Amid Japan crisis, hunt for better radiation care

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(AP) -- Japan's nuclear emergency highlights a big medical gap: Few treatments exist to help people exposed to large amounts of radiation.

But some possibilities are in the pipeline - development of drugs to treat radiation poisoning, and the first rapid tests to tell who in a panicked crowd would really need them.

The U.S. calls these potential products "countermeasures," and they're part of the nation's preparations against a terrorist attack, such as a dirty bomb. But if they work, they could be useful in any kind of radiation emergency.

"Thinking of terrorist events is what drives us. Mother Nature can be much of a terror, too," says Dr. Robin Robinson, who heads the federal Biomedical Advanced Research and Development Authority, or BARDA, that funds late-stage research of products the government deems most likely to pan out.

BARDA has invested $164 million for research into anti-radiation treatment candidates since 2008, and $44 million for radiation testing - in hopes of adding such products to the nation's emergency medical stockpile soon. That's in addition to research dollars from the National Institutes of Health and the Defense Department.

Japan's crisis - where last week two nuclear plant workers were hospitalized for radiation burns - is sure to renew attention to a field

that's long been overshadowed by the hunt for protections against bioterrorism, not radiological emergencies. Among the radiation projects considered farthest along in development:

-Rapid tests that could spot dangerous radiation doses with mere finger-pricks of blood. Already, a prototype machine sits at New York's Columbia University that could check thousands of people.

-Some drugs now used to help cancer patients boost their infection-fighting blood cells, sold under such names as Neupogen. They may do the same thing for radiation victims.

-An injection that saved monkeys from highly lethal beams. It seems to protect the body's two most radiation-sensitive spots, the bone marrow and lining of the gut.

Today, there are only a few proven therapies for radiation injuries. Good supportive care - lots of fluids, infusions of blood-clotting platelets, and infection-fighting antibiotics - is key for acute radiation syndrome, an overall poisoning that can begin causing symptoms days to weeks after a super-high exposure. To guard against longer-term harm, doses of potassium iodide can protect against future thyroid cancer by shielding the thyroid from one type of fallout, radioactive iodine. A few other treatments can help the body eliminate radioactive cesium and a few other isotopes.

Part of the challenge is radiation's variety of injuries - burns, bone marrow and gastrointestinal damage, lung scarring, the later-in-life cancer risk. Yet outside of an immediate blast zone where open wounds and burns make injury clear, there's no fast way to tell who got a huge dose.

Those Geiger counter-style monitors used on power-plant workers in

Japan? They detect contamination on clothing or skin that might not enter the body, not what the body has absorbed, says medical physicist David Brenner, director of Columbia's Center for Radiological Research.

Moreover, previous emergencies have shown that sheer stress can cause nausea and diarrhea that mimic some early symptoms of radiation sickness in people who weren't exposed, he adds.

"Before you can start to treat people, you need to know what radiation doses they got," Brenner says. "If you take a guess and get it wrong, you might do more harm than good."

So his team developed a way to detect early, DNA-based signs of radiation damage that estimated dose - using a drop of blood like diabetics use to test their blood sugar.

Brenner's team built a robotic machine named RABiT -- for "rapid automated biodosimetry tool" - that can analyze those bloodspots quickly. The eventual goal is to be able to test 30,000 blood samples in a day. Brenner is working with Northrop Grumman to make the machinery smaller, even portable.

Brenner says federal approval is still a few years away but that the prototype could be used in an emergency if health officials shipped blood samples to his lab.

What about treatments?

Cells in the bone marrow and GI tract are extremely vulnerable to radiation. They overreact to what should be reparable damage and commit cellular suicide, says Dr. Andrei Gudkov of the Roswell Park Cancer Institute.

Gudkov's team created a drug based on a protein from normal gut bacteria, named flagellin, that blocks some of the cellular destruction and also stimulates recovery of remaining cells. It dramatically improved the survival of monkeys treated up to 48 hours after they were zapped. And safety testing in 150 healthy people so far suggests the main side effect is a flulike reaction, Gudkov says. Cleveland BioLabs Inc. is doing further work needed for Food and Drug Administration evaluation.

BARDA's Robinson says that closest to the emergency stockpile may be those cancer drugs that spur growth of infection-fighting blood cells. Later this year, his agency will begin a push for research to prove they could work similarly in a radiation emergency.

"There isn't going to be a simple solution to any of this," cautions Dr. Nelson Chao of Duke University's countermeasures program, who also co-chairs the Radiation Injury Treatment Network. "There will be a lot of little steps to address the plethora of toxicities that come from radiation."

More information: Columbia test: http://www.cmcr.columbia.edu/project1.html