy given the devastating impacts of nuclear weapons.

The effects were monumental, souring the public opinion on nuclear power for decades. Those protests were more than a decade before Chernobyl, and the 1986 disaster made nuclear energy a third rail in politics.

Only two nuclear power plant licenses have been issued in the past 50 years, Golay said, and both plants became operational in the past year. However, the public's position on nuclear power could shift

"For whether he likes the notion or not, the consumer will pay the lion's share of the tab for a cleaner environment, either in higher prices, higher taxes or—more likely—both."

dramatically in the coming years as people accept it as a cleaner form of energy.

"The reason is climate change," Golay said. "That's the thing that's come along that's changing the discussion. It's a serious consequence in choosing not to have nuclear. What you're seeing, not only in the U.S. but many places, is the public favorability of nuclear has improved and continues to get better. People are recognizing a bigger problem with climate change."

Nuclear is only one solution in a portfolio to combat climate change over the next 50 to 60 years. Jackson Ewing, the director of energy and climate policy at Duke University's Nicholas Institute for Energy, Environment & Sustainability, told *Newsweek* some of the policies that improved the environment in the 1970s need to be reformed, a task that's proving extremely difficult to accomplish.

'A Daunting Task'

Ewing believes that the infrastructure needed to meet the U.S. government's

environmental goals needs to be built six times faster than the current pace.

"It's a daunting task when you consider the different systems of approval processes projects have to go through, in part...because of the existence of the early 1970s environmental regulatory regime," Ewing told *Newsweek*. "It would be naive for us to think because electricity lines and wind and solar infrastructure have this virtuous environmental effect that they are not going to face those same impediments. There's lots of evidence that they will."

Many of the regulations passed in the early 1970s—such as the Clean Water Act and the Endangered Species

Despite their good intentions, only 34 percent of people surveyed spent more money on a sustainable product.

Act—slowed or stopped projects that posed a hazard to the environment, but Ewing said those same policies are now slowing down renewable energy projects.

To change this, the U.S. needs policies that allow for different permitting processes for renewable energy projects or government needs to reduce the number of approvals infrastructure projects must obtain before beginning construction. But some politicians are resistant to reform. Wind and solar projects aren't completely innocent in their environmental impact—particularly with regards to harming wildlife—making the reform effort even more difficult.

"They see [the policies] as the only thing protecting the environment from the same sort of exploitation we saw before the early 1970s," Ewing said.

A Global Effort

One principle from the 1972 *Newsweek* report remains true today: decarbonizing Earth's environment cannot be a problem one country faces alone.

"Other industrialized countries are also plunging considerable fortunes into the campaign," the 1972 report said. "Great Britain has earmarked 3.5 billion [dollars] to scour its rivers, and the Soviet Union has allotted 1 billion [dollars] to the Volga and Ural alone."

Global trade has made some renewable energies infinitely more obtainable since the 1970s. China revolutionizing its manufacturing has made solar power available to more consumers in the U.S., University of California San Diego Professor of Innovation and Public Policy David Victor said.

AT WHAT PRICE? Americans say they prioritize sustainability, like the zero-waste store Mason & Greens in Washington, D.C.—which closed last year.





SUSTAINABILITY ON DISPLAY Clockwise from top left: Nike's then-CEO Mark Parker debuted the Considered line in 2008; a sand replenishment project overseen by the U.S. Army Corps of Engineers in San Clemente, California, to augment the shoreline, help prevent erosion and minimize the effects of storms; recycling bottles and cans at nonprofit center Sure We Can in Brooklyn, New York; solar panels being installed on a Aliso Viejo, California, home.

"In the 1970s, solar power was so expensive that it could only be used in extremely niche applications," Victor said. "Now, solar is one of the cheapest ways of making electricity. A big part of that is because the technology is global."

In some ways, America has made incredible progress in cleaning up its environment and correcting its wrongs. Cities are radically cleaner than they were in the 1970s, Victor said, and other environmental threats such as lead in paint and gasoline are practically nonexistent.

"It's really impressive," Victor said of the change. "A lot of it is backed by voters and therefore by politicians. Most of the problems we were worrying about in the 1970s are radically better."

Despite America's progress, more sinister environmental concerns have arisen in the decades since as climate change worsens. Change—as much as has been made—isn't occurring at a rate fast enough to counter the damage done to the environment. Political reform continues to hit snags. Americans have shown that they support companies making sustainable products but only if those changes don't impact quality. And although people have access to eco-friendly energy options more so than in 1972 with the growing accessibility of solar panels and electric vehicles, cost is still proving to be a roadblock, further delaying any widespread change.

One thing hasn't changed with time. Warnings continue to ring in

the same concerning tone that they did in 1972: If more change is not made, then the Earth will face irreversible consequences that worsen with each generation.

"It's a tragedy," Golay said. "But I won't live to see it."

That each generation's grandchildren will be the ones to bear the brunt of an environmental collapse is a belief spanning back to 1972. Only the clock is ticking down, and the global rush to remedy our wrongs has intensified as experts, politicians and laypeople alike demand action before it's too late. **N**

► **Anna Skinner** is a **NEWSWEEK** senior reporter. You can reach her by email at a.skinner@newsweek.com

GEOPOLITICS

Iran Examines the Nuclear Option

Tehran's rhetoric could spark an arms race in the Middle East like never before

AFTER LONG MAINTAINING ONE of the Middle East's most advanced nuclear programs and most powerful conventional militaries, Iranian decision-makers are beginning to reconsider their nation's official ban on developing weapons of mass destruction in light of rising tensions and deteriorating security conditions in the region.

Such a move, vehemently opposed by Israel and the United States, who are known to possess their own nuclear arsenals, would present both substantial risks and opportunities for the Islamic Republic. But after the severe unrest surrounding the ongoing war in Gaza simmered over into the first-ever direct exchange of attacks between Iran and Israel, influential Iranian figures are seeing greater value in boosting deterrence by going down the nuclear path.

They include Kamal Kharrazi, senior adviser to Supreme Leader Ayatollah Ali Khamenei and a former foreign minister. He reiterated on May 9 that Tehran was not currently developing a nuclear weapon, but "if Iran's existence is threatened, we will have to change our nuclear doctrine." Such a measure "is possible and imaginable," he said, in the event that Israel sought to strike at Iran's nuclear facilities, as Prime

Minister Benjamin Netanyahu has threatened to do.

Similar messages have emerged over the past month within other influential circles in Iran. Islamic Revolutionary Guard Corps Brigadier General Ahmad Haghtalab, commander of the Nuclear Protection and Security Corps, declared that "a revision in the nuclear doctrine and policies of the Islamic Republic and departure from previously stated considerations is possible and conceivable."

The death of Iranian president Ebrahim Raisi along with his entourage in a May 19 helicopter crash near the border with Azerbaijan, an incident still under investigation, may only further intensify concerns over the Islamic Republic's stability.

While Iranian officials have for some time vowed to defend their nation by any means necessary, former Iranian, United Nations and U.S. officials told *Newsweek* that the recent change in rhetoric cannot be dismissed as mere posturing.

In the words of Farzan Sabet, a former researcher at the U.N. Institute for Disarmament Research now serving as senior research associate at the Geneva Graduate Institute's Global Governance Centre and Sanctions and Sustainable Peace

by
**TOM
O'CONNOR**



Hub: "It is a serious discursive shift at a time when regional tensions are quite high."

A Nuclear Timeline

Iran's nuclear program has long been subject to international scrutiny stemming from suspicions that the country was secretly pursuing nuclear capabilities.

The program originates from U.S.-backed efforts dating to the 1950s under the shah and continued to expand after the monarchy was overthrown in the 1979 Islamic Revolution. Years after succeeding Islamic Republic founder Supreme Leader Ayatollah Ruhollah Khomeini, Khamenei is widely reported to have issued in the 1990s a fatwa, an Islamic legal ruling, against the development of nuclear weapons.

But in 2006, a decade after the U.S.



INFLAMED RIVALRY An Iranian burns an Israeli flag on April 5 following a strike in Damascus, which Tehran blamed on Israel.

had already issued nuclear-related sanctions against Tehran, the United Nations Security Council adopted the first international restrictions against the country over its nuclear activities.

These sanctions were briefly eased by the landmark multilateral nuclear deal known as the Joint Comprehensive Plan of Action, or JCPOA, in 2015 under President Barack Obama. In exchange, Iran agreed to restrict its nuclear development, but the U.S. withdrew from the accord under President Donald Trump in 2018 and, as sanctions returned, Iran gradually began to accelerate its program.

Shortly after taking office, President Joe Biden began a series of negotiations in a bid to reinstate Washington's participation in the deal. Talks fell through by the end of 2022, however, and the ongoing conflict in Gaza has only

deepened mistrust between the U.S. and Iran. Following his recent visit to Iran, International Atomic Energy Agency Director General Rafael Mariano Grossi warned the country would be just a matter of weeks away from building a nuclear weapon if it chose to do so.

He, too, expressed concern over the recent comments from

“A revision in the nuclear doctrine... and departure from previously stated considerations is possible and conceivable.”

high-level Iranian figures discussing this possibility. “Director General Grossi has repeatedly made clear his deep concern about any ‘loose talk’ regarding nuclear weapons,” an IAEA spokesperson told *Newsweek*. “He has stressed that Iran is party to the Non-Proliferation [of Nuclear Weapons] Treaty, which bans non-nuclear-weapon states from developing such arms.”

The IAEA spokesperson also cited Grossi's recent comments in which he stated that there is “no evidence to suggest that Iran has moved, or is moving, or is planning to move, to a weapons program.”

Reached for comment, the Iranian Mission to the United Nations reiterated the Islamic Republic's commitment to Khamenei's initial ruling against nuclear weapons but warned against hostile acts that could force a reconsideration of Tehran's cooperation with the IAEA.

“As we know, Iran's nuclear doctrine remains unchanged,” the Iranian Mission told *Newsweek*. “Iran will continue to adhere to the Supreme Leader's fatwa, which unequivocally prohibits the production, procurement, stockpiling and use of any form of weapons of mass destruction.”

“However, in the event of an attack on Iran's nuclear facilities, all of which are subject to monitoring and inspection by the International Atomic Energy Agency,” the Mission added, “there exists a possibility of Iran reconsidering its collaboration within the Comprehensive Safeguards Agreement with the IAEA.”

Iranian concerns over enemy action are “the most important” of three primary factors fueling the shift

in Iran's nuclear debate, according to Sabet. This, he argued, came in direct connection to an explosive series of events in April that saw Israel conduct a deadly airstrike on an Iranian consular building in Damascus, Iran launch a salvo of missiles and drones toward Israel and then Israel conduct a reported attack on an Iranian air defense site.

"A significant portion of the nuclear signaling in April by Iranian officials and figures seemed to be aimed at deterring Israel and getting the United States to restrain Israel from conducting such a retaliatory attack, particularly on Iran's nuclear facilities," Sabet told *Newsweek*.

Meanwhile, the "second and third drivers, generally speaking," he added, "could be the absence of the prospect for nuclear negotiations that plausibly deliver meaningful economic sanctions relief, and concern that the current or a future U.S. administration could undertake further military or economic measures against Iran."

Patience Wears Thin

Seyed Hossein Mousavian, a former Iranian diplomat who served on Iran's nuclear negotiations team in the mid-2000s and is today a specialist at Princeton University's program on Science and Global Security, emphasized the impact of sanctions on Tehran's calculus on whether to maintain its commitments to the NPT, of which Iran was one of the original signatories in 1970.

"I am afraid Iran will not tolerate the trend of remaining a member of the NPT, avoiding mastering nuclear bombs, and being rewarded with more sanctions," Mousavian told *Newsweek*.

He argued that "the problem is beyond the nuclear issue," as Iran was party to not only the NPT but also pacts on other forms of restricted warfare,

including those pertaining to chemical and biological weapons, and yet the country continued to be subject to mounting diplomatic, economic and military pressure.

"During past decades, the world powers expected Iran to comply with commitments and deprived Iran of its rights," Mousavian said. "This will not last."

The new nuclear signals are being watched closely by observers within Iran itself as well.

Life-or-Death Decisions

Alireza Taghavinia, a Tehran-based security analyst, emphasized that only Khamenei, as the nation's leading religious jurist, could reverse the country's stance on nuclear weapons. However, he also asserted that there may be a faith-based argument toward doing so in the event the state's very existence was deemed to be in jeopardy.

"I know that in Islam, preserving the survival and lives of human beings is more important than anything else," Taghavinia told *Newsweek*. "If the lives of the people of Iran and the survival of the country are endangered, the situation will probably be different."

In this vein, he argued that "America should be aware that threats of military attack and sanctions are not effective in order to prevent Iran's nuclearization, and the policy of

**"America... threats of
military attack and
sanctions are not
effective...to prevent
Iran's nuclearization."**



hostility toward Iran should be abandoned so that Iran does not see the need to build nuclear weapons and pursue its nuclear activities within the framework of the NPT treaty.”

“Certainly, Iran has no desire to build an atomic bomb, but it cannot tolerate behaviors that endanger its survival and security,” Taghavinia said. “Therefore, America and Israel should not provoke and threaten Iran so that Iran does not see the need to change its strategy.”

The U.S. and Israel have only doubled down on their warnings in light of the comments coming from Iran, particularly the remarks by Khamenei adviser Kharrazi, which State Department spokesperson Matthew Miller called “irresponsible” during a May press briefing.

The Biden administration has vowed to ramp up the pressure against the Islamic Republic and



SHIFTING POSITION Khamenei prohibits the use of nuclear weapons but it is feared Iran could change its stance following strikes with Israel (below left).

has not ruled out a military option to ensure, as one State Department spokesperson told *Newsweek*—citing the positions of the president and his top diplomat, Secretary of State Antony Blinken—“that Iran never possesses a nuclear weapon.”

“While we have long said we view diplomacy as the best way to achieve a sustainable, effective solution, all options remain on the table,” the State Department spokesperson said. “The administration has not lifted a single sanction on Iran. Rather, we continue to increase pressure. Our extensive sanctions on Iran remain in place, and we continue to enforce them.”

Still, the State Department spokesperson noted that U.S. officials, like the IAEA, “continue to assess that Iran is not currently undertaking the key activities that would be necessary to produce a testable nuclear device.”

Israel has issued even harsher rhetoric toward Iran’s potential nuclear option over the years. Netanyahu has also continued to allude to what he saw as the pressing need to combat Iran’s nuclear ambitions throughout

the war in Gaza, in which Tehran has openly supported the Palestinian Hamas movement and other militias that have entered the fray from Lebanon, Iraq, Syria and Yemen.

Tensions Run High

Israel already has a lengthy history of conducting acts of sabotage and assassinations against Iranian nuclear officials and facilities. Israel has also demonstrated the willingness to take even more brazen measures against rivals’ nuclear sites in the region, conducting daring air raids against reactors in Iraq in June 1981 and in Syria in September 2007.

Newsweek has reached out to the Israeli Prime Minister’s Office for comment.

Although no official accusations have been lodged against Israel or Azerbaijan, where President Ilham Aliyev has forged closer ties with Netanyahu, in connection with the crash that took Raisi’s life amid heavy fog conditions, suspicions continue to haunt the circumstances surrounding the Iranian president’s death.

“The issue of the possibility of the Israeli regime using the territory of the Republic of Azerbaijan to disrupt the electronic operation of the helicopter or any other destructive action is raised as a hypothesis,” Ahmad Kazemi, a professor of international law in Tehran, told *Newsweek*. “In the last 20 years, the Israeli regime has repeatedly used the capabilities of the Republic of Azerbaijan in the assassination of Iranian nuclear scientists and other terrorist acts.”

Should such a hypothesis prove true, Kazemi warned that “all the equations in the region will be fundamentally changed to the detriment of the Israeli regime and the Republic of Azerbaijan.”



Risks and Opportunities

Past Israeli operations have served as a point of caution for Iran, which has increasingly fortified both its nuclear and missile capabilities, including through the use of vast underground complexes that would severely complicate any unilateral Israeli operation.

"I think it's widely believed that Israel acting alone may have difficulties in destroying a dispersed Iranian nuclear weapons program," Robert Einhorn, who served as the first State Department special adviser for non-proliferation and arms control, told *Newsweek*. "But I don't think there's any doubt as to the Israeli will and motivation to prevent Iran from having nuclear weapons."

Einhorn, now a senior fellow at the Brookings Institution's Strobe Talbott Center for Security, Strategy and Technology, said Iranian decision-makers likely see "both risks and opportunities" when looking at the experiences of emerging nuclear states in the 21st century.

Claims of weapons of mass destruction development served as

the pretext for the U.S.-led invasion of Iraq in 2003. That same year, two other states with nuclear programs, Libya and North Korea, went down very different paths, as the former agreed to shutter its facilities in a deal with the West and the latter withdrew from the NPT to accelerate nuclear weapons development.

Longtime Libyan leader Muammar el-Qaddafi was ultimately overthrown and killed in a NATO-backed rebellion just eight years later. North Korea's ruling Kim dynasty remains firmly in power to this day, and commands an increasingly advanced arsenal capable of targeting even the U.S.

Iran, for its part, already possesses the largest missile and drone arsenal in the Middle East and has forged ties with an unprecedented network of mostly nonstate actors known as the "axis of resistance," a term conceived to rival President George W.

TURNING POINT Iran has accelerated its nuclear research since the U.S. announced its withdrawal from the JCPOA under Donald Trump in 2018.

Bush's iconic branding of Iran, Iraq and North Korea as an "axis of evil" in the lead-up to the Iraq War. These two conventional assets have constituted the core of Iranian efforts to establish a credible deterrence for decades.

But Einhorn noted this could be shifting, as "there have been some developments that have, I think, supported some of the arguments within the Iranian elite for nuclear weapons."

"Until now, they have felt that their conventional capabilities as well as the support they get from the proxies would be a sufficient deterrent," Einhorn said. "But now they're in a situation where they face a direct attack from Israel, which was indicated by the recent exchange, but also perhaps direct attack from the United States."

"Another argument, I think, is that, whereas before, they may have felt that the regional strategy was working, they were expanding their influence, deterring their adversaries and so forth," Einhorn said, "[now] they see the United States seeking to assemble a coalition of like-minded states, including Israel, perhaps Saudi Arabia and other Gulf Arab states, Egypt; a coalition that would be designed to counter Iran and its proxies."

But in looking at the other countries in the region, many of which have elected to improve their ties with Iran in recent years despite ongoing strategic rivalries, Einhorn observed another potential effect of Iran's nuclear messaging—the prospect of others following suit. In particular, Saudi Arabia has displayed interest in ramping up nuclear activity, and suggestions to this end have come from Egypt and Turkey as well.

Sabet, the former U.N. arms control researcher, came to a similar conclusion, arguing that an "Iranian nuclear breakout would lead other





ARMS FEARS Iran's Bushehr Nuclear Plant in Halileh. Getting a deal now with Iran would be hard, expert Eric Brewer said.

states of the region to more seriously consider building their own nuclear weapons (although they would face stiff resistance from Western states), and represent a major challenge for the global nuclear nonproliferation regime.”

Ultimately, Sabet stated, the consequences of an Iranian nuclear endeavor could depend on the robustness of the deterrent established.

“It would certainly shift a degree of the balance of power in the region in Iran’s favor,” Sabet said, “and, if the Islamic Republic continues to believe that it faces existential threats—or at least serious challenges that cannot be managed by other tools like diplomacy—lead the country to lash out more strongly and openly against its adversaries.”

“On the other hand,” he added, “if this leads the United States and some of its regional adversaries to come to terms with it, then it could stabilize the regional situation somewhat and perhaps even allow movement on previously intractable issues.”

Uncharted Waters

Adding to the precariousness of the present situation, however, is a fundamental lack of trust that now exists between Washington and Tehran, given the trajectory of their diplomatic breakthrough once hailed as a historic success in spite of the skepticism from hard-liners in both capitals that ultimately prevailed.

Eric Brewer, former director for counterproliferation at the White House National Security Council and now serving as deputy vice pres-

“Iranian nuclear breakout would lead other states of the region to more seriously consider building their own nuclear weapons.”

ident of the Nuclear Threat Initiative think tank, noted how Iran had been abiding by the JCPOA at the time of the Trump administration’s withdrawal. As such, he said, “it’s no surprise that Tehran responded by expanding its nuclear program.”

“President Biden tried but was ultimately unable to revive the deal. Getting any sort of deal with Iran now is much more difficult as a result,” Brewer told *Newsweek*. “Iran’s program has made technical advances that can’t be undone. The geopolitical environment and the relationship between the U.S. and Europe and Russia and China is also far more fractious than in 2015.”

“That doesn’t mean we give up,” he added, “but it does point to the long odds for an agreement, and the need for some creative thinking about what type of a deal remains possible and how we can get there.”

In the meantime, the Middle East continues to trend toward greater instability stoked by the war in Gaza against the backdrop of an even more uncertain international order.

“Even if Iran isn’t planning on going nuclear tomorrow, this increased nuclear rhetoric is still worrying,” Brewer said, “especially as Iran’s nuclear capabilities are more advanced than ever and because the conflict in the region could still play out in ways that lead to a decision by Tehran to expand its program further, or go for a bomb.” **N**

► **Tom O’Connor** is Deputy Editor, National Security & Foreign Policy at *Newsweek*. Follow him on X @ShaolinTom

U.S. POLITICS

Bringing Trump's Trial to Life

Sketch artist Isabelle Brouman tells *Newsweek* what it was like covering the former president's court case

THERE WAS A NONSTOP PARADE of recognizable faces at former President Donald Trump's criminal trial. On the witness stand, in the audience and in the overflow room, high-profile figures, Trump allies and even primetime news anchors made an appearance at 100 Centre Street in New York City.

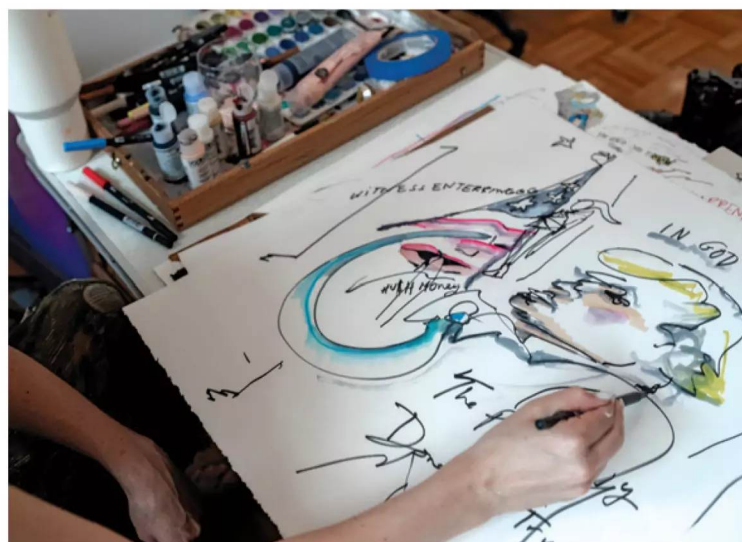
But the best-dressed person in the courtroom was not among that crowd. Instead, she was one of three court sketch artists who spent their days scribbling on large canvases, documenting the historic criminal trial—and eventual conviction—of a former U.S. president. Isa-

belle Brouman—who often sported a large, bedazzled headband and tights that made her legs look like they were covered in tattoos—spent five weeks inside the courtroom, diligently caricaturing the ex-president and the rotating cast of characters.

From star witness Michael Cohen to members of Trump's entourage—including Lara Trump and Representative Lauren Boebert—Brouman not only tried to capture who was in the courtroom, but also the feeling of being in that room on the 15th floor of the Manhattan Criminal Court.

"People ask me, 'What's it like? How are you doing?'

by
**KATHERINE
FUNG**



And those are things that we don't really consider when we're looking back on historic documents. What were people feeling in the room?" she told *Newsweek* during a live interview at her studio, before the trial ended.

Her vibrant, collage-like images are unconventional. Unlike the other court sketch artists who paint snapshots of the trial, Brouman fills her canvases with overlapping images of the defendant, witnesses, exhibits of evidence, quotes from the attorneys and, in one work, even the plastic bag that her lunch came in.

"It said, 'Thank you for your business,'" she said. "It was the day that Jeffrey McConney was on the stand, and I thought that was kind of perfect because he was the former controller [of the Trump Organization]."

Within the layers of her sketches, observers have seen the various members of the Trump family who have accompanied the patriarch to his trial. Brouman said they're all "fun" to draw because they're "kind of action figure-y and ready for TV." She said she particularly enjoyed drawing Trump's son Eric, who became a mainstay in the front row behind his father, because of his eyes.

"He has a forehead that sort of creates a darkness in his eyes, so getting that right and the mood of his face is fun for me and it sort of matches the mood in the room, something that's looming," Brouman said. "Don Jr., he's more of a showman. He comes in and his shoulders are back really far and his head is tilted up, his chin is up, his nose is up. He has an attitude that is compelling."

Brouman has had time to hone her skill for drawing the Trump family. She also sketched last year's civil fraud trial against the former president and the Trump Organization. But practice does not always



CAPTURING HISTORY Brouman felt the need “to continue following the news cycle with my art”; a sketch from the Trump hush money trial, bottom.

financial documents. We’re talking about recordings that none of us have ever heard. Being in the space with somebody who took those recordings and then somebody who didn’t know they were being recorded, there’s the drama and tensions of that as well.”

But what was the feeling Brouman herself experienced in the courtroom each day?

“I’ve just been sort of on fire as far as being able to combine the idea of the American imagination with what’s actually going on in here,” she said. “There are emotions and recent histories that contribute to the way that I put down a line or I understand a handshake or a look between two people.”

She added, “There’s a seriousness, but there’s also a level of humor and absurdity and that matches with my style really well, because I’m someone who is comfortable with chaos.”

Brouman has tried to be less rigid in her work because of the constant element of surprise and the rapidity of certain moments. That meant sometimes throwing away the art she’s been focused on perfecting to get something else on paper. And while she doesn’t plan to sell any of her works until it goes to a show as a whole, she said some of the high-profile individuals in the courtroom have already expressed interest in purchasing the pieces.

“I consider it all one giant document, so I want to keep everything together,” she said. **N**

► **Katherine Fung**, a senior NEWSWEEK reporter, covered Trump’s criminal trial. Follow her on X @katherinefung

make perfect, she said. The criminal trial, unlike the civil one, was more difficult for the artist because all the security surrounding Trump affected her sightlines.

“There are officers that are standing on both sides,” she said. “There’s a lot more showmanship, so there’s also the challenge of, ‘Who’s this person? Is this important? What’s the story here?’”

Brouman began drawing courtroom scenes during the Johnny Depp v. Amber Heard trial. At first, she sketched portraits while following the case on YouTube. But it wasn’t long before she drove down to Fairfax, Virginia, and stood in the public line to draw in the very courtroom where the high-profile defamation case was unfolding. After realizing through veteran sketch artist Bill Hennessy that artists can be credentialed in the courts, she followed suit.

To Brouman, each trial is different. She said what drew her to

Trump’s criminal trial is “the situation that the country is in right now.”

“This trial, the stakes are different,” she said, adding the trial was “a bizarre combination of theater, real-life implications, politics, entertainment, social weirdness and questioning of what’s artifice and what’s real.”

“In a lot of ways, that’s a really fun challenge because there’s a dynamic quality to this trial that wasn’t as much present in the previous one,” Brouman said. “The themes of this trial are a lot different than just

The Trump family are “fun” to draw because they’re “kind of action figure-y and ready for TV.”

ARABIA

SAUDI ARABIA'S INCREASING **STRENGTH** MEANS IT NOW HAS MUCH MORE CLOUT



NIGHT

WITH ITS PARTNERS,

INCLUDING THE U.S.

by
**Tom
O'Connor**

Photo by
**Ahmed
Fahmi**

GETTY



AS PRESIDENT JOE BIDEN PREPARES to fight for reelection this November across a contentious battleground of U.S. states, the White House also finds itself vying for influence among several increasingly critical players on the world stage, among them a long-standing partner in the midst of groundbreaking changes in its policies at home and abroad.

Saudi Arabia is not only a swing state in terms of geopolitics, but also plays an outsized role on issues key to the U.S. election. It holds a pivotal place in the Middle East at a time when Israel's war with Hamas has become central to the campaign, and as the world's biggest oil exporter it is a powerful player in determining oil prices, which could also be important given inflation is among U.S. voters' top concerns.

At 38, Crown Prince Mohammed bin Salman of

SWING STATE
Riyadh's King Abdullah Financial District. With inflation a concern in the U.S., Saudi Arabia's role in determining oil prices could impact election issues.

Saudi Arabia is one of the world's youngest de facto heads of state and the driving force behind a nationalist agenda taking hold in the kingdom. His father, King Salman, 88, has led since 2015 but has handed increasing control to his seventh son since naming him next to rule in 2017 and prime minister in 2022, amid growing concerns over the monarch's health.

The transformation overseen by Crown Prince Mohammed, often referred to simply as MbS, has led to substantial shifts in the kingdom's domestic outlook, which has embraced a more globalized character and a transition away from oil dependence, among other initiatives in line with the youngest-ever heir to the throne's ambitious Vision 2030 plan.

It's also prompted a recalibration of foreign relations and the pursuit of more robust ties with other leading powers, including top U.S. rivals China and

Russia. Though officials in Riyadh and Washington continue to emphasize the importance of their partnership, recent rifts and painstaking negotiations currently taking place over the future of their cooperation have raised serious questions regarding the fate of one of the U.S.'s most strategic footholds in the Middle East. Ali Shihabi, a Saudi political expert who founded the Arabia Foundation think tank and now serves on the advisory board of NEOM—one of several futuristic “megaprojects” outlined in Vision 2030—identified two primary factors behind the kingdom’s balancing act on international relations.

“One is the increasing importance of China as the single largest importer of Saudi oil and a partner that is willing to supply Saudi with arms and technology with no conditions attached,” Shihabi told *Newsweek*. “The second is the perceived unreliability of the relationship with the U.S. that can fluctuate dramatically depending on political currents in D.C., so Saudi feels it has to spread its chips.”

Kingmakers of the Middle East

THE RELATIONSHIP BETWEEN THE U.S. AND SAUDI Arabia dates back to the earliest years of the kingdom, whose founder and namesake, King Abdulaziz ibn Saud, led a three-decade series of conquests to unite much of the Arabian Peninsula by 1932. These ties expanded into a strategic partnership during World War II and further developed throughout the Cold War, with Riyadh serving as a key bulwark against Soviet influence in the region, even amid some major disputes such as the 1973 oil embargo over U.S. support for Israel in the Yom Kippur War.

Not even Saudi Arabia’s murky ties to the 9/11 attacks—in which 15 of the 19 hijackers were Saudi nationals—would prove a lasting setback as the relationship only further solidified throughout the 21st century war on terror. Saudi Arabia would also go on to become a central player in the U.S. effort to counter Iranian influence across the Middle East and is still viewed as a crucial partner in this endeavor.

But while the U.S. has long benefited from Saudi Arabia’s special influence as the world’s leading crude oil exporter and custodian of Islam’s holiest sites, and as the kingdom has enjoyed the Pentagon’s protection amid regional turbulence, interests have begun to diverge in recent years. The schism has grown particularly noticeable under the Biden administration. Unlike Trump, under



SAUDI ARABIA IS AWARE THAT THE WORLD IS NO LONGER UNIPOLAR WITH JUST THE UNITED STATES DOMINATING EVERYTHING, AND THAT IT’S MOVING TOWARD A MULTIPOLAR WORLD WITH OTHER POWERS RISING LIKE CHINA AND INDIA.”

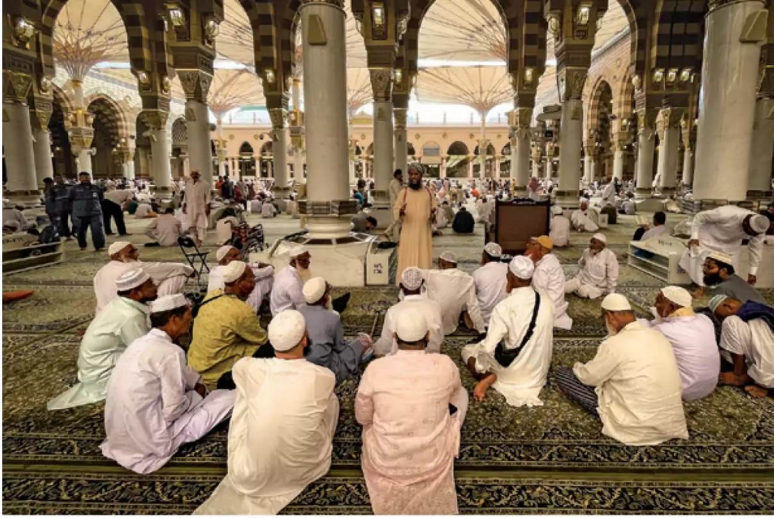
FRAYED TIES

Top to bottom: U.S. President Joe Biden with Crown Prince Mohammed bin Salman in Jeddah, during his July 2022 visit; a worker at an oil refinery in Dhahran.

whom intimate ties with the rising crown prince were fostered, Biden has taken a harder line. On the campaign trail, the ex-vice president called Saudi Arabia a “pariah” over dissident journalist Jamal Khashoggi’s killing, which U.S. intelligence linked directly to the crown prince. He also ended offensive weapons sales over concerns of civilian casualties in the kingdom’s intervention in the Yemeni civil war as one of his earliest major Middle East foreign policy moves upon taking office in 2021.

The president’s July 2022 visit to Saudi Arabia appeared to do little to mend frayed ties. Riyadh went on to openly defy U.S. calls to ramp up oil





the Biden administration has found Saudi Arabia to be driving a hard bargain as it utilizes its growing geopolitical clout to best serve Riyadh's interests in dealing with major plus fellow emerging powers.

A Brave New Multipolar World

RIYADH IS IN A UNIQUE POSITION TO PURSUE THIS path given its already influential status as a leading member of OPEC+, the Arab League and the Organization of Islamic Cooperation as well as one of the fastest-growing economies of the G20. But it's not alone in going down this road.

Nations adopting similar courses include Brazil, India, Indonesia, South Africa and Turkey, all of whom have sought to expand and diversify their international portfolios both East and West. They form what experts at the German Marshall Fund think tank have referred to as "global swing states."

"As for many middle powers/swing states in the Global South, for Saudi Arabia, multi-alignment is the logical response to a more volatile, complex, multipolar world order," Kristina Kausch, deputy managing director of GMF South, who authored the report on Saudi Arabia's position among these rising powers, told *Newsweek*. "Not marriage but a fluid set of relationships is the way Riyadh sees it can hedge against international instability and leverage its strengths and assets to greatest advantage."

She argued this strategy is especially essential for Saudi Arabia, "as the adaptation and sustainability of its geo-economic business model depends on good relations with the United States, China and Russia alike." As it stands, Washington remains Riyadh's top security partner, but Beijing has emerged as its leading trade partner and energy client, and robust ties with Moscow are key to managing global energy production and pricing via OPEC+. Kausch said "this results in a position of permanent

production in concert with fellow members of the expanded Organization of Petroleum Exporting Countries, or OPEC+, amid the soaring energy costs fueled by sanctions over Russia's war in Ukraine.

In sharp contrast to Biden's cold reception, Chinese President Xi Jinping received a warm welcome later that same year as he oversaw the first-ever China-Arab States Summit. Months later, Riyadh reestablished diplomatic ties with Tehran in a Beijing-brokered agreement, and both proceeded to integrate themselves into two multilateral blocs in which China and Russia hold considerable influence, the Shanghai Cooperation Organization and BRICS.

Today, Biden is again looking to Riyadh for support amid the ongoing war in the Gaza Strip. The White House seeks to secure a so-called megadeal that would involve U.S. security guarantees, along with nuclear and technology-sharing initiatives against the backdrop of lingering worries over Iran's nuclear program; Israeli-Saudi diplomatic normalization as an effective extension of the Trump-era Abraham Accords; and, perhaps most challenging of all, a pathway toward Palestinian statehood. Yet

FAITH AND FURY

From top: Prophet's Mosque in Medina; friends of Jamal Khashoggi mark the second anniversary of the journalist's killing.



MBS HAS FOCUSED ON A MORE TRADITIONAL UNDERSTANDING OF ISLAM THAT HAS TO DO WITH PIETY AND BELIEF AND, WHEN IT COMES TO POLITICS, MORE TO DO WITH NATIONALISM AS OPPOSED TO ISLAMISM."

ambiguity, which naturally leads to friction with the U.S. government, which would like to see Riyadh positioned more firmly in its own geopolitical camp.”

While she noted that a breakthrough in the ongoing negotiations leading to U.S. security guarantees could provide valuable benefits for both sides, she also argued that an “adjustment of the traditional U.S. approach is needed in the sense that Washington will have to understand that Riyadh’s approach to the alliance is more transactional, and it will not align with U.S. preferences by default.”

“The U.S.’s narrowing approach to the Middle East in the past few years, seeing the region primarily through a lens of competition with China and Russia while countering Iran,” she added, “has not been conducive to this understanding.”

Bernard Haykel, professor of Near Eastern Studies

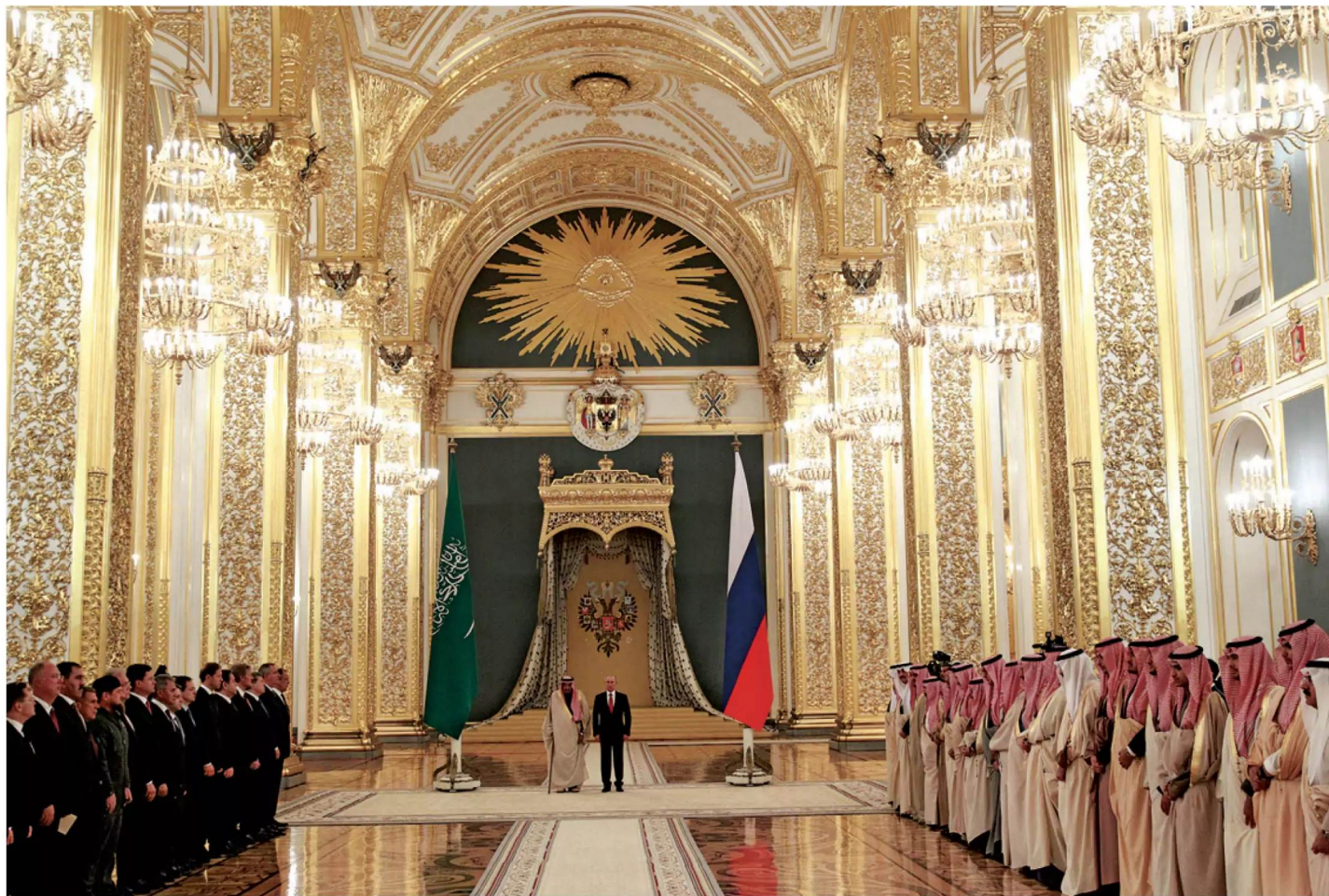
FOREIGN RELATIONS

King Salman with Russian leader Vladimir Putin in Moscow in 2017. Saudi Arabia is pursuing more robust ties with Russia and China.

at Princeton University, also observed the strategic adjustment in Riyadh’s standpoint. “Saudi Arabia is aware that the world is no longer unipolar with just the United States dominating everything, and that it’s moving towards a multipolar world with other powers rising like China and India,” Haykel told *Newsweek*, “and that it has to maintain a relationship with as many of these countries, especially these rising powers, who are its major customers for oil and petrochemicals.”

Saudi Arabia First

HAYKEL MAINTAINS DIRECT CONTACT WITH CROWN Prince Mohammed and spoke about how the future monarch has reshaped the kingdom’s direction. He described the approach as a “Saudi First” policy, evoking the century-old “America First” doctrine more recently reinvigorated by Trump. “The big



FROM TOP LEFT: FADEL DAWOD/GETTY; OZAN KOSE/AP/GETTY; MIKHAIL SVETLOV/GETTY

difference is that Saudi Arabia is operating much more with nationalism in mind, rather than any other ideology,” Haykel said. “It’s putting its own self-interest before regional interests or, say, pan-Arab, pan-Islamic interests, which used to be important factors earlier, as well as American interests.”

“Given that it’s placing its own interests first and it’s desperately trying to transform itself and diversify its economy and become less dependent on oil revenues,” he added, “it is opting for policies that mean, for example, it has to keep excellent relations with China and America simultaneously.”

He argued that this policy of “Saudi first is not intended to threaten the United States with a switch to China.” But, given the recent tensions in ties between Riyadh and Washington, he said it demonstrates the ability “to look at other options, to diversify relationships as much as possible.”

Haykel noted that the decision to clamp down on Islamist political activists and movements began under former King Abdullah, who led from 2005 to 2015, and “MbS basically put an end to these Islamists and instead has focused on a more traditional understanding of Islam that has to do with piety and belief and, when it comes to politics, more to do with nationalism as opposed to Islamism.”

The change has paved the way for more social reforms, including the lifting of a long-standing ban on women driving, easing the male guardianship system and establishing new entertainment centers. It’s also opened the door for attracting more foreign investment and campaigns to promote tourism, bringing high-profile concerts and sporting events, even the kingdom’s first women’s swimsuit fashion show, and reports of a debut liquor store.

Both Haykel and Shihabi noted that there were risks to this endeavor, given the kingdom’s traditional ties to ultraconservative strains of Islam, which Shihabi pointed out “constitute a much smaller element of society than previously imagined.” These ideologies, most notably the state-backed school of Wahhabism, have long served as a cornerstone of the House of Saud’s legitimacy, but the most fundamentalist and sometimes violent interpretations of Islam have been decisively suppressed as the march toward Vision 2030 presses on.

What these reforms do not entail, however, are core compromises on broader concerns frequently raised by U.S. officials when it comes to democracy,



SOCIAL CHANGE
Women running in Jeddah in 2018. MbS's clampdown on Islamist movements paved the way for the lifting of a ban on women driving.

freedom of expression and other human rights issues in the absolute monarchy. Whether Washington would accept this state of affairs moving forward is a matter of U.S. priorities, Haykel argued.

“I think it depends on what America wants from its relationship with Saudi Arabia,” Haykel said. “If it wants a responsible global producer of oil, a country that balances global oil markets through its production policies, then Saudi Arabia can do that quite well. But if it privileges human rights and values, then it’s going to be a tense relationship.”

The Cost of Failure

ABDULAZIZ AL-KHAMIS, A PROMINENT SAUDI JOURNALIST and researcher, felt the Biden administration could improve its ties with Riyadh by “strengthening diplomatic dialogue, reducing public criticism and taking into account geopolitical differences and diverging interests” and “offering mutual concessions on economic and security issues.”

However, “if the United States fails to stabilize its relationship with the kingdom, many risks could ensue,” Khamis told *Newsweek*, including, “a weakening of American influence in the Middle East, strengthening the influence of competitors such as China and Russia, which seek to strengthen their relations with the kingdom,” as well as a situation that “may negatively affect the stability of global energy markets.”

Even a successful effort by the Biden administration may not be enough to sway a deep-rooted Saudi shift toward embracing new foreign ties that may run contrary to U.S. interests. Khamis noted that the benefits of forging stronger cooperation with other powers include “diversifying alliances, which strengthens the kingdom’s position on the international scene and reduces its dependence on one



IF THE U.S. NEEDS TO KEEP ITS INFLUENCE IN THE MIDDLE EAST, IT SHOULD ENSURE COLLABORATION ON MUTUAL INTERESTS SUCH AS REGIONAL STABILITY, COUNTERTERRORISM AND SECURITY EFFORTS AND ENERGY SECURITY?"

country, diversifying trade and investment partners, which strengthens the Saudi economy," and "improving national security by establishing strong relations with several major powers, which contributes to achieving a regional balance of power."

"I expect that Crown Prince Mohammed bin Salman will continue this path in building relations with other major powers when he assumes power in the future," Khamis added, "given the strategic and economic benefits that these relations provide."

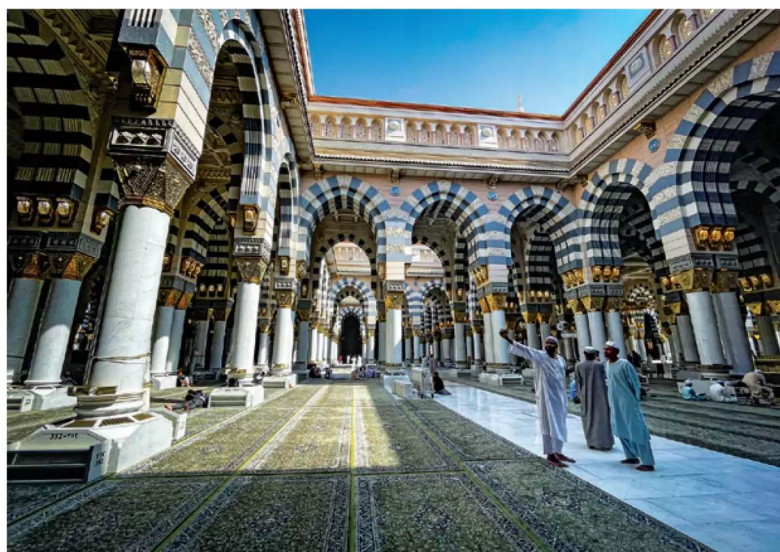
The U.S. coming to terms with Saudi Arabia's "swing state" status is key to stabilizing and building upon further relations, argued Mohammed Alhamed, a Saudi geopolitical analyst serving as president of the Saudi Elite consultancy.

"There is a real opportunity to achieve balance in Saudi-American relations—specifically with the Democratic Party and the Biden administration—by repairing what time has damaged from attempts to demonize relations with an important security ally of the United States," Alhamed told *Newsweek*.

Such attempts, Alhamed argued, "always fail due to a very simple reason, that the kingdom is in a huge stage of economic, cultural, artistic, scientific and political development and maturity in Saudi leadership toward the Arab world, the Middle East and the Islamic world toward moderation."

A breakthrough would be particularly crucial, according to Alhamed, at a time when Riyadh may have the capacity to effect real change during a

TRADITIONAL BELIEFS
Prophet's Mosque. The Crown Prince is said to have focused on an understanding of Islam that's "more to do with nationalism."



period of substantial instability across the Middle East stemming from the war in Gaza. "Saudi Arabia's weight in economic and geopolitical spheres necessitates the U.S. to consider Saudi interests in negotiations," he said. "Given Saudi's strategic importance, the U.S. may need to balance its administration ideology agenda with the broader benefits of maintaining a strong relationship with Riyadh."

"If the U.S. needs to keep its influence in the Middle East," he added, "it should ensure collaboration on mutual interests such as regional stability, counterterrorism and security efforts and energy security."

Reached for comment, Saudi Embassy to the U.S. spokesperson Fahad Nazer told *Newsweek* that "the Kingdom of Saudi Arabia enjoys excellent relations with the overwhelming majority of nations around the world" and "believes that it is uniquely positioned to bridge the differences between the Global North and Global South and East and West."

"While Saudi Arabia has every reason to cultivate its newer relations with various countries, based on its economic interests in the context of Vision 2030," Nazer added, "our relationship with the United States has not only endured for eight decades but it has also deepened and broadened to now include advanced technologies, supply chain resilience and space exploration."

Today, he argued that "Saudi Vision 2030 is moving forward full steam ahead," and that "many of its objectives and goals have already been achieved and have been revised upwards."

"We have empowered our youth, our women and our entrepreneurs. We have also revolutionized the delivery of government services," Nazer said. "These measures have diversified the economy, generated thousands of jobs and improved the quality of life for Saudis and non-Saudis alike. All indicators suggest that there is very broad support among Saudis for Vision 2030 and its various programs."

Newsweek has reached out to the U.S. State Department for comment. **N**

BEST Specialized HOSPITALS

► Asia Pacific | 2024

THE ASIA PACIFIC (APAC) REGION IS ONE OF THE MOST DIVERSE AND economically dynamic areas on Earth. Its inhabitants comprise about 60 percent of the global population with 4.7 billion people. Many of those countries are home to aging populations.

A report released in February from global data intelligence platform Statista found that the over-65 population is expected to double by 2050, with three Asian nations topping the predictions for the highest percentage of adults over 65. Given that, it makes sense that spending on precision medical treatment in the region is expected to increase substantially, from \$8.32 billion in 2022 to an estimated \$18.2 billion in 2027, according to banking giant HSBC, which also put out a report in February, one showing a “strong potential for growth” in the APAC health care industry.

To help patients navigate the increasingly in-demand medical services in APAC countries, *Newsweek* has partnered with Statista for the second annual Best Specialized Asia Pacific Hospitals ranking. The list recognizes the leading medical facilities in Australia, India, Indonesia, Japan, Malaysia, Singapore, South Korea, Taiwan and Thailand. Ranked hospitals represent nine key areas of expertise: cardiac surgery, cardiology, endocrinology, neurology, neurosurgery, oncology, orthopedics, pediatrics and pulmonology.

Receiving specialized care at a top-ranked institution makes a crucial difference in a patient's life. Especially in a region where people with advanced age will soon make up such a large share of the population, knowing where to seek treatment could be an invaluable resource. ► **Nancy Cooper**, *Global Editor in Chief*



Cardiac Surgery

1 The University of Tokyo Hospital BUNKYO, JAPAN	8 Osaka University Hospital SUITA, JAPAN	15 Royal Prince Alfred Hospital CAMPERDOWN, AUSTRALIA	24 The Alfred MELBOURNE, AUSTRALIA
2 National Cerebral and Cardiovascular Center SUITA, JAPAN	9 All India Institute of Medical Sciences-Delhi NEW DELHI	16 The National Heart Centre Singapore (NHCS) SINGAPORE	25 Kyoto University Hospital SAKYO, JAPAN
3 Asan Medical Center ■■ SEOUL, SOUTH KOREA	10 The Prince Charles Hospital CHERMSIDE, AUSTRALIA	17 Monash Medical Centre-Clayton CLAYTON, AUSTRALIA	26 Mount Elizabeth Hospital-Orchard SINGAPORE
4 Sakakibara Heart Institute TOKYO	11 Keio University Hospital SHINJUKU, JAPAN	18 Narayana Institute of Cardiac Sciences BENGALURU, INDIA	27 Severance Hospital-Yonsei University SEOUL, SOUTH KOREA
5 The Royal Melbourne Hospital-Parkville PARKVILLE, AUSTRALIA	12 Seoul National University Hospital ■ SEOUL, SOUTH KOREA	19 Juntendo University Hospital BUNKYO, JAPAN	28 Bangkok Heart Hospital BANGKOK
6 St Vincent's Hospital Sydney DARLINGHURST, AUSTRALIA	13 St. Luke's International Hospital CHUO, JAPAN	20 Center Hospital of the National Center for Global Health and Medicine SHINJUKU, JAPAN	29 Gangnam Severance Hospital-Yonsei University SEOUL, SOUTH KOREA
7 National University Heart Centre Singapore SINGAPORE	14 Samsung Medical Center ■■ SEOUL, SOUTH KOREA	21 Seoul National University-Bundang Hospital SEONGNAM, SOUTH KOREA	30 Apollo Heart Centre CHENNAI, INDIA
		22 Austin Hospital HEIDELBERG, AUSTRALIA	31 Hokkaido University Hospital SAPPORO, JAPAN
		23 Fortis Escorts Heart Institute NEW DELHI	32 Changi General Hospital SINGAPORE
			33 Gleneagles Hospital SINGAPORE

METHODOLOGY

The Asia-Pacific (APAC) region has become the fastest-growing destination for healthcare investment. In recent years, hospitals in the APAC region are thriving on increasing specialization and technological advances in key medical fields. To provide patients with a comprehensive resource for informed decision making, Statista and *Newsweek* have partnered for the second time to award the leading hospitals in the APAC region, encompassing the countries Australia, India, Indonesia, Japan, Malaysia, Singapore, South Korea, Taiwan and Thailand. The ranking awards hospitals in nine medical fields: cardiac surgery, cardiology, endocrinology, neurology, neurosurgery, oncology, orthopedics, pediatrics and pulmonology. List lengths vary between these nine medical fields: top 100 hospitals for cardiology, oncology and pediatrics, and top 75 hospitals for cardiac surgery, endocrinology, neurology, neurosurgery, orthopedics and pulmonology.

THE UNDERLYING DATA ANALYSIS IS BASED ON THREE DATA SOURCES:

► **International Online Survey** – From February to April 2024 medical professionals (e.g., medical doctors, nurses, physician assistants and therapists) as well as staff working in the management/administration in the countries of the designated APAC region were

asked to recommend hospitals in their own field of expertise and in a secondary medical field. Participants were asked to recommend hospitals in their own country as well as internationally. Recommendations for their own employer/hospital were not allowed. The analysis of the primary and secondary recommendations of the nine medical fields was used to determine the reputation score.

► **Certifications** – Several Joint Commission International (JCI) certifications, relevant to specific medical fields, were included in the scoring analysis. Examples of certifications are “Acute Ischemic Stroke,” “Breast Cancer” and “Low Back Pain”. Hospitals received 5% toward their total score if they had a JCI certification.

► **Statista PROMS Implementation Survey** – For the first time, a PROMs implementation score has been included in the scoring model of the Best Specialized Hospitals Asia Pacific project. Patient Reported Outcome Measures (PROMs) are defined as standardized, validated questionnaires completed by patients to measure their perception of their functional well-being and quality of life. In fall/winter of 2023, *Newsweek* and Statista conducted the voluntary PROMs implementation survey to determine the status quo of PROMs implementation, audits and reporting of the data, and whether the PROMs data is used to optimize care process and support therapeutic decisions in real time.

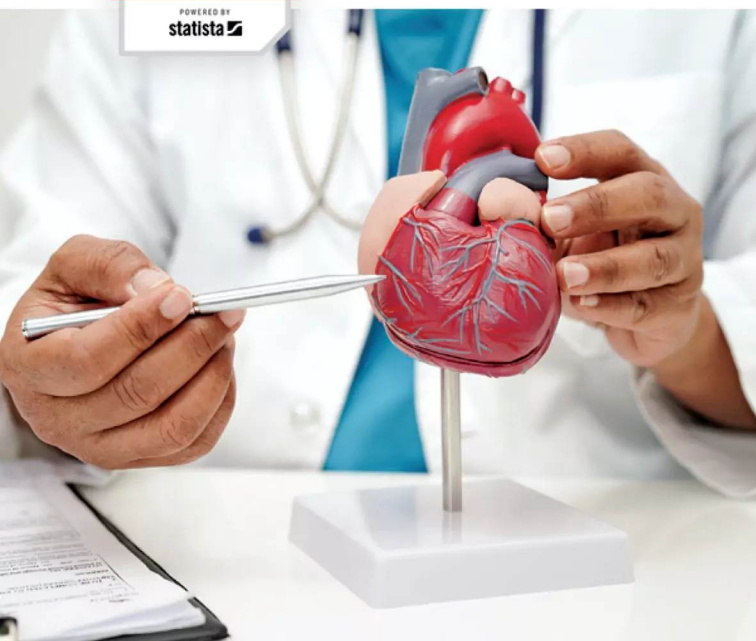
Scores were calculated for each hospital

in each of the three categories and weighted accordingly: international recommendations (56.5%, consisting of 70% recommendations from peers for primary medical field and 30% recommendations from peers for secondary medical field), national recommendations (35%), certifications (5%) and PROMs (3.5%).

Hospitals specializing in multiple medical fields received specific recommendation scores for each respective medical field. Therefore, one hospital can be represented in more than one list if it receives enough recommendations in each medical field.

DISCLAIMER: The rankings are comprised exclusively of hospitals that are eligible regarding the scope described in this document. The ranking is the result of an elaborate process which, due to the interval of data collection and analysis, is a reflection of the last 12 months. Furthermore, events preceding or following the period April 30, 2023–April 30, 2024, and/or pertaining to individual persons affiliated/associated with the facilities were not included in the metrics. As such, the results of this ranking should not be used as the sole source of information for future deliberations.

The information provided in this ranking should be considered in conjunction with other available information about hospitals or, if possible, accompanied by a visit to a facility. The quality of hospitals that are not included in the rankings is not disputed.



- 34 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 35 **Medanta The Medicity**
GURUGRAM, INDIA
- 36 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 37 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 38 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 39 **Kurashiki Central Hospital**
KURASHIKI, JAPAN
- 40 **Christian Medical College, Vellore**
VELLORE, INDIA
- 41 **Bumrungrad International Hospital**
BANGKOK
- 42 **Institut Jantung Negara National Heart Institute**
KUALA LUMPUR, MALAYSIA
- 43 **Taichung Veterans General Hospital**
TAICHUNG, TAIWAN
- 44 **Apollo Speciality Hospitals**
TIRUCHIRAPPALLI, INDIA
- 45 **Shonan Kamakura General Hospital**
KAMAKURA, JAPAN

- 46 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 47 **Jawaharlal Institute of Postgraduate Medical Education and Research**
NAGAR, INDIA
- 48 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 49 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 50 **Max Super Speciality Hospital, Saket**
NEW DELHI
- 51 **Nagoya University Hospital**
NAGOYA, JAPAN
- 52 **Westmead Hospital**
WESTMEAD, AUSTRALIA
- 53 **Gleneagles Hospital Penang**
GEORGE TOWN, MALAYSIA
- 54 **Princess Alexandra Hospital**
WOOLLOONGABBA, AUSTRALIA
- 55 **Safdarjung Hospital**
NEW DELHI
- 56 **Nagoya City University Hospital**
NAGOYA, JAPAN
- 57 **Sri Jayadeva Institute of Cardiovascular Sciences and Research**
BENGALURU, INDIA

- 58 **St Vincent's Hospital-Fitzroy**
FITZROY, AUSTRALIA
- 59 **Korea University-Anam Hospital**
SEOUL, SOUTH KOREA
- 60 **Kokilaben Dhirubhai Ambani Hospital**
MUMBAI, INDIA
- 61 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 62 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 63 **Raffles Hospital**
SINGAPORE
- 64 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 65 **King Edward Memorial Hospital**
MUMBAI, INDIA
- 66 **Linkou Chang Gung Memorial Hospital**
TAOYUAN, TAIWAN

- 67 **Gold Coast University Hospital**
SOUTHPORT, AUSTRALIA
- 68 **Cardiac Vascular Sentral Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 69 **Korea University-Ansan Hospital**
ANSAN, SOUTH KOREA
- 70 **Sydney Adventist Hospital**
WAHROONGA, AUSTRALIA
- 71 **Hospital Umum Sarawak**
KUCHING, MALAYSIA
- 72 **Cheng Hsin General Hospital**
TAIPEI, TAIWAN
- 73 **Sunway Medical Centre**
PETALING JAYA, MALAYSIA
- 74 **Ara Damansara Medical Centre**
SHAH ALAM, MALAYSIA
- 75 **Kaohsiung Chang Gung Memorial Hospital**
KAOHSIUNG, TAIWAN

Cardiology

- 1 **Asan Medical Center**
SEOUL, SOUTH KOREA
- 2 **National Cerebral and Cardiovascular Center**
SUITA, JAPAN
- 3 **The National Heart Centre Singapore (NHCS)**
SINGAPORE
- 4 **Seoul National University Hospital**
SEOUL, SOUTH KOREA
- 5 **Samsung Medical Center**
SEOUL, SOUTH KOREA
- 6 **The Prince Charles Hospital**
CHERMSIDE, AUSTRALIA
- 7 **Sakakibara Heart Institute**
TOKYO
- 8 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 9 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 10 **Kyoto University Hospital**
SAKYO, JAPAN
- 11 **Osaka University Hospital**
SUITA, JAPAN

- 12 **Monash Medical Centre-Clayton**
CLAYTON, AUSTRALIA
- 13 **The Alfred**
MELBOURNE, AUSTRALIA
- 14 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 15 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 16 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 17 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 18 **Gleneagles Hospital**
SINGAPORE
- 19 **Bumrungrad International Hospital**
BANGKOK
- 20 **Apollo Heart Centre**
CHENNAI, INDIA
- 21 **Keio University Hospital**
SHINJUKU, JAPAN

★★★★★
**BEST
SPECIALIZED
HOSPITALS
ASIA PACIFIC**
2024

Newsweek

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statista



- 22 **Medanta The Medicity**
GURUGRAM, INDIA
- 23 **Fortis Escorts Heart Institute**
NEW DELHI
- 24 **National University Heart Centre Singapore**
SINGAPORE
- 25 **Changi General Hospital**
SINGAPORE
- 26 **Institut Jantung Negara National Heart Institute**
KUALA LUMPUR, MALAYSIA
- 27 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 28 **Kurashiki Central Hospital**
KURASHIKI, JAPAN
- 29 **Korea University-Anam Hospital**
SEOUL, SOUTH KOREA
- 30 **St Vincent's Hospital Sydney**
DARLINGHURST, AUSTRALIA
- 31 **Narayana Institute of Cardiac Sciences**
BENGALURU, INDIA
- 32 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 33 **Westmead Hospital**
WESTMEAD, AUSTRALIA
- 34 **Shonan Kamakura General Hospital**
KAMAKURA, JAPAN
- 35 **Austin Hospital**
HEIDELBERG, AUSTRALIA
- 36 **Mount Elizabeth Hospital-Novena**
SINGAPORE
- 37 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 38 **Center Hospital of the National Center for Global Health and Medicine**
SHINJUKU, JAPAN
- 39 **St. Luke's International Hospital**
CHUO, JAPAN
- 40 **Kobe City Medical Center General Hospital**
KOBE, JAPAN
- 41 **Kyushu University Hospital**
HIGASHI, JAPAN
- 42 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA

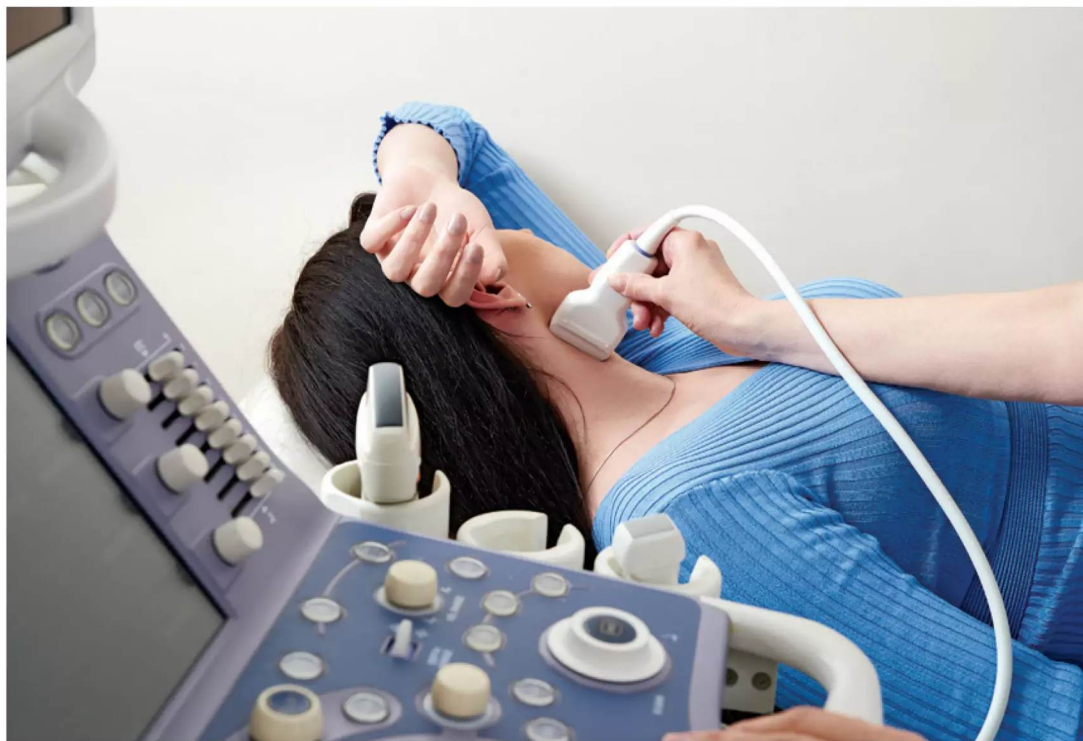
- 43 **Nippon Medical School Hospital**
BUNKYO, JAPAN
- 44 **Christian Medical College, Vellore**
VELLORE, INDIA
- 45 **Royal Brisbane & Women's Hospital**
HERSTON, AUSTRALIA
- 46 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 47 **Hospital Umum Sarawak**
KUCHING, MALAYSIA
- 48 **Mahkota Medical Centre**
MELAKA, MALAYSIA
- 49 **Chiba University Hospital**
CHIBA, JAPAN
- 50 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 51 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 52 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 53 **Sydney Adventist Hospital**
WAHROONGA, AUSTRALIA
- 54 **Japanese Red Cross Medical Center**
SHIBUYA, JAPAN
- 55 **Aster Medcity**
KOCHI, INDIA
- 56 **Fortis Hiranandani Hospital**
NAVI MUMBAI, INDIA
- 57 **The Wesley Hospital**
AUCHENFLOWER, AUSTRALIA
- 58 **Khoo Teck Puat Hospital & Yishun Community Hospital**
SINGAPORE
- 59 **Breach Candy Hospital Trust**
MUMBAI, INDIA
- 60 **Sunway Medical Centre**
PETALING JAYA, MALAYSIA
- 61 **Gleneagles Hospital Penang**
GEORGE TOWN, MALAYSIA
- 62 **KIMS Sunshine Hospital**
HYDERABAD, INDIA
- 63 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 64 **St Vincent's Hospital-Fitzroy**
FITZROY, AUSTRALIA
- 65 **Fortis Escorts Hospital Amritsar**
AMRITSAR, INDIA

- 66 **Raffles Hospital**
SINGAPORE
- 67 **Alexandra Hospital**
SINGAPORE
- 68 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 69 **Saifee Hospital**
MUMBAI, INDIA
- 70 **Royal Perth Hospital-Wellington Street Campus**
PERTH, AUSTRALIA
- 71 **Toyohashi Municipal Hospital**
TOYOHASHI, JAPAN
- 72 **Island Hospital**
GEORGE TOWN, MALAYSIA
- 73 **The Royal Melbourne Hospital-Royal Park**
PARKVILLE, AUSTRALIA
- 74 **Kokilaben Dhirubhai Ambani Hospital**
MUMBAI, INDIA
- 75 **St Vincent's Private Hospital-Sydney**
DARLINGHURST, AUSTRALIA
- 76 **Prince of Wales Hospital**
RANDWICK, AUSTRALIA
- 77 **P. D. Hinduja Hospital & Medical Research Centre**
MUMBAI, INDIA
- 78 **Osaka General Medical Center**
OSAKA, JAPAN
- 79 **Cardiac Vascular Sentral Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 80 **Fortis Hospital Mulund**
MUMBAI, INDIA
- 81 **Bangkok Heart Hospital**
BANGKOK
- 82 **Ramathibodi Hospital**
BANGKOK
- 83 **Pantai Hospital Ampang**
KUALA LUMPUR, MALAYSIA

- 84 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 85 **Fiona Stanley Hospital**
MURDOCH, AUSTRALIA
- 86 **SCB Medical College and Hospital**
CUTTACK, INDIA
- 87 **Jawaharlal Institute of Postgraduate Medical Education and Research**
NAGAR, INDIA
- 88 **Fortis Flt. Lt. Rajan Dhall Hospital**
NEW DELHI
- 89 **Toranomon Hospital**
MINATO, JAPAN
- 90 **Linkou Chang Gung Memorial Hospital**
TAOYUAN, TAIWAN
- 91 **Nagahama City Hospital**
NAGAHAMA, JAPAN
- 92 **Concord Hospital**
CONCORD, AUSTRALIA
- 93 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 94 **Korea University-Ansan Hospital**
ANSAN, SOUTH KOREA
- 95 **Aadya Hospital**
AHMEDABAD, INDIA
- 96 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 97 **Princess Alexandra Hospital**
WOOLLOONGABBA, AUSTRALIA
- 98 **Taichung Veterans General Hospital**
TAICHUNG, TAIWAN
- 99 **Juntendo University Hospital**
BUNKYO, JAPAN
- 100 **Max Super Speciality Hospital, Saket**
NEW DELHI

Endocrinology

- 1 **Asan Medical Center** ■■
SEOUL, SOUTH KOREA
- 2 **Seoul National University Hospital** ■
SEOUL, SOUTH KOREA
- 3 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 4 **Samsung Medical Center** ■■
SEOUL, SOUTH KOREA
- 5 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 6 **Kyoto University Hospital**
SAKYO, JAPAN
- 7 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 8 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 9 **Kyung Hee University Hospital**
SEOUL, SOUTH KOREA
- 10 **Gleneagles Hospital**
SINGAPORE
- 11 **Kyoto Medical Center**
KYOTO, JAPAN
- 12 **Changi General Hospital**
SINGAPORE
- 13 **National University Hospital** ■■
SINGAPORE
- 14 **Korea University-Anam Hospital**
SEOUL, SOUTH KOREA
- 15 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 16 **Singapore General Hospital**
SINGAPORE
- 17 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 18 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 19 **Nagoya University Hospital**
NAGOYA, JAPAN
- 20 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 21 **Jeonbuk National University Hospital**
JEONJU, SOUTH KOREA
- 22 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 23 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 24 **Hanyang University Medical Center**
SEOUL, SOUTH KOREA
- 25 **The Alfred**
MELBOURNE, AUSTRALIA
- 26 **Royal Brisbane & Women's Hospital**
HERSTON, AUSTRALIA
- 27 **Kyushu University Hospital**
HIGASHI, JAPAN
- 28 **Medanta The Medicity**
GURUGRAM, INDIA
- 29 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 30 **Osaka University Hospital**
SUITA, JAPAN
- 31 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 32 **St Vincent's Hospital-Fitzroy**
FITZROY, AUSTRALIA
- 33 **Royal North Shore Hospital**
ST LEONARDS, AUSTRALIA
- 34 **Linkou Chang Gung Memorial Hospital**
TAOYUAN, TAIWAN
- 35 **Austin Hospital**
HEIDELBERG, AUSTRALIA
- 36 **Juntendo University Hospital**
BUNKYO, JAPAN
- 37 **Keio University Hospital**
SHINJUKU, JAPAN
- 38 **Royal Adelaide Hospital**
ADELAIDE, AUSTRALIA
- 39 **Chung-Ang University Hospital**
SEOUL, SOUTH KOREA
- 40 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 41 **Westmead Hospital**
WESTMEAD, AUSTRALIA
- 42 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 43 **The Catholic University of Korea-Yeouido St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 44 **KPJ Ampang Puteri Specialist Hospital (KPJ Ampang)**
AMPANG, MALAYSIA
- 45 **Kyung Hee University-Hospital at Gangdong**
SEOUL, SOUTH KOREA
- 46 **Tohoku University Hospital**
SENDAI, JAPAN
- 47 **KPJ Ipoh Specialist Hospital**
IPOH, MALAYSIA
- 48 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 49 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 50 **Inha University Hospital**
INCHEON METROPOLITAN CITY, SOUTH KOREA
- 51 **Bumrungrad International Hospital**
BANGKOK
- 52 **Apollo Hospital-Chennai**
CHENNAI, INDIA



- 53 **Bangkok Hospital**
BANGKOK
- 54 **Toranomon Hospital**
MINATO, JAPAN
- 55 **Mahkota Medical Centre** ■
MELAKA, MALAYSIA
- 56 **ParkCity Medical Centre**
KUALA LUMPUR, MALAYSIA
- 57 **Kangbuk Samsung Hospital**
SEOUL, SOUTH KOREA
- 58 **Tokyo Women's Medical University Hospital**
TOKYO
- 59 **Ramathibodi Hospital**
BANGKOK
- 60 **Raffles Hospital**
SINGAPORE
- 61 **Khoo Teck Puat Hospital & Yishun Community Hospital**
SINGAPORE
- 62 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 63 **Pantai Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 64 **Taichung Veterans General Hospital**
TAICHUNG, TAIWAN
- 65 **Sir Charles Gairdner Hospital**
NEDLANDS, AUSTRALIA
- 66 **Pantai Hospital Ampang**
KUALA LUMPUR, MALAYSIA
- 67 **Christian Medical College, Vellore**
VELLORE, INDIA
- 68 **Gleneagles Hospital Penang**
GEORGE TOWN, MALAYSIA
- 69 **Alexandra Hospital**
SINGAPORE
- 70 **Apollo Gleneagles Hospitals**
KOLKATA, INDIA
- 71 **Chungnam National University Hospital**
DAEJEON, SOUTH KOREA
- 72 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 73 **St Vincent's Hospital Sydney**
DARLINGHURST, AUSTRALIA
- 74 **Ito Hospital**
TOKYO
- 75 **P. D. Hinduja Hospital & Medical Research Centre**
MUMBAI, INDIA

Neurology

- 1 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 2 **Asan Medical Center** ■■
SEOUL, SOUTH KOREA
- 3 **Juntendo University Hospital**
BUNKYO, JAPAN
- 4 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 5 **Seoul National University Hospital** ■
SEOUL, SOUTH KOREA
- 6 **Samsung Medical Center** ■■
SEOUL, SOUTH KOREA
- 7 **Kyoto University Hospital**
SAKYO, JAPAN
- 8 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 9 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 10 **Nagoya University Hospital**
NAGOYA, JAPAN
- 11 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 12 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 13 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 14 **Changi General Hospital**
SINGAPORE
- 15 **National Center of Neurology and Psychiatry**
TOKYO
- 16 **Chung-Ang University Hospital**
SEOUL, SOUTH KOREA
- 17 **The Alfred**
MELBOURNE, AUSTRALIA
- 18 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 19 **Tottori University Hospital**
YONAGO, JAPAN
- 20 **St. Luke's International Hospital**
CHUO, JAPAN

- 21 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 22 **Christian Medical College, Vellore**
VELLORE, INDIA
- 23 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 24 **Austin Hospital**
HEIDELBERG, AUSTRALIA
- 25 **Prince of Wales Hospital**
RANDWICK, AUSTRALIA
- 26 **National University Hospital** ■■
SINGAPORE
- 27 **Keio University Hospital**
SHINJUKU, JAPAN
- 28 **Gleneagles Hospital**
SINGAPORE
- 29 **Kyushu University Hospital**
HIGASHI, JAPAN
- 30 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE

- 31 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 32 **Osaka University Hospital**
SUITA, JAPAN
- 33 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 34 **Medanta The Medicity**
GURUGRAM, INDIA
- 35 **The Catholic University of Korea-Yeouido St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 36 **National Institute of Mental Health and Neuro Sciences**
BENGALURU, INDIA
- 37 **Hanyang University Medical Center**
SEOUL, SOUTH KOREA
- 38 **Chiba University Hospital**
CHIBA, JAPAN
- 39 **Royal Perth Hospital-Wellington Street Campus**
PERTH, AUSTRALIA
- 40 **KPJ Ampang Puteri Specialist Hospital (KPJ Ampang)**
AMPANG, MALAYSIA





- 41 **Center Hospital of the National Center for Global Health and Medicine**
SHINJUKU, JAPAN
- 42 **Sir Charles Gairdner Hospital**
NEDLANDS, AUSTRALIA
- 43 **Alexandra Hospital**
SINGAPORE
- 44 **Sunway Medical Centre**
PETALING JAYA, MALAYSIA
- 45 **Japanese Red Cross Medical Center**
SHIBUYA, JAPAN
- 46 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 47 **Westmead Hospital**
WESTMEAD, AUSTRALIA
- 48 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 49 **Singapore General Hospital**
SINGAPORE
- 50 **Mount Elizabeth Hospital-Novena**
SINGAPORE
- 51 **Jaslok Hospital and Research Centre**
MUMBAI, INDIA
- 52 **Liverpool Hospital**
LIVERPOOL, AUSTRALIA
- 53 **Bangkok Hospital**
BANGKOK
- 54 **Royal Brisbane & Women's Hospital**
HERSTON, AUSTRALIA
- 55 **Artemis Hospital Gurgaon**
GURUGRAM, INDIA
- 56 **Monash Medical Centre-Clayton**
CLAYTON, AUSTRALIA
- 57 **Bombay Hospital & Medical Research Centre**
MUMBAI, INDIA
- 58 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 59 **St Vincent's Hospital-Fitzroy**
FITZROY, AUSTRALIA
- 60 **Breach Candy Hospital Trust**
MUMBAI, INDIA
- 61 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 62 **Kyung Hee University Hospital**
SEOUL, SOUTH KOREA

- 63 **Pantai Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 64 **Okayama University Hospital**
OKAYAMA, JAPAN
- 65 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 66 **King Chulalongkorn Memorial Hospital**
BANGKOK
- 67 **Cathay General Hospital**
TAIPEI, TAIWAN
- 68 **Columbia Asia Hospital Puchong**
PUCHONG, MALAYSIA
- 69 **Concord Hospital**
CONCORD, AUSTRALIA
- 70 **Pantai Hospital Ayer Keroh**
MELAKA, MALAYSIA
- 71 **Apollo Hospital-Chennai**
CHENNAI, INDIA
- 72 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 73 **King Edward Memorial Hospital**
MUMBAI, INDIA
- 74 **Linkou Chang Gung Memorial Hospital**
TAOYUAN, TAIWAN
- 75 **Gold Coast University Hospital**
SOUTHPORT, AUSTRALIA

Neurosurgery

- 1 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 2 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 3 **Kyoto University Hospital**
SAKYO, JAPAN
- 4 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 5 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 6 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 7 **Juntendo University Hospital**
BUNKYO, JAPAN
- 8 **Nagoya University Hospital**
NAGOYA, JAPAN
- 9 **Keio University Hospital**
SHINJUKU, JAPAN
- 10 **Changi General Hospital**
SINGAPORE
- 11 **Seoul National University Hospital**
SEOUL, SOUTH KOREA
- 12 **Osaka University Hospital**
SUITA, JAPAN
- 13 **Samsung Medical Center**
SEOUL, SOUTH KOREA
- 14 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 15 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 16 **Asan Medical Center**
SEOUL, SOUTH KOREA
- 17 **The Alfred**
MELBOURNE, AUSTRALIA
- 18 **Tohoku University Hospital**
SENDAI, JAPAN
- 19 **Medanta The Medicity**
GURUGRAM, INDIA
- 20 **Akita Kousei Medical Center**
NIIGATA, JAPAN
- 21 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA



22 Apollo Hospital-Chennai
CHENNAI, INDIA

23 Tokyo Medical and
Dental University Hospital
BUNKYO, JAPAN

24 Royal North Shore Hospital
ST LEONARDS, AUSTRALIA

25 St. Luke's International
Hospital
CHUO, JAPAN

26 Kameda Medical Center
KAMOGAWA, JAPAN

27 Singapore
General Hospital
SINGAPORE

28 Chiba University Hospital
CHIBA, JAPAN

29 National Center of
Neurology and Psychiatry
TOKYO

30 Kyushu University Hospital
HIGASHI, JAPAN

31 Center Hospital of the
National Center for Global
Health and Medicine
SHINJUKU, JAPAN

32 Toranomon Hospital
MINATO, JAPAN

33 Seoul National University-
Bundang Hospital
SEONGNAM, SOUTH KOREA

34 Tottori University Hospital
YONAGO, JAPAN

35 Showa University Hospital
TOKYO

36 National Taiwan
University Hospital
TAIPEI, TAIWAN

37 Liverpool Hospital
LIVERPOOL, AUSTRALIA

38 Gleneagles Hospital
Kuala Lumpur
KUALA LUMPUR, MALAYSIA

39 National University Hospital
SINGAPORE

40 National Institute of Mental
Health and Neuro Sciences
BENGALURU, INDIA

41 King Chulalongkorn
Memorial Hospital
BANGKOK

42 Chung-Ang
University Hospital
SEOUL, SOUTH KOREA

43 Sunway Medical Centre
PETALING JAYA, MALAYSIA

44 Korea University-
Anam Hospital
SEOUL, SOUTH KOREA

45 Mount Elizabeth
Hospital-Orchard
SINGAPORE

46 Tan Tock Seng Hospital (TTSH)
SINGAPORE

47 Austin Hospital
HEIDELBERG, AUSTRALIA

48 Hanyang University
Medical Center
SEOUL, SOUTH KOREA

49 Taipei Veterans
General Hospital
TAIPEI, TAIWAN

50 Sir Charles Gairdner Hospital
NEDLANDS, AUSTRALIA

51 The Catholic University
of Korea-Yeouido
St. Mary's Hospital
SEOUL, SOUTH KOREA

52 Tokyo Metropolitan
Bokutoh Hospital
TOKYO

53 The Catholic University
of Korea-Seoul
St. Mary's Hospital
SEOUL, SOUTH KOREA

54 Christian Medical
College, Vellore
VELLORE, INDIA

55 King Edward Memorial
Hospital
MUMBAI, INDIA

56 Japanese Red Cross
Nagoya Daini Hospital
NAGOYA, JAPAN

57 Gleneagles Hospital
SINGAPORE

58 Sree Chitra Tirunal
Institute for Medical Sciences
& Technology
THIRUVANANTHAPURAM, INDIA

59 Ajou University Hospital
SUWON, SOUTH KOREA

60 Prince of Wales Hospital
RANDWICK, AUSTRALIA

61 Kurashiki Central Hospital
KURASHIKI, JAPAN

62 Linkou Chang Gung
Memorial Hospital
TAOYUAN, TAIWAN

63 Bumrungrad
International Hospital
BANGKOK

64 St Vincent's Hospital-Fitzroy
FITZROY, AUSTRALIA

65 The Jikei University Hospital
MINATO, JAPAN

66 P. D. Hinduja Hospital &
Medical Research Centre
MUMBAI, INDIA

67 Korea University-
Guro Hospital
SEOUL, SOUTH KOREA

68 St Vincent's Hospital Sydney
DARLINGHURST, AUSTRALIA

69 Monash Medical
Centre-Clayton
CLAYTON, AUSTRALIA

70 Juntendo University
Nerima Hospital
TOKYO

71 Tokyo Saiseikai
Central Hospital
MINATO, JAPAN

72 Okayama University Hospital
OKAYAMA, JAPAN

73 National Cerebral and
Cardiovascular Center
SUITA, JAPAN

74 Nippon Medical School Hospital
BUNKYO, JAPAN

75 Westmead Hospital
WESTMEAD, AUSTRALIA

Oncology

- 1 **Samsung Comprehensive Cancer Center/ Samsung Medical Center** ■■
SEOUL, SOUTH KOREA
- 2 **Asan Medical Center** ■■
SEOUL, SOUTH KOREA
- 3 **National Cancer Center Hospital**
TOKYO
- 4 **Peter MacCallum Cancer Centre**
MELBOURNE, AUSTRALIA
- 5 **SNU Cancer Hospital/Seoul National University Hospital** ■
SEOUL, SOUTH KOREA
- 6 **National Cancer Centre Singapore**
SINGAPORE
- 7 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 8 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 9 **Keio University Hospital**
SHINJUKU, JAPAN
- 10 **Cancer Institute Hospital of JFCR**
TOKYO
- 11 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 12 **Tata Memorial Hospital**
MUMBAI, INDIA
- 13 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 14 **National Cancer Center**
GOYANG CITY, SOUTH KOREA
- 15 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 16 **National Cancer Center Hospital East**
KASHIWA, JAPAN
- 17 **Kyoto University Hospital**
SAKYO, JAPAN
- 18 **NCCS Oncology Clinic**
SINGAPORE
- 19 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 20 **Royal Brisbane & Women's Hospital**
HERSTON, AUSTRALIA
- 21 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 22 **Apollo Cancer Centre**
CHENNAI, INDIA
- 23 **Olivia Newton-John Cancer Wellness & Research Centre**
HEIDELBERG, AUSTRALIA
- 24 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 25 **St. Luke's International Hospital**
CHUO, JAPAN
- 26 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 27 **Shizuoka Cancer Center**
NAGAIZUMI, JAPAN
- 28 **Tohoku University Hospital**
SENDAI, JAPAN
- 29 **Osaka University Hospital**
SUITA, JAPAN
- 30 **Gangnam Severance Cancer Hospital/Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 31 **Chiba University Hospital**
CHIBA, JAPAN
- 32 **Center Hospital of the National Center for Global Health and Medicine**
SHINJUKU, JAPAN
- 33 **The Crown Princess Mary Cancer Centre**
WESTMEAD, AUSTRALIA
- 34 **Chonnam National University-Hwasun Hospital** ■■
Hwasun, SOUTH KOREA
- 35 **Kyushu University Hospital**
HIGASHI, JAPAN
- 36 **Korea Cancer Center Hospital**
SEOUL, SOUTH KOREA
- 37 **Nagoya University Hospital**
NAGOYA, JAPAN
- 38 **Parkway Cancer Centre**
SINGAPORE
- 39 **National Hospital Organization Kyushu Cancer Center**
FUKUOKA, JAPAN
- 40 **National University Cancer Institute Singapore** ■■
SINGAPORE
- 41 **Juntendo University Hospital**
BUNKYO, JAPAN
- 42 **Osaka International Cancer Institute**
OSAKA, JAPAN
- 43 **Kangbuk Samsung Hospital**
SEOUL, SOUTH KOREA
- 44 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 45 **Linkou Chang Gung Memorial Hospital**
TAOYUAN, TAIWAN
- 46 **Apollo Speciality Hospitals-Cancer Centre Teynampet**
CHENNAI, INDIA
- 47 **Okayama University Hospital**
OKAYAMA, JAPAN
- 48 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 49 **Koo Foundation Sun Yat-Sen Cancer Center**
TAIPEI, TAIWAN
- 50 **Konkuk University Medical Center**
SEOUL, SOUTH KOREA
- 51 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 52 **Royal North Shore Hospital**
ST LEONARDS, AUSTRALIA
- 53 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 54 **William Buckland Cancer Centre**
MELBOURNE, AUSTRALIA
- 55 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 56 **Christian Medical College, Vellore**
VELLORE, INDIA
- 57 **Princess Alexandra Hospital**
WOOLLOONGABBA, AUSTRALIA
- 58 **Medanta The Medicity**
GURUGRAM, INDIA
- 59 **Sydney Adventist Hospital**
WAHROONGA, AUSTRALIA
- 60 **Kindai University Hospital**
OSAKA, JAPAN
- 61 **RS MRCCC Siloam Hospitals Semanggi**
KOTA JAKARTA SELATAN, INDONESIA
- 62 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 63 **Rajiv Gandhi Cancer Institute and Research Centre**
DELHI, INDIA
- 64 **Concord Hospital**
CONCORD, AUSTRALIA
- 65 **Korea University-Anam Hospital**
SEOUL, SOUTH KOREA
- 66 **Mahkota Medical Centre**
MELAKA, MALAYSIA
- 67 **Horizon Regional Cancer Center**
BANGKOK
- 68 **Sunway Medical Centre** ●
PETALING JAYA, MALAYSIA



- 69 **Mount Elizabeth Hospital-Novena**
SINGAPORE
- 70 **St Vincent's Private Hospital-Sydney**
DARLINGHURST, AUSTRALIA
- 71 **Monash Medical Centre-Clayton**
CLAYTON, AUSTRALIA
- 72 **Kokilaben Dhirubhai Ambani Hospital**
MUMBAI, INDIA
- 73 **The Catholic University of Korea-Yeouido St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 74 **Hanyang University Medical Center**
SEOUL, SOUTH KOREA
- 75 **Prince of Wales Hospital**
RANDWICK, AUSTRALIA
- 76 **KPJ Ampang Puteri Specialist Hospital (KPJ Ampang)**
AMPANG, MALAYSIA
- 77 **Kaohsiung Chang Gung Memorial Hospital**
KAOHSIUNG, TAIWAN
- 78 **RS Kanker Dharmais**
KOTA JAKARTA BARAT, INDONESIA
- 79 **Chonnam National University Hospital**
GWANGJU, SOUTH KOREA
- 80 **Taichung Veterans General Hospital**
TAICHUNG, TAIWAN
- 81 **Osaka Metropolitan University Hospital**
OSAKA, JAPAN
- 82 **Tokyo National Hospital**
TOKYO
- 83 **Columbia Asia Hospital Cheras**
CHERAS, MALAYSIA
- 84 **Aichi Medical University Hospital**
NAGAKUTE, JAPAN

- 85 **Korea University-Ansan Hospital**
ANSAN, SOUTH KOREA
- 86 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 87 **Flinders Cancer Clinic**
BEDFORD PARK, AUSTRALIA
- 88 **St Vincent's Hospital Sydney**
DARLINGHURST, AUSTRALIA
- 89 **University Hospital Kyoto Prefectural University of Medicine**
KYOTO, JAPAN
- 90 **National Cheng Kung University Hospital**
TAINAN, TAIWAN
- 91 **National Taiwan University Cancer Center**
TAIPEI, TAIWAN
- 92 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 93 **Royal Adelaide Hospital**
ADELAIDE, AUSTRALIA
- 94 **Sir Ganga Ram Hospital**
NEW DELHI
- 95 **King Chulalongkorn Memorial Hospital**
BANGKOK
- 96 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 97 **Jawaharlal Institute of Postgraduate Medical Education and Research**
NAGAR, INDIA
- 98 **Liverpool Hospital**
LIVERPOOL, AUSTRALIA
- 99 **Max Super Speciality Hospital, Saket**
NEW DELHI
- 100 **Alexandra Hospital**
SINGAPORE

Orthopedics

- 1 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 2 **Asan Medical Center** ■■
SEOUL, SOUTH KOREA
- 3 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 4 **Kyung Hee University Hospital**
SEOUL, SOUTH KOREA
- 5 **Seoul National University Hospital** ■
SEOUL, SOUTH KOREA
- 6 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 7 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 8 **Osaka University Hospital**
SUITA, JAPAN
- 9 **Samsung Medical Center** ■■
SEOUL, SOUTH KOREA
- 10 **Changi General Hospital**
SINGAPORE
- 11 **Kyoto University Hospital**
SAKYO, JAPAN
- 12 **Royal Adelaide Hospital**
ADELAIDE, AUSTRALIA
- 13 **Singapore General Hospital**
SINGAPORE
- 14 **St Vincent's Private Hospital-Sydney**
DARLINGHURST, AUSTRALIA
- 15 **Osaka Metropolitan University Hospital**
OSAKA, JAPAN
- 16 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 17 **Royal Perth Hospital-Wellington Street Campus**
PERTH, AUSTRALIA
- 18 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 19 **Alexandra Hospital**
SINGAPORE
- 20 **All India Institute of Medical Sciences-Delhi**
NEW DELHI
- 21 **Kangbuk Samsung Hospital**
SEOUL, SOUTH KOREA
- 22 **National University Hospital** ■■
SINGAPORE
- 23 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 24 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 25 **Kyung Hee University-Hospital at Gangdong**
SEOUL, SOUTH KOREA
- 26 **Gleneagles Hospital**
SINGAPORE
- 27 **Medanta The Medicity**
GURUGRAM, INDIA
- 28 **Keio University Hospital**
SHINJUKU, JAPAN
- 29 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 30 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 31 **Taipei Veterans General Hospital**
TAIPEI, TAIWAN
- 32 **Subang Jaya Medical Centre**
SUBANG JAYA, MALAYSIA
- 33 **Praram 9 Hospital**
BANGKOK
- 34 **Bumrungrad International Hospital**
BANGKOK
- 35 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 36 **Gleneagles Hospital Penang**
GEORGE TOWN, MALAYSIA
- 37 **Korea University-Anam Hospital**
SEOUL, SOUTH KOREA
- 38 **Nara Medical University Hospital**
KASHIHARA, JAPAN
- 39 **Siriraj Piyamaharajkarun Hospital**
BANGKOK





Pediatrics

40 Kokilaben Dhirubhai Ambani Hospital
MUMBAI, INDIA

41 Tokyo National Hospital
TOKYO

42 Island Hospital
GEORGE TOWN, MALAYSIA

43 Konkuk University Medical Center
SEOUL, SOUTH KOREA

44 Linkou Chang Gung Memorial Hospital
TAOYUAN, TAIWAN

45 Nanavati Max Super Speciality Hospital
MUMBAI, INDIA

46 Mount Elizabeth Hospital-Novena
SINGAPORE

47 Ramkhamhaeng Hospital
BANGKOK

48 Juntendo University Hospital
BUNKYO, JAPAN

49 St Vincent's Hospital-Fitzroy
FITZROY, AUSTRALIA

50 The Catholic University of Korea-Yeouido St. Mary's Hospital
SEOUL, SOUTH KOREA

51 RS Premier Bintaro
KOTA TANGERANG SELATAN, INDONESIA

52 Penang Adventist Hospital
GEORGE TOWN, MALAYSIA

53 Norwest Private Hospital
BELLA VISTA, AUSTRALIA

54 Sir Ganga Ram Hospital
NEW DELHI

55 The Alfred
MELBOURNE, AUSTRALIA

56 Max Super Speciality Hospital, Saket
NEW DELHI

57 King Edward Memorial Hospital
MUMBAI, INDIA

58 Melbourne Private Hospital
PARKVILLE, AUSTRALIA

59 Korea University-Ansan Hospital
ANSAN, SOUTH KOREA

60 Royal North Shore Hospital
ST LEONARDS, AUSTRALIA

61 Chonnam National University Hospital
GWANGJU, SOUTH KOREA

62 Sir Charles Gairdner Hospital
NEDLANDS, AUSTRALIA

63 Tokyo Medical and Dental University Hospital
BUNKYO, JAPAN

64 RSUPN Dr. Cipto Mangunkusumo
KOTA JAKARTA PUSAT, INDONESIA

65 Soon Chun Hyang University Hospital-Cheonan
CHEONAN, SOUTH KOREA

66 Korea University-Guro Hospital
SEOUL, SOUTH KOREA

67 RS Pondok Indah Puri Indah
KOTA JAKARTA BARAT, INDONESIA

68 Aichi Medical University Hospital
NAGAKUTE, JAPAN

69 Okayama University Hospital
OKAYAMA, JAPAN

70 Chiba University Hospital
CHIBA, JAPAN

71 Vejthani Hospital
BANGKOK

72 ParkCity Medical Centre
KUALA LUMPUR, MALAYSIA

73 Bombay Hospital & Medical Research Centre
MUMBAI, INDIA

74 RS Umum PAD Gatot Soebroto
KOTA JAKARTA PUSAT, INDONESIA

75 Bangkok Hospital
BANGKOK

1 Seoul National University Children's Hospital
SEOUL, SOUTH KOREA

2 The Royal Children's Hospital Melbourne
PARKVILLE, AUSTRALIA

3 National Center for Children's Health and Development
TOKYO

4 Queensland Children's Hospital
SOUTH BRISBANE, AUSTRALIA

5 Asan Medical Center Children's Hospital
SEOUL, SOUTH KOREA

6 Sydney Children's Hospital-Randwick
RANDWICK, AUSTRALIA

7 All India Institute of Medical Sciences-Delhi
NEW DELHI

8 Sir Ganga Ram Hospital
NEW DELHI

9 KK Women's and Children's Hospital
SINGAPORE

10 The Children's Hospital at Westmead
WESTMEAD, AUSTRALIA

11 The University of Tokyo Hospital
BUNKYO, JAPAN

12 Apollo Children's Hospital
CHENNAI, INDIA

13 Kanagawa Children's Medical Center
YOKOHAMA, JAPAN

14 Khoo Teck Puat-National University Children's Medical Institute
SINGAPORE

15 Christian Medical College, Vellore
VELLORE, INDIA

16 National Taiwan University Hospital Children's Hospital
TAIPEI, TAIWAN

17 Keio University Hospital
SHINJUKU, JAPAN

18 The Catholic University of Korea-Seoul St. Mary's Hospital
SEOUL, SOUTH KOREA

19 Ewha Womans University-Seoul Hospital
SEOUL, SOUTH KOREA

20 Tokyo Metropolitan Children's Medical Center
TOKYO

21 Severance Children's Hospital
SEOUL, SOUTH KOREA

22 Korea University-Anam Hospital
SEOUL, SOUTH KOREA

23 Mount Elizabeth Hospital-Orchard
SINGAPORE

24 Osaka Women's and Children's Hospital
OSAKA, JAPAN

25 Thomson Medical Centre
SINGAPORE

26 Sunway Medical Centre
PETALING JAYA, MALAYSIA

27 Bumrungrad International Hospital
BANGKOK

28 Monash Medical Centre-Clayton
CLAYTON, AUSTRALIA

29 Gangnam Severance Hospital-Yonsei University
SEOUL, SOUTH KOREA

30 Hanyang University Medical Center
SEOUL, SOUTH KOREA

31 Korea University-Guro Hospital
SEOUL, SOUTH KOREA

32 Nagoya University Hospital
NAGOYA, JAPAN

33 Osaka University Hospital
SUITA, JAPAN

34 Shizuoka Children's Hospital
SHIZUOKA, JAPAN

35 Subang Jaya Medical Centre
SUBANG JAYA, MALAYSIA

36 Kyung Hee University-Hospital at Gangdong
SEOUL, SOUTH KOREA

37 John Hunter Hospital
NEW LAMBTON, AUSTRALIA

38 Ajou University Hospital
SUWON, SOUTH KOREA

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2024

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- 39 **Perth Children's Hospital**
NEDLANDS, AUSTRALIA
- 40 **Chungnam National University Hospital**
DAEJEON, SOUTH KOREA
- 41 **Rainbow Children's Hospital**
HYDERABAD, INDIA
- 42 **Inha University Hospital**
INCHEON METROPOLITAN CITY, SOUTH KOREA
- 43 **Kyushu University Hospital**
HIGASHI, JAPAN
- 44 **Okinawa Chubu Hospital**
URUMA, JAPAN
- 45 **Pantai Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 46 **Samsung Medical Center** 
SEOUL, SOUTH KOREA
- 47 **King Chulalongkorn Memorial Hospital**
BANGKOK
- 48 **Women's & Children's Hospital**
NORTH ADELAIDE, AUSTRALIA
- 49 **Center Hospital of the National Center for Global Health and Medicine**
SHINJUKU, JAPAN
- 50 **Chung-Ang University Hospital**
SEOUL, SOUTH KOREA
- 51 **Tokyo Medical And Dental University Hospital**
BUNKYO, JAPAN
- 52 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 53 **Ara Damansara Medical Centre**
SHAH ALAM, MALAYSIA
- 54 **Korea University-Ansan Hospital**
ANSAN, SOUTH KOREA
- 55 **Gleneagles Hospital Kuala Lumpur**
KUALA LUMPUR, MALAYSIA
- 56 **Hiroshima University Hospital**
HIROSHIMA, JAPAN
- 57 **Mater Mothers' Private Brisbane**
SOUTH BRISBANE, AUSTRALIA
- 58 **MacKay Children's Hospital**
TAIPEI, TAIWAN
- 59 **Rainbow Hospital for Women and Children**
HYDERABAD, INDIA
- 60 **Keimyung University-Dongsan Medical Center**
DAEGU METROPOLITAN CITY, SOUTH KOREA

- 61 **Mount Elizabeth Hospital-Novena**
SINGAPORE
- 62 **Austin Hospital**
HEIDELBERG, AUSTRALIA
- 63 **Soon Chun Hyang University Hospital-Seoul**
SEOUL, SOUTH KOREA
- 64 **Mater Hospital Brisbane**
SOUTH BRISBANE, AUSTRALIA
- 65 **Bangkok Hospital**
BANGKOK
- 66 **Kyungpook National University Hospital**
DAEGU METROPOLITAN CITY, SOUTH KOREA
- 67 **Bangkok Christian Hospital**
BANGKOK
- 68 **Gold Coast University Hospital**
SOUTHPORT, AUSTRALIA
- 69 **Pusan National University Children's Hospital**
BUSAN, SOUTH KOREA
- 70 **St. Luke's International Hospital**
CHUO, JAPAN
- 71 **BPK 9 International Hospital**
BANGKOK
- 72 **Siriraj Piyamaharajkarun Hospital**
BANGKOK
- 73 **KPJ Ampang Puteri Specialist Hospital (KPJ Ampang)**
AMPANG, MALAYSIA
- 74 **Akita University Hospital**
AKITA, JAPAN

- 75 **MedPark Hospital**
BANGKOK
- 76 **Kangbuk Samsung Hospital**
SEOUL, SOUTH KOREA
- 77 **Kyoto University Hospital**
SAKYO, JAPAN
- 78 **KPJ Sabah Specialist Hospital**
KOTA KINABALU, MALAYSIA
- 79 **Gleneagles Hospital**
SINGAPORE
- 80 **Hallym University Hangang-Sacred Heart Hospital**
SEOUL, SOUTH KOREA
- 81 **Chonnam National University Hospital**
GWANGJU, SOUTH KOREA
- 82 **Jeonbuk National University Hospital**
JEONJU, SOUTH KOREA
- 83 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 84 **Inje University-Busan Paik Hospital**
BUSAN, SOUTH KOREA
- 85 **Medanta The Medicity**
GURUGRAM, INDIA
- 86 **Osaka Metropolitan University Hospital**
OSAKA, JAPAN
- 87 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 88 **Rainbow Children's Heart Institute-Hyderabad**
HYDERABAD, INDIA

- 89 **Ewha Womans University-Mokdong Hospital**
SEOUL, SOUTH KOREA
- 90 **Safdarjung Hospital**
NEW DELHI
- 91 **Gachon University-Gil Medical Center**
INCHEON METROPOLITAN CITY, SOUTH KOREA
- 92 **Hallym University Sacred Heart Hospital**
ANYANG CITY, SOUTH KOREA
- 93 **Jaslok Hospital and Research Centre**
MUMBAI, INDIA
- 94 **Tohoku University Hospital**
SENDAI, JAPAN
- 95 **Jawaharlal Institute of Postgraduate Medical Education and Research**
NAGAR, INDIA
- 96 **Rainbow Children's Hospital & BirthRight, Marathahalli**
BENGALURU, INDIA
- 97 **Royal Adelaide Hospital**
ADELAIDE, AUSTRALIA
- 98 **Samitivej Sukhumvit Hospital**
BANGKOK
- 99 **China Medical University Hospital**
TAICHUNG, TAIWAN
- 100 **Kokilaben Dhirubhai Ambani Hospital**
MUMBAI, INDIA



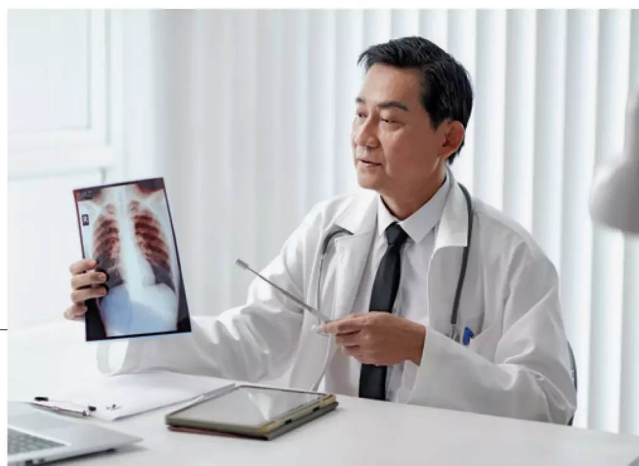
Pulmonology

- 1 **Samsung Medical Center** ■■
SEOUL, SOUTH KOREA
- 2 **Asan Medical Center** ■■
SEOUL, SOUTH KOREA
- 3 **The University of Tokyo Hospital**
BUNKYO, JAPAN
- 4 **Seoul National University Hospital** ■
SEOUL, SOUTH KOREA
- 5 **Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 6 **Changi General Hospital**
SINGAPORE
- 7 **Royal Prince Alfred Hospital**
CAMPERDOWN, AUSTRALIA
- 8 **The Alfred**
MELBOURNE, AUSTRALIA
- 9 **Inha University Hospital** ■■
INCHEON METROPOLITAN CITY, SOUTH KOREA
- 10 **Center Hospital of the National Center for Global Health and Medicine**
SHINJUKU, JAPAN
- 11 **Chung-Ang University Hospital**
SEOUL, SOUTH KOREA
- 12 **National University Hospital**
SINGAPORE
- 13 **Kyoto University Hospital**
SAKYO, JAPAN
- 14 **The Royal Melbourne Hospital-Parkville**
PARKVILLE, AUSTRALIA
- 15 **Sir Ganga Ram Hospital**
NEW DELHI
- 16 **Ajou University Hospital**
SUWON, SOUTH KOREA
- 17 **Gangnam Severance Hospital-Yonsei University**
SEOUL, SOUTH KOREA
- 18 **St. Luke's International Hospital**
CHUO, JAPAN
- 19 **Austin Hospital**
HEIDELBERG, AUSTRALIA
- 20 **All India Institute of Medical Sciences-Delhi**
NEW DELHI

- 21 **Nagoya University Hospital**
NAGOYA, JAPAN
- 22 **Kyung Hee University Hospital**
SEOUL, SOUTH KOREA
- 23 **Toranomon Hospital**
MINATO, JAPAN
- 24 **Aichi Medical University Hospital**
NAGAKUTE, JAPAN
- 25 **Osaka University Hospital**
SUITA, JAPAN
- 26 **Seoul National University-Bundang Hospital**
SEONGNAM, SOUTH KOREA
- 27 **Tosei General Hospital**
AICHI, JAPAN
- 28 **Singapore General Hospital**
SINGAPORE
- 29 **Keio University Hospital**
SHINJUKU, JAPAN
- 30 **Pusan National University Hospital**
BUSAN, SOUTH KOREA
- 31 **Fiona Stanley Hospital**
MURDOCH, AUSTRALIA
- 32 **Juntendo University Hospital**
BUNKYO, JAPAN
- 33 **Kameda Medical Center**
KAMOGAWA, JAPAN
- 34 **King Edward Memorial Hospital**
MUMBAI, INDIA
- 35 **National Cancer Center Hospital**
TOKYO
- 36 **Medanta The Medicity**
GURUGRAM, INDIA
- 37 **Gleneagles Hospital**
SINGAPORE

- 38 **Yokohama Municipal Citizen's Hospital**
YOKOHAMA, JAPAN
- 39 **Korea University-Guro Hospital**
SEOUL, SOUTH KOREA
- 40 **Korea University-Ansan Hospital**
ANSAN, SOUTH KOREA
- 41 **Chungnam National University Hospital**
DAEJEON, SOUTH KOREA
- 42 **Toranomon Hospital Kajigaya**
KAWASAKI, JAPAN
- 43 **P. D. Hinduja Hospital & Medical Research Centre**
MUMBAI, INDIA
- 44 **Kyushu University Hospital**
HIGASHI, JAPAN
- 45 **PGIMER-Postgraduate Institute of Medical Education and Research**
CHANDIGARH, INDIA
- 46 **Japanese Red Cross Medical Center**
SHIBUYA, JAPAN
- 47 **Tan Tock Seng Hospital (TTSH)**
SINGAPORE
- 48 **Kurashiki Central Hospital**
KURASHIKI, JAPAN
- 49 **National Hospital Organization Kyushu Cancer Center**
FUKUOKA, JAPAN
- 50 **National Hospital Organization Kobe Medical Center**
KOBE, JAPAN
- 51 **Osaka City General Hospital**
OSAKA, JAPAN
- 52 **Konkuk University Medical Center**
SEOUL, SOUTH KOREA
- 53 **Osaka Medical and Pharmaceutical University Hospital**
TAKATSUKI, JAPAN

- 54 **Komaki City Hospital**
KOMAKI, JAPAN
- 55 **Hanyang University Medical Center**
SEOUL, SOUTH KOREA
- 56 **Kobe City Medical Center General Hospital**
KOBE, JAPAN
- 57 **Bumrungrad International Hospital**
BANGKOK
- 58 **St Vincent's Hospital Sydney**
DARLINGHURST, AUSTRALIA
- 59 **Fortis Hospital Mulund**
MUMBAI, INDIA
- 60 **St. Marianna University Hospital**
KAWASAKI, JAPAN
- 61 **Mount Elizabeth Hospital-Orchard**
SINGAPORE
- 62 **Safdarjung Hospital**
NEW DELHI
- 63 **Yashoda Hospitals-Somajiguda**
HYDERABAD, INDIA
- 64 **National Taiwan University Hospital**
TAIPEI, TAIWAN
- 65 **Bangkok Hospital**
BANGKOK
- 66 **The Prince Charles Hospital**
CHERMSIDE, AUSTRALIA
- 67 **Royal North Shore Hospital**
ST LEONARDS, AUSTRALIA
- 68 **St Vincent's Hospital-Fitzroy**
FITZROY, AUSTRALIA
- 69 **Hokkaido University Hospital**
SAPPORO, JAPAN
- 70 **Jawaharlal Institute of Postgraduate Medical Education and Research**
NAGAR, INDIA
- 71 **The Catholic University of Korea-Seoul St. Mary's Hospital**
SEOUL, SOUTH KOREA
- 72 **Gleneagles Hospital Penang**
GEORGE TOWN, MALAYSIA
- 73 **Sir Charles Gairdner Hospital**
NEDLANDS, AUSTRALIA
- 74 **Monash Medical Centre-Clayton**
CLAYTON, AUSTRALIA
- 75 **Kokilaben Dhirubhai Ambani Hospital**
MUMBAI, INDIA



CHEMICALS—THE NEW ERA

Reporter & Sr. Director: **Julian Issa**

Project Director: **Libby Jennings**

The environmental impact of chemical contamination and plastic waste is well-documented. The image of plastic on our shores is etched in our memories. Yet, the complexity of the issue is often overlooked. Why is there so much plastic polluting our oceans? Is this a problem of plastic waste or plastic production? Considering the chemicals industry contributes 5 percent of global greenhouse gas emissions, according to the International Energy Agency (IEA), what purpose does this industry really serve?

Over the past four months, I have had conversations with leaders from 75 top chemical companies and associations across the U.S., Europe and Asia to uncover the deep truth behind the role of chemicals in our lives. Every day, you and I use, see, touch, or taste dozens of products that originate from the chemicals industry. If chemicals were to disappear, our quality of life would suffer significantly.

While it is a large contributor to greenhouse gas emissions and is having to answer for the harmful chemicals present in our environment, the

chemicals industry will be crucial to the energy transition and the next phase of modernity.

In this feature, I aim to shed light on this \$6.2 trillion global industry (in 2023 according to Markets and Markets) that Lori J. Ryerkerk, chairman, CEO & president of Celanese, says needs to overcome public misconceptions. "Much like the agricultural industry, the ubiquity and essential nature of chemical products are often overlooked or misunderstood by the public. From medical supplies and vehicles to renewable energy infrastructure and everyday electronics, polymers and chemicals are indispensable," highlights Ryerkerk. Tracy Garrison, CEO of GEON Performance Solutions adds: "The challenge lies in educating the broader community about the industry's foundational contributions to modern conveniences and necessities."

This piece will showcase key innovations being developed by the industry and the challenges it faces while providing a toolbox for you to better address challenges you may personally encounter with chemicals in your daily lives.

IN THIS REPORT...



JIM FITTERLING |
CHAIR AND CEO,
DOW, INC.

By the end of this decade, our circular and renewable solutions business will represent ~25 percent of Dow's polyethylene capacity; this can deliver ~15 percent lower CO₂e emissions vs. traditional polymers.



MITCHELL TOOMEY |
VP SUSTAINABILITY &
RESPONSIBLE CARE,
**AMERICAN
CHEMISTRY COUNCIL**

Emerging technologies and digital tools like digital twins are essential for simulating scenarios to eliminate inefficiencies or incorporate non-fossil feedstocks.



FREDERIQUE VAN BAARLE |
PRESIDENT & CEO,
LANXESS CORPORATION

The challenges in 2023 were multifaceted, involving raw material and energy cost increases, a global reduction in demand, geopolitical instability, logistical challenges, and regulatory complexities.

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ask us about our innovative platform technologies
ashland.com/platforms

who has responsible pharma technologies?
—
we do.

Ashland
always solving

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The Global Chemicals Industry at Large

The global chemical industry is navigating a complex landscape, shaped by the aftermath of the COVID-19 pandemic, fluctuating economic conditions, and geopolitical conflicts.

United States: The Land of Incentives

The U.S.' chemicals industry has been bolstered by a domestic economic boom and strategic incentives as President Joe Biden looks to bring green and semiconductor industries back from China. The Inflation Reduction Act (IRA), which is directing \$400 billion toward clean energy, with a key goal of reducing the nation's carbon emissions by 2030, is now in its second year and is playing a crucial role in supporting industry growth. "CO₂ capture and sequestration technology is seen as both scalable and profitable, especially with recent enhancements in incentive programs like the IRA in the United States," emphasizes Mark Behrman, president & CEO of LSB Industries, when talking about the value add from the IRA.

However, not all industry leaders are entirely satisfied with the IRA's scope. Mark Nikolich, CEO of Braskem America, acknowledged the act's positive aspects but also highlighted its limitations. "While initiatives like the IRA in the U.S. represent a positive step, especially in funding sustainable projects, they are viewed as too narrow as they do not address circularity projects," he notes.

While the bipartisan nature of the IRA ensures its continued influence beyond the upcoming election, there will be continued calls for more inclusive incentives that address a wider range of sustainability issues.



\$639 Billion

generated annually by the U.S. chemicals industry



Less than 1%

Proportion of bioplastics in the overall global plastics market

INGREDIENTS AND PRODUCTS IN CHEMICALS INDUSTRY INCLUDE:



Personal care & cosmetics

items like shampoos and makeup, detergents, paints and coatings for laptops, food additives etc.



Specialty chemicals

high-value materials that serve many industries including semiconductor, pharma, agriculture and many more



Basic chemicals

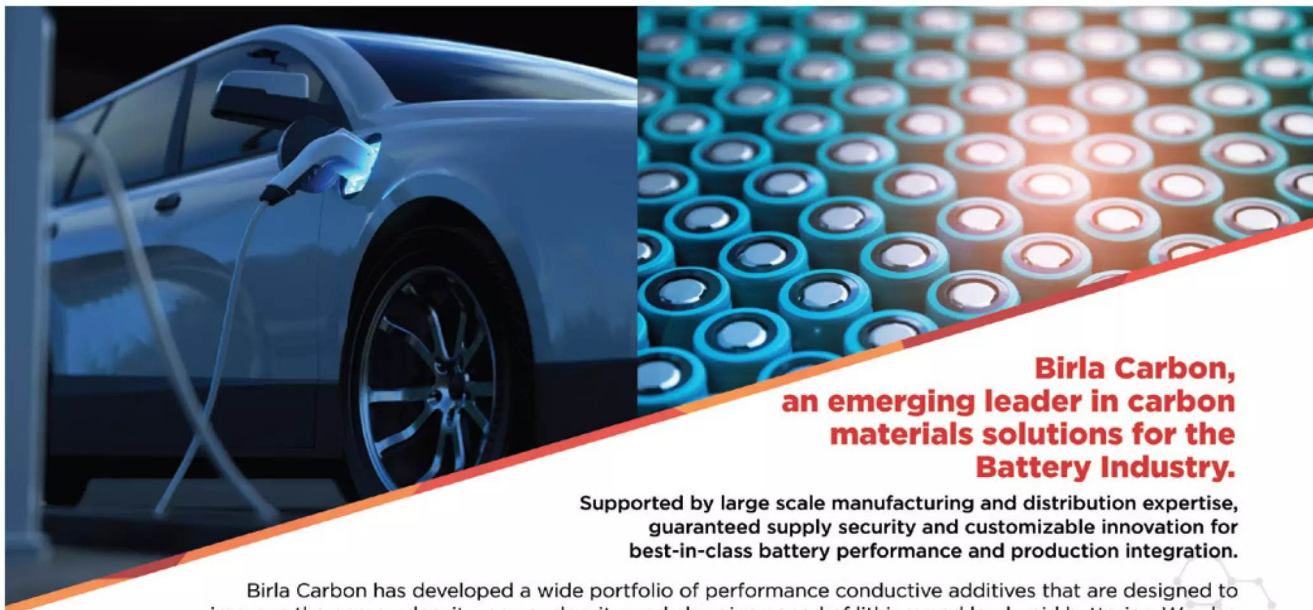
used in industry, construction and other industries



Polymers

are large molecules composed of repeating structural units called monomers, which are crucial to the industry

Sources: (The Business of Chemistry, By The Numbers; American Chemistry Council, 2023)
(World plastics production 2022; Plastics Europe, 2023)



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Europe: Slow Push Back From the Edge

Europe has seen itself on a different trajectory. “2023 presented a ‘perfect storm’ for Covestro, accentuated by the geopolitical crisis and its domino effects on global demand and energy costs,” underlines Covestro’s Chief Commercial Officer Sucheta Govil. “The Ukraine-Russia conflict exacerbated these challenges, leading to a notable impact on our sales volumes, prices, and ultimately, a 20 percent decrease in sales to 14.4 billion from the previous year’s 18 billion. Despite these adversities, we take pride in our cash management and the steps we took to mitigate the downturn,” she notes.

While companies have weathered the almighty storm in Europe, and inflation and interest rates appear to be coming down, the European chemical industry does face upcoming challenges. Giuseppe Librandi, president and CEO of COIM, believes “stringent regulations and the ambitious but, in our view, poorly implemented Green Deal,” will affect the European chemical industry’s competitiveness moving forward. In the context of regulation, Sanjeev Rastogi, CEO of Arxada, underlines how certain markets like Switzerland, are becoming “highly attractive to customers seeking sustainable solutions,” due to their low scope three emissions.



New ships need to be built and alternative fuel sources used, but there is still a lot of debate and little consensus on what fuels are most appropriate. LNG, LPG, methanol, and ammonia are contenders but there’s a limit to the amount of ammonia available commercially currently that is not being used for fertilizer production.

GINA FYFFE |
CEO, **INTEGRA**



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APAC: Growing Economies Still Creating Demand

The ripple effects of China’s economic deceleration have been felt across the APAC region, influencing market dynamics and trade flows. Neighboring countries that rely heavily on China for raw materials

THE IMPORTANCE OF LOCALIZATION



GEOFFREY CLOSE | CEO, PRAYON

Adaptability, a local yet global approach and family-like mindset are key components of Prayon success. Strategies are essential but the capacity to adjust swiftly is paramount.



ANNE MARIE INFILISE | PRESIDENT & CEO, QUADRA

With Canada’s strengths in critical minerals and mining, these sectors represent potential growth areas for Quadra, contributing to the broader energy transition movement.



OLIVIER RIGAUD | CEO, CORBION

Our geographical strategy prioritizes proximity to feedstock for cost and carbon emission reasons, especially for bulk bio-based chemicals. However, for more specialized products, like biomedical polymers for slow-release drug delivery, being closer to the consumer becomes crucial.



JOHN FORTSON | CEO, INGEVITY

South Carolina’s rich forestry resources and its position as a hub for pine trees provide a unique advantage for our chemistry-based operations.



SEAN KEOHANE | CEO, CABOT

Cabot’s global strategy leverages our pioneering heritage and a business model that emphasizes local production and leadership to meet regional demands effectively.

[READ THE FULL INTERVIEWS](#)

and chemical products are experiencing some cost fluctuations. However, APAC’s chemicals industry continues to be buoyed by growing middle classes and urbanization with Southeast Asia and India leading this. Growth in APAC’s chemicals industry will be 5.2 percent in 2024 compared to 3 percent worldwide, according to Atradius.

When it comes to sustainability, it is Singapore that is taking the boldest steps in the region. As a city-state with no natural feedstock

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who has responsible paint additives?
—
we do.

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and little land, it is leveraging its strategic geographical location and ease of doing business to be a first mover in the energy transition.

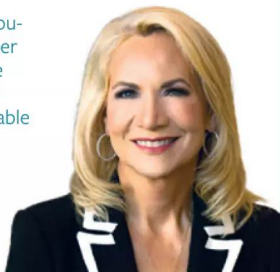
One of Singapore's most significant initiatives is the continued implementation of a carbon tax. Wey-Len Lim, executive vice president of the Singapore Economic Development Board, explains, "The carbon tax in Singapore was introduced not as a revenue-generating tool but as a price signal to encourage companies towards sustainable practices and energy transition."

The revenue generated from the carbon tax is reinvested, for example, through the Resource Efficiency Grant for Emissions, into the industry to support energy efficiency and emission reduction projects, directly contributing to the industry's sustainable transition.



This strategic focus on sustainability, coupled with our agility in meeting customer needs, exemplifies our proactive stance on environmental stewardship and our capacity to deliver tailor-made, sustainable solutions rapidly.

LORI J. RYERKERK |
CEO, CHAIR & PRESIDENT,
CELANESE



READ THE FULL INTERVIEW

Why Not Just Create Sustainable Products?

In 2023, President Biden emphasized the need to replace 90 percent of plastics—which are predominantly made with fossil fuels—with biomaterials over the coming decades. With McKinsey predicting that bio-based processes could generate \$4 trillion in annual U.S. economic impact, it seems illogical that the industry would not shift toward creating bio-based plastics and chemicals today.

However, many challenges impede this transition. Albert Y. Chao, president and CEO of Westlake Corporation, explains, "There are some bio-based polymers, but they do not have all the properties that petroleum-based polymers have, and they are very expensive. While bio-based options are more sustainable, they often lack the durability required for certain applications and come at a significantly higher cost." Jeroen Verhoeven, VP of value

INFLATION REDUCTION ACT



\$369 Billion

for energy security and climate change initiatives



Driving investments in hydrogen production - increasing the 45Q tax credit for captured CO₂ to

\$85/metric ton

SINGAPORE: A FIRST MOVER



DANNY FOONG | GENERAL MANAGER OF HIGH PERFORMANCE POLYMERS, **ARKEMA SINGAPORE**:
Singapore's strategic position as a logistics hub significantly benefits our operations, especially given that our raw materials, like castor oil, are sourced mainly from India and our products are distributed globally.



LEE PAK SING | ASSISTANT MANAGING DIRECTOR, **ENTERPRISE SINGAPORE**
The industrialization of Southeast Asia has boosted demand for energy products, and this has attracted major players from the Middle East to set up operations in Singapore.



PROF PS LEE | EXECUTIVE DIRECTOR, **SINGAPORE ENERGY CONSORTIUM**
The unique collaborative environment in Singapore, involving research, industry, and government, is ideal for advancing our mission.



GINA FYFFE | CEO, **INTEGRA PETROCHEMICALS**
The trend towards localization and deglobalization is shaping different strategies across regions. China is focusing on self-sufficiency and higher-value projects, while Korea and Southeast Asia are undergoing economic transformations.

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 **Celanese**



GREENER CHEMISTRY SOLUTIONS



SANJEEV RASTOGI | CEO, ARXADA

Microbial control technology plays a critical role in our daily lives, often without our awareness...Innovation is geared towards precision in defending against specific organisms without harming the surrounding environment, including humans, fish, and other non-target species.



GUILLERMO NOVO | CHAIR & CEO, ASHLAND INC.

One example of a sustainable, commercially available product is our transformed vegetable oil-based core ingredient which is used across the pharma, personal care, and coating sectors. It represents a new core ingredient around which we can design a myriad of products, such as biodegradable seed coatings, personal care products and more efficient pill coatings.



DONALD WISEMAN | CEO, TEKOR APEX COMPANY

Our TekVentures Group was established precisely because predicting the future, especially in biopolymers and biology-based chemistries, is complex.



D. MICHAEL WILSON | PRESIDENT & CEO, VIBRANTZ TECHNOLOGIES

Our solution offers a dry, volumetrically dosed tinting system in recyclable packaging that eliminates the need for harmful chemicals.

[READ THE FULL INTERVIEWS](#)

chain development at Neste Renewable Polymers and Chemicals, adds: "The primary obstacle in moving towards a more sustainable chemical industry is the cost competitiveness of fossil-based feedstocks. The low price of these materials discourages the shift to more expensive, sustainable alternatives."

The inherent qualities that make plastics valuable—durability, longevity and waterproofness—are the same qualities that complicate the creation of biodegradable or sustainable versions. For instance, low-density polyethylene (LDPE) used in single-use plastic bags or polyethylene terephthalate (PET) for food packaging are difficult to replicate sustainably due to their robust properties. Imagine a plastic bag disintegrating into the ocean without leaving a trace and that same bag needing to support the contents and potential leakage of your grocery shopping.

Renee Henze, chief sustainability officer at IFF, notes, "Further complicating the adoption of innovative technologies are the challenges of scaling up. Many promising solutions remain in the R&D phase, and scaling them to make a measurable impact requires significant capital and resources."

Attaining commercial viability for most bio-based products takes time, and many companies are waiting for future regulation to provide the right conditions and price point for wider adoption. As Rahul Rasal, VP commercial at NatureWorks, puts it, "we believe an inflection point is near. Legislation is a significant factor driving this shift, with Europe, the U.S. and other countries leading the way."

Anthony O'Donovan, president and CEO of Arkema Inc., mentions another significant barrier: "Overcoming market inertia is crucial. Customers are often reluctant to pay a premium for sustainable

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products despite their professed interest in sustainability. This economic reality makes it challenging to achieve economies of scale for new sustainable technologies.

Yet, there is progress. Almost every company I spoke to is already developing sustainable bio-based polymers. And many are reaching commercial viability. Ashland's vegetable oil-based core ingredient can be designed into a range of products such as biodegradable seed coatings and efficient pill coatings. Kalsec has developed a range of "natural antioxidants from rosemary to replace synthetic preservatives," highlights their CEO, Robert Wheeler, as an alternative to synthetic products common in the food industry. And thankfully for many coffee drinkers, like this reporter, Kuraray America is addressing the "coffee 2050 problem" by developing "biodegradable drip bag coffee filters made from plant-derived polylactic acid-based material," highlights Vance Darr, director of Health, Safety, Environmental and Security (HSES).

Pioneering the Future of Sustainability

Away from chemistry, chemical companies have even shifted their entire strategic direction to focus on the energy transition with divestments validating their actions. As an example, Johnson Matthey has divested assets to refocus the company toward clean air technologies, particularly automotive catalysts, and Indorama has acquired Oxitenio in South America to leverage "sustainable resources, such as corn and ethanol, and renewable energy sources," highlights Alastair Port, executive president, Indorama Ventures - Indovina.

Circularity, carbon capture and processes to create more efficient and sustainable fuels are becoming more widespread within the industry. Air Liquide's Cryocap™ technology can capture over 99 percent of CO₂ emissions from key industrial processes. Mike Graff, chairman of American Air Liquide, explains, "This technology combines membranes and cryogenics to purify and liquefy CO₂ in a single unit, making it ready for sequestration or transport without the need for multiple steps." Despite its potential, widespread adoption of carbon sequestration faces hurdles. Graff notes, "The pace of carbon sequestration adoption is influenced by several factors, including technological readiness and the development of partnerships. The challenge lies in forming the right partnerships and securing permits." Effective sequestration requires collaboration between the chemical industry's expertise in carbon capture and the oil and gas sector's knowledge in subsurface geology.

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Our Performance & Essential Materials can be found in coatings and composites that help wind turbine blades harness power more efficiently and automotive structural components reduce weight.

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Innovations in Sustainable Aviation Fuel

Sustainable aviation fuel (SAF) is another critical frontier in reducing carbon emissions. Kenneth Lim, general manager and refinery director at Neste Singapore, highlights that “currently, SAF supplies just 0.2 percent of the jet fuel demand, with projections to reach 1 to 2 percent by 2027. Although these figures fall short of the International Air Transport Association (IATA)’s net-zero carbon emissions by 2050, they reflect a growing market potential.”

Given the IATA’s aim is for SAF to be at 65 percent of overall aviation consumption, this demonstrates the huge opportunity at hand. Johnson Matthey is leveraging this through its Fischer-Tropsch process, which transforms various forms of feedstock, such as municipal waste or biomass, into synthetic crude oil, which is then converted into SAF. Johnson Matthey has also identified low-carbon hydrogen production. “Our project with BP, focusing on low-carbon hydrogen—often referred to as blue hydrogen—primarily uses natural gas as a feedstock,” says Johnson Matthey CEO Liam Condon.

Can We Truly End Plastic Waste?

Plastic pollution is one of the greatest environmental issues and most villainized stories of our time. The very reason why plastic has revolutionized countless industries and vastly improved our lives is what poses a severe threat to our biodiversity. At the recent Intergovernmental Negotiating Committee (INC-4), 28 countries introduced the “Bridge to Busan” declaration advocating for a comprehensive treaty on plastic production. And yet, we find ourselves at a critical crossroads: We rely on plastics, but often hesitate to invest in pricier, biodegradable alternatives. With plastic demand only growing, and with bio-based plastics needing time to penetrate, scale and become more cost-effective, should more focus be on how we manage plastic waste?

The Alliance to End Plastic Waste (AEPW) certainly thinks so. They have pledged \$1.5 billion by 2024 to tackle plastic pollution and boost recycling efforts. AEPW’s CEO and president, Jacob Duer, points out the primary challenge: “The massive scale of plastic pollution, particularly in parts of the world with inadequate waste management infrastructure. Our approach focuses on these high-leakage regions, prioritizing the development of basic waste management solutions. For instance, we run significant projects in countries like Indonesia and Vietnam, establishing essential infrastructure like household bins and collection systems.”

Duer, who transitioned from the UN to AEPW to drive impactful change, underlines the importance of industry involvement: “I realized that while policies are essential for progress, they are not sufficient without the active involvement of all stakeholders, especially the private sector.” The industry must play a pivotal role in the solution, focusing on standardizing design requirements to enhance recyclability and identifying specific chemicals and products of concern.

Frederic Schmuck, CEO at Alterra Energy, acknowledges the intricacies of plastic waste management. “The issue of plastic waste is complex and not solely an educational problem. While increased consumer awareness and participation are vital, as evidenced by higher separation and recycling rates in Europe compared to North America, the core challenge remains... the fragmented nature of waste management in the U.S., where many curbside pickups go to outdated single-stream facilities, highlights the need for investment in advanced sorting technologies to enhance recycling outcomes,” says Schmuck.

Ending plastic waste entirely might seem like a far-fetched goal, but better waste management, increased recycling efforts, and the development of sustainable alternatives will be essential in getting us some of the way there.

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DONALD WISEMAN

CEO,
TEKNOR APEX
COMPANY



Teknor Apex Company, which is celebrating its 100th anniversary in 2024, is a leading materials company specializing in custom compounds and sustainable polymer solutions, while investing in validating multiple biology-based recycling technologies. Donald Wiseman recently succeeded Jonathan Fain as CEO, following Fain's 52-year tenure.

As a plastics manufacturer, Teknor Apex operates in a segment that can be villainized and misunderstood. What are the current challenges and opportunities for Teknor Apex in the plastics industry?

Our aim is to shift the narrative by highlighting our commitment to sustainability and circularity. We've been focusing on ensuring that new plastics do not end up in landfills or oceans and are instead repurposed into high-end applications. Our efforts extend to reducing our carbon footprint and exploring innovative solutions such as enzymatic recycling and bioplastics. Despite the challenges, we see this as a long-term journey to maintain our leadership and commitment to sustainability.

Privately held companies can often have a longer-term mindset than those listed. How does Teknor Apex's status as a privately held company impact its strategic decisions?

Being a privately held company with a strong balance sheet allows us to allocate resources towards long-term investments through our TekVentures group. This flexibility enables us to partner with inventors and develop minimum viable products without the pressure of meeting short-term financial targets. Our focus remains on making meaningful investments that align with our vision for the future, underpinned by a commitment to doing the right thing, which has been the cornerstone of our success and was emphasized during my transition into the CEO role by our investors.

The chemicals industry has often sided away from high-risk ventures. What value does having a ventures team bring for Teknor Apex?

Having a ventures team is quite unique for a company of our size and reflects our commitment to innovation and sustainability. While R&D spend in the chemical industry is traditionally modest, we believe it's crucial to make substantial bets on the future. This strategy involves partnering with scientists and startups to explore new avenues, such as green chemistry. Our focus on reinventing the company aligns with our long-term vision to not just survive but thrive by adapting our product lines and market approaches to the evolving global landscape.

Teknor Apex's blog aims to humanize plastics by linking them to their real-world applications. What are you doing to address the negative perceptions of plastics?

We are actively working to change the narrative around plastics by highlighting their essential role in various applications and their sustainability potential. Our efforts include addressing misconceptions about the environmental impact of polymers and promoting the benefits of recycling and circularity. Despite the challenges posed by regulatory changes and the cost implications of developing environmentally friendly plastics, our focus remains on innovation and improving recyclability to tackle the issue of single-use plastics and enhance food preservation and transfer solutions.



Nexus aims to complement mechanical recycling through advanced processes by managing many of today's plastic formats, such as films, flexible packaging and foams, which often end in landfills. This approach addresses the limitations of current recycling methods, improving the overall recycling ecosystem.

JODIE MORGAN |
CEO, **NEXUS CIRCULAR**



[READ THE FULL INTERVIEW](#)

Advanced Recycling Technologies: Innovation Enhances Recycling Rates

As we wrestle with the plastic waste crisis, exploring every potential solution is critical. Advanced recycling technologies like pyrolysis—a process that breaks down materials using heat (400°C–800°C) in the absence of oxygen, preventing combustion—offer new hope, promising significant benefits but also presenting notable challenges. How can these innovations fit into a broader mission to reduce plastic waste and reliance on fossil fuels? Jodie Morgan, CEO of Nexus Circular, believes advanced recycling technologies are poised to become the norm, with an increasing recognition of their necessity as plastic use grows. “This growth in plastic, unfortunately, will likely lead to more visible environmental pollution, which in turn will drive the push for effective recycling solutions.”

Morgan highlights the limitations of traditional mechanical recycling, particularly for certain plastics and food-safe materials. Morgan's vision for Nexus Circular includes processing 5 billion pounds of post-use plastic by 2030. “We believe that we can reach the point of decoupling manufacturing from extraction and reducing the dependence on new fossil-based resources by ensuring that the plastic resources that we already have above ground stay in play.”

Simon Critten, SVP and strategic market lead energy North America at Mott MacDonald, points out a crucial market shift: “Historically, recycled materials were sold at a discount, but now they can achieve parity or even a premium over virgin materials. This pricing shift encourages compa-

IS ADVANCED RECYCLING THE FUTURE?



JOHN LOUDERMILK |
PRESIDENT AND CEO, **BIRLA CARBON**

Our partnership with Cirttec to commercialize Sustainable Carbonaceous Material under the brand name Continua™ represents a significant innovation, focusing on pyrolysis to recycle tires back into usable materials.



RANDY POGUE | PRESIDENT & CEO, **AMSTY**

Whilst bio-based options reduce reliance on petrochemicals, they do not fundamentally change the need for effective waste management and recycling systems.



MARCO CODOGNOLA | CEO, **ITALYUM**

We advocate for a balanced view where both generic and specific recycling methods like pyrolysis and our tailored solutions coexist to enhance overall recycling yields.

[READ THE FULL INTERVIEWS](#)

nies to integrate advanced recycling into their operations, maintaining material quality and meeting stringent environmental standards.” This change represents a pivotal moment for the industry, aligning economic incentives with environmental benefits.

Despite the optimism surrounding advanced recycling, it faces its fair share of criticism. Concerns include the energy and resources required for processes like pyrolysis, which may offset environmental benefits. Additionally, integrating these technologies into existing systems can be complex and costly. Frederic Schmuck underlines the complementary nature of advanced recycling. “Our approach complements existing mechanical recycling methods by enhancing the recycling rates and tackling plastics that are currently deemed nonrecyclable.”

By blending the strengths of mechanical and advanced recycling, substantial strides can be made to not only reduce plastic pollution but the reliance on fossil fuels. As some of my interviewees confirmed, including Morgan, we have already dug up all the fossil fuels needed for future plastic demand. Just recycle it.

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WATER IN 2024



DAVID NICHOLSON |
PRESIDENT & CEO, **PVS CHEMICALS**

Regulatory standards, especially regarding water quality, continue to tighten at local, state, and national levels. This trend presents growth opportunities for PVS Chemicals, as our base chemistry solutions are instrumental in removing pollutants from water.



RENATO MUNOZ OSSES |
MANAGING DIRECTOR, **WATERISLIFE**

We are in a context where billions of dollars are invested in water projects around the world, but we still have 2 billion people without access to safe drinking water.



MARK GARRETT |
GROUP CEO, **ARCHROMA**

We've recently introduced systems that can cut water usage by up to 50 percent.



AL BENINATI |
CEO & PRESIDENT, **PQ CORPORATION**

Silicate-based products, including precipitated silicas and gels, are increasingly used in sustainability-focused applications such as water purification.

[READ THE FULL INTERVIEWS](#)

Dealing With Water Contamination: A Crisis Demanding Immediate Action

From reducing water and energy usage to ensuring access to safe drinking water and tackling pervasive pollutants, having a robust water management strategy is a must for all chemical companies.

The most pressing issue right now within this space is water contamination and the increased prevalence of perfluoroalkyl substances (PFAS) in our water. There are now over 13,000 PFAS compounds, according to Minerals Technologies Inc., which originate from many sources including industrial waste and consumer products like nonstick cookware or cleaning products.

And due to their high solubility, they do not degrade and can lead to widespread contamination. Michael Kozak, business unit president - environmental & infrastructure at Minerals Technologies Inc., explains: "These compounds are notorious for their persistence and ability to spread quickly through groundwater, increasing the risk of exposure and potential harm to human health. The ubiquity of PFAS is alarming due to their proven adverse effects on human health, leading to significant regulatory attention worldwide, including stringent limits on PFAS levels in drinking water."

Understanding water quality is not just a task for regulators; it is something we all need to be aware of. Melissa Aquino, senior VP of the water quality segment at Veralto, offers practical advice: "I recommend that individuals take the time to read and understand their local water quality reports, which are sent out by municipalities. These reports detail the contaminants tested for and their levels in the water supply. It is important for everyone, especially families, to be informed about what is in their water and understand the measures being taken to ensure its safety. At home, I engage my children in this learning process, showing them how water testing works using simple kits that even children can use."

Aquino also touches on the complexities of regulating water contaminants: "The intention behind setting such low regulatory limits for contaminants like PFAS is to exert pressure on the system to eliminate harmful chemicals. However, another challenge is the practicality of dealing with these contaminants once captured—whether in filters or granulated activated carbon, they still need disposal."

Water management is more important than ever before. As the impact and awareness of contamination grows, so will the need to take action. We can take action ourselves with increased awareness of what may be in our water.



DOUGLAS T. DIETRICH |
CHAIRMAN OF THE BOARD & CEO,
MINERALS TECHNOLOGIES INC.

Our environmental business, particularly our ability to address water contamination and support the supply of clean water, represents a significant growth opportunity and a way to contribute positively to global challenges.



[READ THE FULL INTERVIEW](#)

who has responsible
beauty ingredients?
—
we do.

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platform technologies
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We're a
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Company

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Powerhouse

Private, Family-Owned

People First Approach

Responsible Sourcing Partner

Focused On Sustainable Chemistry

quadragroup.com

Great
Place
To
Work.

Green Shoots in Distribution & Logistics

Both the distribution and logistics sectors within the chemicals industry are having to make sustainability a number one priority. "Today, sustainability is a crucial aspect of our operations, influencing our strategies and partnerships across the industry," notes Anne Marie Infilise, president and CEO of Quadra. Distributors are incorporating sustainability frameworks as a norm. That includes Univar's, which includes six characteristics: "Natural or bio-based, carbon footprinting, safer substitutes, circular materials, social impact, and environmental accreditation," highlights Liam McCarroll, global director of sustainability, Univar Solutions.

Across logistics in the chemicals space, sustainability and safety are the most important topics of conversation. Joe Hinrichs, president and CEO of CSX Transportation, underlines this by stating: "Safety is our paramount concern. Incidents like the East Palestine, Ohio, derailment highlight the critical importance of safety for rail. This focus is not just about compliance or avoiding negative attention—it's about the profound responsibility we carry every day."

The emphasis on safety is complemented by a push toward more sustainable logistics operations. Randy Strutz, president of Quality Carriers, outlines the challenges and opportunities: "Initially, there is the continuous push to enhance the efficiency of existing technologies, such as diesel trucks. Despite advancements, there are limits to how far efficiencies can extend without impacting other operational aspects like payload capacities. The aspiration for a shift towards electric vehicles (EVs) as a more sustainable option faces practicality issues, including significant payload reduction due to the heavy weight of batteries, potentially necessitating an increase in the number of trucks on the road to maintain current freight volumes."

The path forward will likely involve a blend of incremental improvements and more innovative changes, ensuring that the chemicals industry's logistics and distribution sectors continue to advance toward a more sustainable future.

The Next Leap in Chemicals

The chemicals industry has been, at times, slow to truly innovate. But since I last reported on this industry in 2018, I have seen a shift in approach from many chemical companies. Breakthrough technologies are now being integrated much faster into company processes, chief digital officers are being hired and the AI revolution is being taken seriously.

Digital Twinning: Optimizing Processes and Decarbonization

Dr. Wai Kiong Ng, acting executive director at the Institute of Sustainability for Chemicals, Energy, and Environment (ISCE²) at A*STAR, is a strong advocate for digital twinning in the context of the industry. "Digital twinning allows us to optimize and plan processes before conducting physical tests," he says. This method integrates different companies across the value chain and is crucial for decarbonization through process control and standards adherence. It is an approach that Mayank Patel, industry strategy director for chemicals at Siemens, has also taken note of, along with generative AI. "We have been integrating generative AI and digital twinning to enhance process modeling and operational efficiency," Patel highlights.

These technologies create detailed, dynamic models that simulate various operational scenarios, optimizing processes without extensive manual input. Siemens is leveraging partnerships with tech giants like Microsoft and NVIDIA to further enhance these capabilities, particularly looking to aid new entrants in green ammonia production.

Driving the AI Revolution Through Chemistry

Specialty chemical companies are also posturing to align themselves with the industries of tomorrow. The semiconductor industry, crucial for advancements in various technologies including AI, is one of them. Eric Johnson, CEO of JSR Corporation, mentions how through chemistry: "We enable manufacturing precision and quality at unprecedented levels." Focusing on imaging and processing for semiconductor manufacturing at the nanometer level, JSR Corporation ensures that its products meet extreme quality and

reliability standards. This precision is vital for the progression of computing, AI, 5G and autonomous vehicles.

The chemicals industry is also playing a significant role in supporting the AI revolution through advanced cooling solutions. Matthew Joyce, senior VP - lubricants & specialties at HF Sinclair, notes, "This initiative involves innovative cooling solutions that involve immersing servers in specially designed fluids to dissipate heat more effectively, thus reducing the massive energy consumption typically associated with cooling systems. Data centers, as they operate today, consume vast amounts of energy and water, which is the industry's dirty little secret."

Enhancing Oil Recovery With Nanotechnology

Even as the world shifts to cleaner energy, the demand for oil and gas remains significant. Ofek Levy, founder and CEO of Valor International, focuses on "maximizing efficiency and sustainability in oil production," he explains. By using renewable raw materials and innovative chemistry, Valor enhances well stimulation and production. Levy highlights their work with enhanced oil recovery (EOR) techniques and nanotechnology to clear organic deposits inside wells, improving extraction rates and reducing environmental harm.

These innovators leveraging digital twinning, AI, nanotechnology, predictive maintenance and enhanced oil recovery techniques are pioneering technologies to not only improve operational performance but also contribute to a more sustainable and responsible industrial landscape. As these advancements continue to evolve, they will play a crucial role in shaping a cleaner, more efficient future for the chemicals sector.

In Three Years' Time...

Throughout my journey with industry leaders, I would often finish interviews by asking: "Where will you be in three years?" Responses would often paint a picture of optimism, which makes sense given the vast opportunity being offered by the energy transition.

I asked Mark Nikolich, CEO of Braskem America, based in Philadelphia, how he imagined a Philadelphia Eagles game at Lincoln Financial Field. "By 2027, we envision a world where sustainability efforts are fully realized and integrated into everyday experiences, including at the Eagles game. We aim to have sustainable materials, like bio-EVA and bio-based polyethylene, utilized in sports equipment, apparel and infrastructure, creating a tangible connection between consumers and sustainable practices," Nikolich said.

Guillermo Novo, CEO of Ashland, shared a similarly optimistic outlook. "Three years from now, our goal is to have reshaped the public's perception from merely chemicals to a broader focus on materials, especially as we embrace more natural and sustainable products," he says.

The chemicals industry is at a critical juncture, facing significant environmental challenges while holding the potential for transformative innovations. My journey over the past four months has shown me that while advancements in carbon capture, bio-based polymers and sustainable aviation fuels are promising, the road ahead is fraught with obstacles—high costs, scalability issues, and market resistance. But I am optimistic that this industry will play its hugely significant role in the energy transition.

As we look forward, the vision of integrating sustainable practices not only into the day-to-day of the industry but our lives is necessary. This is not a time for passive optimism but for decisive action. The chemicals industry needs to continue accelerating its commitment to sustainability, and we, as consumers, must demand and support these changes. Our future depends on this collective effort.

THE FUTURE OF CHEMICALS



REBECCA LIEBERT |
PRESIDENT & CEO, **LUBRIZOL**

Data collection and analysis are critical in designing sustainable solutions. For example, analyzing data from fleet cars worldwide, we can improve the sustainability of our lubricants, allowing for extended use before needing an oil change.



MICHAEL GREEN |
SEGMENT BUSINESS SERVICES MANAGER,
AKZONOBEL AEROSPACE

Aerofleet Coatings Management is essentially a fleet monitoring and predictive maintenance program designed to help maximize the life of aircraft paint jobs using data-driven insights.



BRAD BUDDE |
CHIEF DIGITAL OFFICER, **PPG**

AI integration is a significant part of our strategy to enhance operational efficiency and product quality. In our automotive paint facilities, we've reduced the production cycles for paint batches significantly, from eight cycles down to two.



RAEF SULLY | CEO, **LILAC SOLUTIONS**

Our technology is particularly transformative in that it unlocks potential in groundwater reserves previously deemed uneconomical due to low lithium concentrations.

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CLEANER CHEMISTRY - BETTER FUTURE

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Ian Karmel

WHEN YOU'VE BEEN A FAT KID, A LITTLE BIT of that fat kid stays with you, no matter if you stay fat or not. But how to cope with that? Well, that's exactly what comedian Ian Karmel and his sister, Alisa Karmel, PsyD, aim to tackle in their poignant memoir *T-Shirt Swim Club: Stories From Being Fat in a World of Thin People* (June 11). "I've seen so often that people's representation with fat was either as a punchline or as an object of pity. And I hated that we were either Cartman [from *South Park*] or the whale," Ian says. The two write about growing up fat and not addressing it. Eventually Ian's weight would reach 420 pounds when he decided to lose the weight, but not his humor. "I had two goals in writing my part of this book, which was to be as honest and as vulnerable as possible and even harsh on myself. And be clear about my opinions and my feelings and what I went through. I was like, if I'm gonna get my story out here, and help my sister get her story out there and her professional opinions too, I'm gonna have to do it through being funny." — H. Alan Scott



IAN SPEAKS ABOUT ...

"When you start talking about weight, it gets a little bit too real for people."

HOW BEING A FAT KID IMPACTS YOUR ENTIRE LIFE ▶

"We thought about naming [the book] *Fat is Forever*. If you're a fat kid, if you're fat ever, you get a sense of how the world treats fat people, both benignly and malignantly. You never lose that. And especially if you're a fat kid, that's a foundational part of your upbringing that stays with you forever. It will shape the rest of our lives."

WHY MEN SHOULD TALK MORE ABOUT BODY ISSUES ▶

"We are behind on a lot of stuff, and one of those is acknowledging that we have those feelings. What I have found, speaking in generalities here, is men don't really ever acknowledge those feelings. They don't have conversations about them, certainly with their friends, which is crazy, because we definitely feel them."

HOW HUMOR HAS HELPED HIM COMMUNICATE ▶

"I didn't want it [the book] to be maudlin or overly serious because I think people tune out when that happens, because I've tuned out. We crave entertainment, and we crave more than empathy and people relating to us. So I thought the only way I know how to relate to people is through humor."



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The Resilience and Innovation of Japanese Manufacturing

The Japanese manufacturing industry, despite facing significant challenges such as resource scarcity and fierce global competition, remains a global leader through innovation, quality and an unwavering commitment to *monozukuri* (the philosophy behind high-quality Japanese manufacturing). Key industry leaders highlight how Japan continues to excel by leveraging its strengths in high-quality production, technological advancement and a robust industrial ecosystem.

Katsuhiko Gunji, president of Shinx Corporation, attributes Japan's success in the steel industry to its ability to produce high-quality, niche-application steel products. "The main strength of the Japanese steel industry lies in the production of construction materials like H-beams and automotive materials like high-tensile steel," Mr. Gunji states. This specialization has enabled Japan to maintain its position as the third-largest steel producer globally despite high import costs. The Japanese ethos of punctuality and commitment further bolsters its reputation for quality and reliability, differentiating it from lower-cost competitors like China.

The semiconductor sector exemplifies Japan's advanced manufacturing capabilities. Companies like Tokyo Electron lead the way with cutting-edge equipment critical for chip production. Toshiaki Kawai, CEO of Tokyo Electron, remains optimistic about the sector's future, despite current downturns. He highlights the pivotal role of generative AI and the increasing demand for powerful

graphics processing units (GPUs) as key drivers for future growth. "I expect the market to rebound by the second half of 2024, with significant improvements in 2025," Mr. Kawai notes, underlining the long-term potential of the semiconductor industry.

Japan's competitive edge in automation and precision tools is underscored by Susumu Yamazaki, president of Athlete FA Corporation. He emphasizes the superior technology and high standards that define Japanese manufacturing. "Even though we may not win on price, we can offer products with high value, better quality and better accuracy," Mr. Yamazaki asserts. This focus on quality over cost has allowed Japanese firms to maintain strong relationships with global leaders in various industries.

Yasuo Miyake, president of Hakaru Plus Corporation, highlights the strategic importance of diversification and overseas expansion. Despite domestic challenges such as an aging population and labor shortages, Japanese companies benefit from the weak yen, enhancing their cost-effectiveness on the global stage. Mr. Miyake points out that firms with a significant presence abroad, like those in the automotive sector, continue to thrive. "Business is booming for all the Japanese companies that went overseas to the U.S., China and Thailand," he states, suggesting that international markets provide a vital buffer against domestic demographic shifts.

Masaaki Takahashi, president of Komatsu NTC, emphasizes the importance of offering

comprehensive manufacturing systems and adapting to fluctuating demand. Komatsu NTC's ability to provide integrated solutions for automotive production and semiconductor processing distinguishes it from general-purpose manufacturers. "We provide specially-designed production lines and support our customers' production with high-production technology and high quality," says Mr. Takahashi. This holistic approach not only meets current demands but also positions the company to capitalize on emerging trends such as electric vehicle (EV) production.

While Japanese manufacturers face significant competition from neighboring countries like China and Korea, their focus on high-quality products and advanced technology continues to provide a competitive edge. Furthermore, as Mr. Miyake observes, Japan's demographic challenges could spur greater innovation in automation technologies, presenting new opportunities for manufacturers. The ability to automate more complex and precise tasks will be crucial as the domestic workforce ages.

By maintaining a steadfast commitment to quality, leveraging advanced technology and strategically diversifying both domestically and internationally, Japan continues to uphold its status as a global manufacturing powerhouse. As global dynamics shift, the industry's adaptability and focus on high-value production ensure that it remains a formidable player on the world stage.

Komatsu NTC Focuses on EV Battery Field



"Our mission is to enhance our technology and provide cutting-edge processing machinery for our customers."

Masaaki Takahashi, President,
Komatsu NTC Ltd.

Established almost 80 years ago in 1945, Komatsu NTC has a long history when it comes to designing and manufacturing industrial machinery, as well as laser technology, inspection technology and image analysis technology.

"Our three main businesses," company president Masaaki Takahashi explains, "are our machine tool business, our EV (electric vehicle) battery business and our wire saw business."

A line builder capable of producing entire systems based on its own design, Komatsu NTC's high level of design and production

The internationally-regarded manufacturer with extensive experience in the machine tool business looks to mitigate fluctuations in capital investment by diversifying its brand and improving the capabilities of its workforce.

technology enables it to provide customer-specific production lines.

Mr. Takahashi again: "We are one of the few manufacturers that can fulfil customer requirements in terms of cycle time, size and material of the workpiece to be processed."

With an international reputation for manufacturing engine processing machinery, the firm is now shifting its focus towards EV batteries. "Our strategy," Mr. Takahashi says, "is to protect our technology using our software. We consider the best sales strategy for all our businesses, taking into account the various risks involved in doing business globally."

Not that international expansion is the only item on the agenda. Rather, in the immediate term, the onus will be on "increasing the capabilities of our workforce so that it is adaptable and able to design and manufacture any type of machinery." This newfound versatility should, in turn, mean the company is better able to deal with anticipated fluctuations in clients' capital investment.

"We also want," Mr. Takahashi confirms, "to focus more on technical alliances and partnerships with local companies in South-east Asia and India."



Tab forming equipment

Though the world is changing rapidly, some things remain the same. The need for manufacturing, for example, and for facility makers, who continue to play a vital role in the industry.

Put simply, the better the machinery the production machinery facility manufacturer can provide, the better the products for the customer. And there Komatsu NTC's aims are clear.

"Our goal," Mr. Takahashi concludes, "is to be the number one facility maker in the world."



Yamato Denki: Gold Plating Pioneers

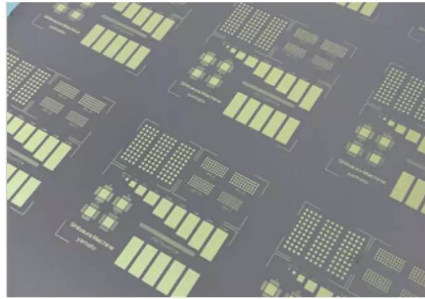


"Yamato Denki provides a fast and accurate service by conducting plating services near our customers."

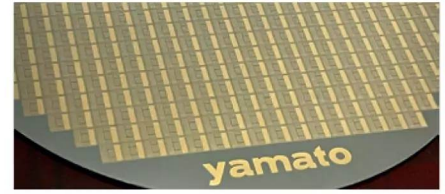
Masahiro Hara, President,
Yamato Denki Co., Ltd.

Established in 1944, Japanese company Yamato Denki offers electrolysis gold plating processing for printed circuit boards. Electrolysis technology is used for semiconductor packaging by companies for a variety of products, from electronic control units in the automotive industry to nano flash memory devices. This innovative technology is also used for image censoring and complementary metal oxide semiconductor (CMOS) sensors, which are commonly found in smartphones, electric vehicles and cameras.

The Japanese gold plating processing company is trailblazing the circuit board industry with its unique electroless technology, offering a speedy and accurate service to customers from a variety of sectors including the automotive market.



As electronic components became smaller and electronic circuit designs became finer, ensuring that circuits conducted electricity has proved difficult. To address this, president of the company, Masahiro Hara, explains that the firm developed an electroless plating technology that uses a three-layer structure consisting of nickel, gold and palladium. Mr. Hara points out that "in recent years, the need for gold plating on the electrodes of semiconductor chips has increased, and this three-layer plating process has been adopted to address this demand." Such advanced selective plating technologies give the company an advantage over its competitors by ensuring precise circuit formation and higher adhesive film.



Since 2012, Yamato Denki's efforts have been focused on Thailand, where demand for electronic components in the automotive industry has increased. Mr. Hara notes the advantages of having a factory in Thailand for both the company and its customers, as it "allows us to receive products transferred from Japan, whilst allowing customers to make preferential processing requests for new products with a reputable company." Mr. Hara intends to strengthen this Japan-Thailand partnership by pooling all of the company's resources into the collaboration.

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<https://yamato-elec.co.jp>

Tamagawa Denki's Precision Technology Driving Sustainable Progress

As pioneers in advanced technology solutions, Tamagawa Denki leads the way, from precision plastics, cutting-edge semiconductor design, and AI-driven automation.



"We pioneer AI-driven tech, aiming to empower SMEs and redefine industry standards."

Hironobu Miyakoshi, President,
Tamagawa Denki Co., Ltd.

Tamagawa Denki boasts a rich legacy spanning 75 years in precision engineering plastics and 42 years in semiconductor design and development. As company president Hironobu Miyakoshi says: "Our commitment lies in the seamless integra-

tion of creativity and cutting-edge technology to serve our customers and society."

With a solid foundation built on extensive experience at IDM, Tamagawa Denki consistently delivers value to customers. Renowned for its technical prowess and integrity, it has earned the trust of major semiconductor manufacturers. As for plastics manufacturing, the company specializes in bio-materials and paint-less molding. Expertise in specialized molding techniques—including insert molding, thin-wall molding, hoop molding, two-color molding, and LIM molding—have helped with creating partnerships and enhanced Tamagawa Denki's competitive edge.

"If there is an opportunity to expand our business with overseas companies, we want to do that," says the president. "However, we're not thinking of simply outsourcing jobs, rather of working together."

Tamagawa Denki is dedicated to advancing Sustainable Development Goals (SDGs), actively contributing to the community and society. There is a commitment to fostering a work environment that is both community and society-friendly, promoting engagement in SDGs initiatives among its employees.

"We are developing bioplastics and recycled plastics, and we have already devel-

oped vapor deposition paint," explains Mr. Miyakoshi. "It looks like metal, but it's soft. It's a non-linear sort of vapor deposition, using tin and indium."

Looking ahead, the aim is to revolutionize the visual inspection process for small and medium-sized companies, alleviating the burden on workers through the innovative application of Tamagawa Denki's AI VISION technology.

"Instead of using human eyes, we're able to do the inspection in less time. So in five years, we want to achieve great results in image identification with generative AI," concludes the president.



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Tamagawa Denki Co., Ltd.
www.td-pla.jp

Precision Pioneer: Athlete FA Leads Japanese Manufacturing Renaissance

Athlete FA Corporation continues to develop assembly equipment for the semiconductor, electric vehicle, telecommunications and medical fields, using state-of-the-art technology and demonstrating an unwavering commitment to quality.



"We have superb technology... We can offer better value including performance and quality."

Susumu Yamazaki, President,
Athlete FA Corporation

At the heart of Japan's manufacturing lies Athlete FA Corporation, a company deeply entrenched in the ethos of precision engineering and technological advancement. Led by Susumu Yamazaki, the president of the company, Athlete FA Corporation stands as a beacon of Japanese manufacturing excellence amidst the shifting tides of global economics and demographics.

Highlighting the company's commitment to superior technology and adherence to high Japanese standards, Mr. Yamazaki states: "I think the greatest weapons we have are our superior technology and our high Japanese

standards. With that arsenal of technology and quality, we do business with some of the biggest companies in the world."

Discussing future growth prospects, Mr. Yamazaki identifies advanced computing, data centers, and semiconductor industries as areas poised for significant growth, adding: "Data centers, servers, and cloud computing are all booming right now. These three industries are all expected to experience significant growth going forward."

Delving into the company's product portfolio, Mr. Yamazaki provides insights into the Micro Ball Mounter (BM-2150SI). "This equipment uses advanced printing and ball mounting technology to achieve an array of solder balls as small as 30 μm in diameter," he explains. "It has been well received by users around the world for its perfect performance under various conditions, such as board size, board thickness, and board warpage."

When discussing the mass-production Flip Chip Bonder (CB-3000), Mr. Yamazaki elaborates on the calibration function: "There is a built-in mechanism for self-adjustment and fine-tuning of the default settings. Errors are corrected and the equipment is able to provide the best performance. And to get there, this equipment is also reviewed, verified, and checked at every step of the process, ultimately delivering the highest speed and accuracy."

The company president also touches upon the significance

of supporting both eight and twelve-inch wafers with their high-accuracy Die Bonder (AB-1000). He explains: "This equipment has demonstrated performance that exceeds expectations, with a maximum die size of 2.5 mm on the board side and chip sizes as small as 0.50 mm to 1 mm to be mounted."



Athlete FA Corporation has experienced remarkable revenue growth, with sales increasing at an annual rate of 50% since 2020. Looking ahead, Mr. Yamazaki outlines strategies to sustain and accelerate revenue expansion, focusing on product innovation and enhancing capabilities to cater to ever-evolving demands.

Sharing his insights on the company's growth trajectory, the company president says: "Over the past three years, demand for semiconductors, servers, and PCs has skyrocketed due to COVID-19. It was a big surprise to us that our performance doubled along with it. To meet this high demand, we had to work with outside vendors to cover the double workload. However, the semiconductor industry is now in a period of temporary stagnation. But we expect the situation will recover after 2025, and we stress the importance of continuous improvement and innovation to meet the changing needs of our customers in the future. One example of this is the development of equipment that is compatible with the submicron level. As

these products are developed, our sales will grow."

In terms of expansion, Mr. Yamazaki expresses a focus on expanding overseas business dealings, particularly in Southeast Asia. "Overseas we work mainly in Taiwan and China, as well as South Korea," he says. "However, we are also strengthening our sales in Europe, the United States, and Southeast Asia. Additionally, we are looking optimistically towards emerging countries like India, but for right now, those countries remain a mystery to us. Experts are predicting major growth in these emerging nations, which means that there will be demand there sooner rather than later. Honestly, we are looking to expand in any potential country."

Discussing future partnerships, Mr. Yamazaki adds: "Currently, 20% of our customers are domestic and 80% are overseas. This means that our business dealings overseas are growing. As we continue to work with our distributors, we will continue to strengthen our partnerships."

With a clear vision, innovative spirit, and unwavering commitment to quality, Athlete FA Corporation continues to chart a path of success in the dynamic landscape of Japanese manufacturing. As the company gears up to embrace the challenges and opportunities of tomorrow, one thing remains certain – its dedication to excellence will continue to drive its growth and impact on the global stage.



BM-2150SI
Micro Ball Mounter



AB-1000
High Accuracy Die Bonder

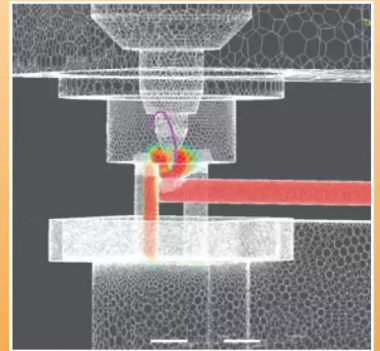
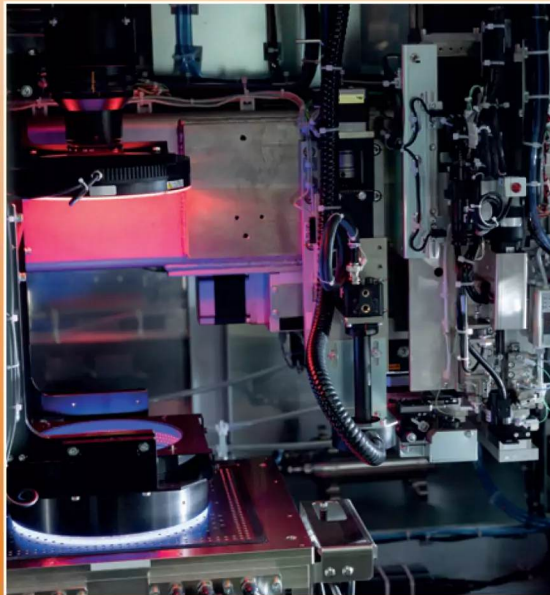
Athlete

Create Future Arts



*The Athlete brand expresses our commitment to craftsmanship
and endless challenges in semiconductor back-end processes* www.athlete-fa.jp/en

Advance Accuracy Assembly leading technology



Suwa, Nagano, Japan

Hakaru Plus: Championing Japanese Precision Manufacturing

Hakaru Plus Corporation, a leader in Japan's manufacturing sector, excels in precision weighing systems and advanced sensor technology, driving innovations across industries and championing energy efficiency and sustainability.



"Our company philosophy is to make products that contribute to society."

Yasuo Miyake, President, Hakaru Plus Corporation

Established in 1916, Hakaru Plus Corporation has evolved into a linchpin of the Japanese manufacturing landscape, renowned for its specialized equipment in industrial weighing systems, energy measurement and advanced sensor technology. Celebrating over a century of innovation, the company continues to set benchmarks in precision and technological excellence, steering clear through the competitive tides of the global market.

At the helm of Hakaru Plus is President Yasuo Miyake, who articulates the essence of the company's resilience and adaptability in a dynamic economic climate. "Japan is quite strong in the automotive industry and the situation is not relevant for the companies that have a presence overseas," Mr. Miyake observes, highlighting how Japanese manufacturers leverage their technological prowess and reliable supply chains to compete internationally.

Hakaru Plus has carved a niche in the development of advanced weighing systems, crucial for industries where precision is paramount. "In the 1960s, ready-mixed concrete was being weighed roughly, and its quality was not correct," Mr. Miyake says. The company responded to this industry need by developing a so-

phisticated weighing control system for concrete, setting a precedent in precision measurement.

The technology developed for concrete has since been extended to various other materials, including powders and liquids that pose unique challenges in measurement due to their properties. "Powders have various characteristics, e.g., sticky, very light in specific gravity, highly absorbent, etc. It is very difficult to accurately weigh such powders in a given time," Mr. Miyake points out, underscoring the complexity of their tasks. Hakaru Plus designs custom solutions to tackle these challenges, maintaining its edge in a highly specialized market.

Amidst these technological advancements, the company has not overlooked the significance of energy efficiency and sustainability. Mr. Miyake emphasizes the importance of measuring energy consumption as a precursor to effective energy management, adding that Hakaru Plus has specialized in measuring electricity since its establishment. "Measuring is the first step for energy saving," he states. This philosophy has led to the deployment of over 3,000 power meters at major sites like Tokyo Disney Resort, enabling detailed monitoring and substantial energy savings.

Adding to its portfolio of innovations, Hakaru Plus is venturing into agricultural technology with a focus on nitrate nitrogen sensors. This move is poised to revolu-

tionize agricultural practices by providing farmers with precise data on soil conditions, thereby optimizing fertilizer use and enhancing crop yields. "Our next goal is to develop our nitrate nitrogen sensor and release it as a product," Mr. Miyake shares, revealing the strategic direction towards agricultural industrialization.

As Hakaru Plus looks to the future, it remains committed to its foundational philosophy of contributing to society through technology. Whether it's refining weighing systems or pioneering energy measurement techniques, the company's innovations are tailored to meet the evolving needs of industries across the globe.

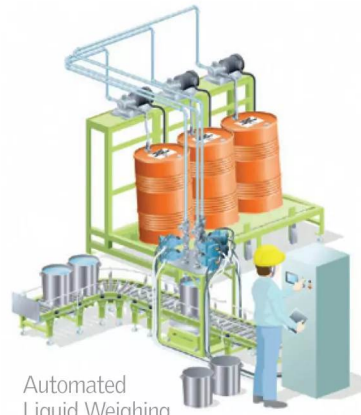
In an era marked by rapid technological change and environmental concerns, Hakaru Plus stands out as a beacon of innovation and reliability, continually pushing the boundaries of what is possible in industrial manufacturing and beyond.



Energy Meter,
XM3-110



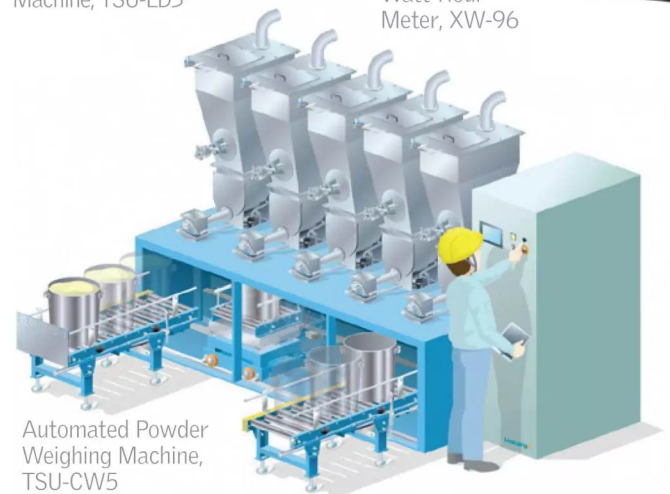
Energy Meter,
RM-110



Automated
Liquid Weighing
Machine, TSU-LD3



Watt-Hour
Meter, XW-96



Automated Powder
Weighing Machine,
TSU-CW5

Hakaru+

Scale up your business

<https://hakaru.jp>



The exterior of SHINX MALAYSIA

Delivering Metal, Delivering More

SHINX offers a wide range of items, from materials to processed products, by making use of proprietary production equipment and technology.



"Our current strength lies in always delivering high-quality products on time."

Katsuhiko Gunji, President,
SHINX CORPORATION

SHINX was first established almost 30 years ago as a supplier of aluminum and stainless steel plates used in many types of equipment and machinery, and today caters to a number of industries for which precision and accuracy are essential.

"Since our establishment, we have been committed to providing added value to our customers under the policy of 'high quality', 'fast delivery' and 'reasonable price,'" company president Katsuhiko Gunji explains. "We develop our own production line and use all our original, dedicated cutting and milling machines for material processing, which allows us to maintain a high

production capacity and ship more than 5,000 orders per day."

One of the firm's major contributions is the supply of materials to non-ferrous metal distributors and machinery and parts processors, mainly related to semiconductor manufacturing equipment. SHINX meets their requirements for extremely high precision.



And, with the semiconductor industry projected to be worth USD 1 trillion, quality is an increasingly important theme for both manufacturers and clients alike.

Mr. Gunji emphasizes: "For our milled products, we generally guarantee an accuracy of ± 0.05 mm, with a minimum of ± 0.01 mm. Also, we are the first in the industry to establish a temperature control system for all products at $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ in accordance with 'ISO1' to guarantee dimensional accuracy. Because aluminum expands or shrinks three times more than steel at different temperatures."

Kobe Steel produces high-quality aluminum plates and SHINX has the leading market share in Japan.

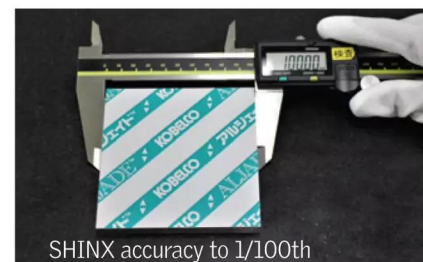
ALJADE and ALHIGHCE (A5052) made by Kobe Steel have precise plate thickness, minimal residual inner stresses and extreme quality control. In the semiconductor equipment industry, which is predicted to grow, the demand for high-quality ALJADE and ALHIGHCE will increase. Mr. Gunji takes up the thread: "Our unique production lines, equipment and technology, combined with the high-quality materials made by Kobe Steel, have led to our success."

This commitment to quality will soon be replicated abroad as the company expands its overseas operations. In 2023, SHINX established sales bases in Malaysia and Vietnam. "Our long-term strategy," Mr. Gunji confirms, "is to get the ALJADE A5052 to replace the A6061. Our major mission is to enlarge the market of Kobe Steel's ALHIGHCE and ALJADE. And then, by offering our high-precision machined products, we want to create a culture in which customers buy machined products rather than cut products. Having a foothold in Malaysia and Vietnam will allow us to take up new challenges and find our way through Asia and the global market."

On the home front, meanwhile, one of SHINX's stated focuses is to revitalize Japan's manufacturing industry, for which it

has been implementing digital transformation (DX).

In future, the company will offer a DX solution that analyzes computer-aided design (CAD) data based on 3D data, identifies and assigns machining types, selects the optimum tools using AI and cutting conditions using algorithms, and then automatically generates NC programs—thereby significantly reducing workload.



SHINX accuracy to 1/100th

As well as delivering high-quality products and customer satisfaction, both of which will enable the company to secure a top market share in the semiconductor industry, Mr. Gunji is also keen to emphasize the importance of relationships: "We want to continue to innovate, listen to our customers' requirements and strengthen our relationship with everyone."

Shinx
www.shinx-corp.co.jp



Kara Young

THIS YEAR KARA YOUNG BROKE A TONY'S RECORD, BECOMING THE FIRST Black person to receive three consecutive nominations and only the sixth person ever to do so. "It feels special that the third [nomination] is historical, but more historical in the sense that it's civil rights activist Ossie Davis' words that are being activated and recognized." Young's nomination is for the play *Purlie Victorious*, a comedy written by Davis in 1961 and revived for Broadway this year with Young and Leslie Odom Jr. "This is 63 years since its last production on Broadway, and I feel like for this play to be recognized is so important." Young says the script of *Purlie Victorious* is "such an American masterpiece of text" and that it was the diverse audiences that came to see the play that made it so special. "In the history of people being silenced, you are listening to a Black woman, a Black man, a Black cast, speak their truth, unapologetically speak Ossie Davis' words. How magical is that?" For Young, it's the power of plays that inspires her. "I feel like plays allow us to see each other as human."

How do you process the enormity of the legacy of this play?

I was absolutely nervous. And then there's also a part of me that feels like this thing feels beyond me. And I have to just say, "Yes, I just have to surrender to not only opportunity, but this very magical moment." People have been saying that I remind them of Ruby Dee [who originated Young's role] for so long. I'm still pinching myself. I can't even believe it happened, to be honest with you.

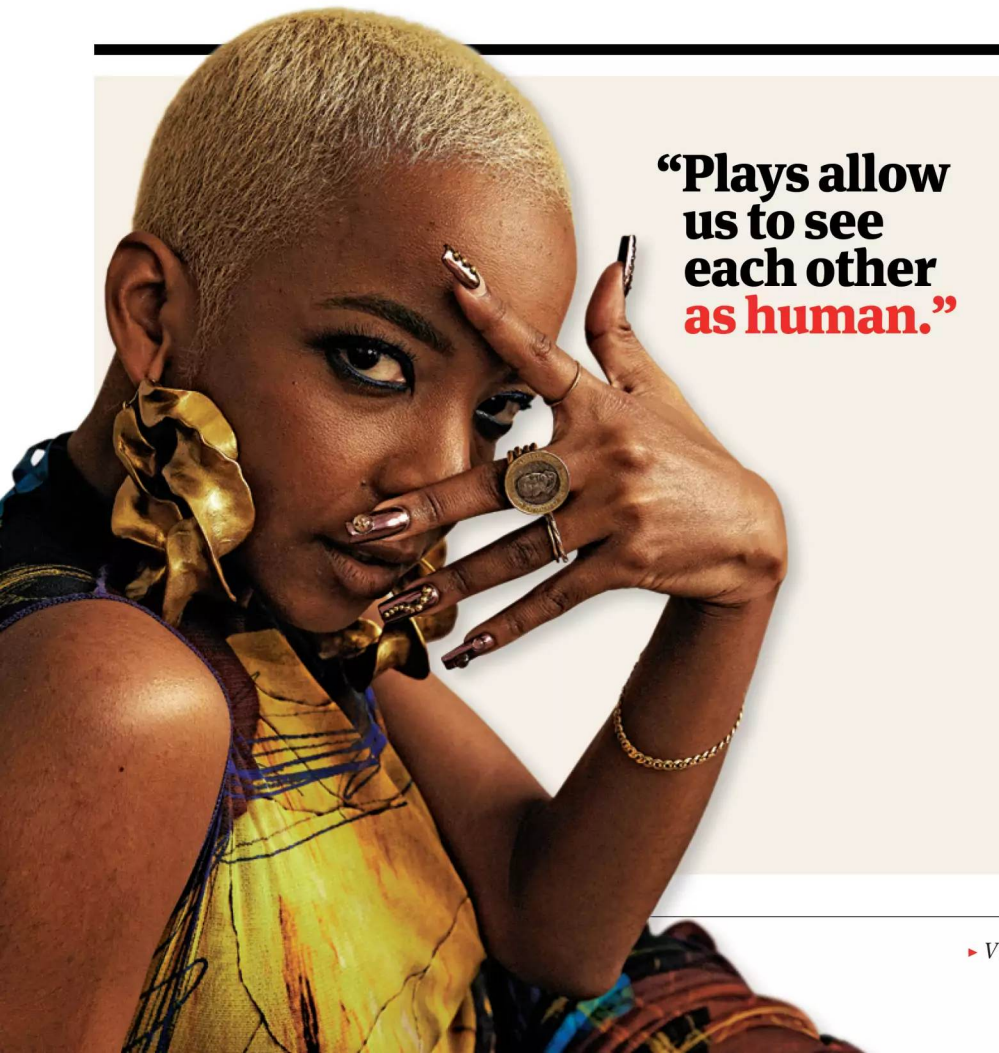
And if you're being compared to Ruby Dee, your co-star can certainly be compared to Ossie Davis.

Oh my goodness, Leslie in a nutshell feels like he makes the impossible feel possible. He wears many hats. I'm just happy that I've absorbed a little bit of Leslie Odom Jr. in that experience, because he taught me so much about what leadership is and what this career can be.

How does your milestone third consecutive Tony nomination feel?

It might sound corny, but I just feel so fortunate that I've been able to be a part of art that is changing the world. So for these acknowledgments every single year for those characters, and for these women, these Black women, to be acknowledged every year feels bigger than me, and I'm grateful. I'm grateful for the work to be acknowledged, but it couldn't be possible without the writers, without the directors, without the theater makers. — *H. Alan Scott*

"Plays allow us to see each other as human."



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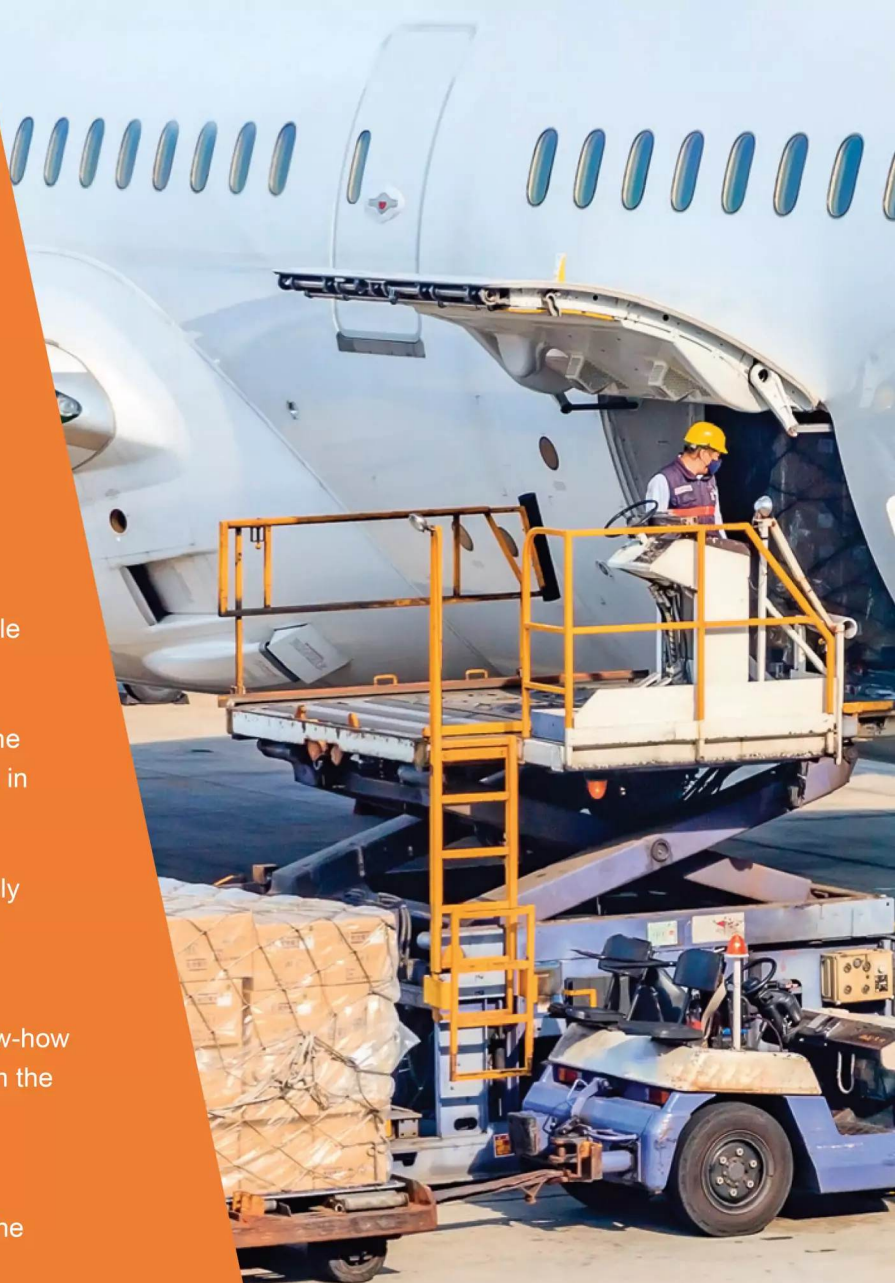
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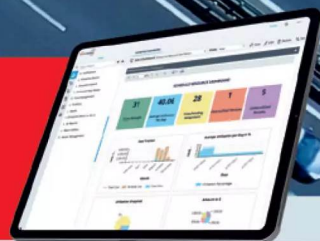


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