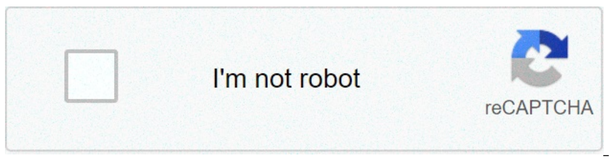

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Functions of membrane proteins pdf

Foods high in protein such as fish, chicken, meats, soy products and cheese, are all called “protein foods.” You may also hear them referred to as "meats or meat substitutes.” The biggest difference among foods in this group is how much fat they contain, and for the vegetarian proteins, whether they have carbohydrate. Protein choices Plant-based proteins Plant-based protein foods provide quality protein, healthy fats and fiber. They vary in how much fat and carbohydrate they contain, so make sure to read labels. Beans such as black, kidney and pinto Bean products like baked beans and refried beans Hummus and falafel Lentils such as brown, green or yellow Peas such as black-eyed or split peas Edamame Soy nuts Nuts and spreads like almond butter, cashew butter or peanut butter Tempeh, tofu Products like meatless "chicken" nuggets, "beef" crumbles, "burgers", "bacon", "sausage" and "hot dogs" Fish and seafood Try to include fish at least two times per week. Fish high in omega-3 fatty acids like Albacore tuna, herring, mackerel, rainbow trout, sardines and salmon Other fish including catfish, cod, flounder, haddock, halibut, orange roughy and tilapia Shellfish including clams, crab, imitation shellfish, lobster, scallops, shrimp and oysters. Poultry Choose poultry without the skin for less saturated fat and cholesterol. Chicken, turkey, cornish hen Cheese and eggs Reduced-fat cheese or regular cheese in small amounts Cottage cheese Whole eggs Game Buffalo, ostrich, rabbit or venison Dove, duck, goose or pheasant (no skin) Beef, pork, veal and lamb It’s best to limit your intake of red meat which is often higher in saturated fat and processed meats like ham, bacon and hot dogs which are often higher in saturated fat and sodium. If you decide to have these, choose the leanest options, which are: Select or Choice grades of beef trimmed of fat including: chuck, rib, rump roast, round, sirloin, cubed, flank, porterhouse, T-bone steak or tenderloin Lamb: chop, leg or roast Veal: loin chop or roast Pork: Canadian bacon, center loin chop, ham or tenderloin Published: RAS proteins reside on the inner cell membrane, where they use a lure like a fly fisherman to bring partner proteins to the membrane, leading to cell growth. Researchers at the Frederick National Laboratory for Cancer Research (FNL) used multiple experimental techniques along with a computer simulation to understand how KRAS functions at the inner side of the cell membrane and discovered an unexpected, dominant orientation of the protein on the membrane. The KRAS protein sits on the surface of the cell inner membrane. In the active state, KRAS “casts out” part of itself known as the G domain like a fly fisherman in search of partner proteins, like RAF kinase, to enable cell growth. Image by Rob Dimeo, Ph.D., director of NIST Center for Neutron Research. Their work is part of the National Cancer Institute’s RAS Initiative, which is dedicated to learning as much as possible about RAS proteins because of their link to roughly one-third of all human cancers, with the goal of finding therapeutics to directly target cancer-causing mutant RAS proteins. Contrary to previously published reports, the researchers found part of the KRAS protein (known as the G-domain) to be extended away from the cell membrane about 90 percent of the time. In this orientation, recruiting partner proteins is more feasible, and the protein acts like a fisherman’s lure, hoping for a bite. When a RAS protein recruits a partner protein, it causes a domino effect of molecular activations that make a cell divide. In cancer, RAS is mutated and stuck in an active state, leading to uncontrolled proliferation. Currently, there are no effective ways to directly block this domino effect in mutated RAS proteins. This unfortunately means the proteins take a form in which there’s no way to stop them from setting off cell division. This study has provided a deeper understanding of how the protein functions, which is essential for understanding the cascade of activations leading to cell division. Scientists hope such information will eventually contribute to developing potential therapeutics for RAS-related cancers. All About RAS RAS proteins are membrane-associated proteins connected to the cell surface on the cytoplasmic face of the plasma membrane. The RAS family of proteins are important in signal transduction cascades, chains of molecular activations that transfer extracellular signals controlling cell proliferation, differentiation, and growth to the nucleus. RAS proteins consist of a globular G-domain (green orb in image below) and a flexible hypervariable region at the C-terminal (green “string” in image below). Lipidation of residues in the hypervariable region allows RAS proteins to anchor themselves to membranes. In the active state, RAS proteins extend the G-domain in search of partner proteins (like RAF, blue in image below) to enable cell growth. A fly-casting model of how KRAS uses the G-domain as bait to recruit RAF to the membrane. Membrane-bound KRAS exists in multiple shapes under fast dynamic exchange but is predominantly extended. The KRAS G-domain (green orb), once freed from a transient, membrane-bound state, can more efficiently interact with partner proteins such as RAF (blue) and recruit them to the membrane. Image by Joseph Meyer, staff illustrator. The team spent four years collecting and analyzing data to determine KRAS membrane interactions using techniques including a mass-spectrometry-based technique called fast photochemical oxidation of proteins (FPOP), neutron reflectivity, nuclear magnetic resonance (NMR), and computer simulations. Though other scientists had used some of these techniques to study proteins, the team is the first to combine them. Each technique has advantages and disadvantages, so using only one doesn’t provide as complete a picture. “With limited perspective, you only see limited pieces of information, and so the goal here was to try and apply many different measurement techniques to try and illuminate the subject a little bit more, so that’s what we did,” said Andrew Stephen, Ph.D., a principal scientist in FNL’s RAS Initiative and an author on the paper. Performing NMR using one of the most powerful magnets available—900 megahertz—at the National Magnetic Resonance Facility at Madison allowed them to determine which part of the protein is close to the membrane by detecting the residues of KRAS amino acids (the building blocks of all proteins) interacting with the membrane. But before they began, NMR experts had warned them that they were unlikely to get good data from their sample, which was nearly three times the size of molecules that verge on “too big” for the method. “When we first started, it was high-risk, high reward … and we were actually surprised that we could study something that was … considered huge for NMR. … I remember the phrase I used—‘If RAS is not too sticky, it will work,’” said Que Van, Ph.D., first author on the paper and a scientist in FNL’s RAS Initiative. The team took a leap of faith, assuming that KRAS spends some time positioned away from the membrane, and it paid off, though it gave them information that contradicted what other researchers had previously reported. This led them to pursue more data to verify their work. They shined a large neutron beam housed in an airplane-hangar-sized space at the National Institute of Standards and Technology Center for Neutron Research onto their lipid-membrane-bound sample, which gave off a reflection. By measuring the reflection pattern, they were able to determine a cross-section of the protein with respect to the membrane. They then used mass spectrometry measurements to confirm which regions of RAS interact with the membrane. Once they had their data, they checked it against a computer simulation of KRAS that helped them explain how the different pieces of their data work together and provided a more complete picture. This huge effort was only possible because of the researchers’ collaborations and collective expertise. Being part of a national laboratory allowed them to spend unanticipated extra time on their research, where other laboratories who rely on grant funding may not have been able to do so. The access to cutting-edge technology and experts for data analysis gave them additional confidence. Van said, “We’re bringing in people who, that’s their expertise. People who are really knowledgeable in their area of work. And then, to bring it together, that was a big, big task, combining all of the data … you don’t find one single lab that would have all this expertise in one building.” It shows from their author list, which—at almost 30 people from nine institutions—is much longer than most studies like this one. Though the findings didn’t provide a new druggable target as hoped, the thorough methodology illuminated some mechanisms of the activations involved in cell growth. These methods can also be used in the future to validate or invalidate other components of RAS interactions, hopefully leading scientists ever closer to being able to inhibit cell growth in cancer-causing RAS mutations. Tagged: functions of membrane proteins quizlet. functions of membrane proteins diagram. functions of membrane proteins include. functions of membrane proteins bioninja. functions of membrane proteins slideshare. functions of membrane proteins transport. functions of membrane proteins attachment and recognition. functions of membrane proteins pdf

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