

Grilling:

Most meat is slow twitch animal muscle, 75% of which is water. The rest is protein (about 20%) and fat (5%), as well as small amounts of carbohydrates, acids, and minerals. The meat contains myoglobin as an internal energy source. Similar to hemoglobin, myoglobin is a protein that stores oxygen in red blood cells. This pigmented substance is why your steak is red and why in packaging, deprived of oxygen, might turn brown. So what happens when a piece of raw meat goes on a hot grill?

According to HowStuffWorks, the protein molecules are in bonded coils, but as heat is applied the bonds are disrupted and the coils start to unwind. Meanwhile much of the water content in the muscle fibers leaches out – that’s why your fillet steak or chicken breast is smaller after cooking than when it is raw. If it’s red meat (lamb, beef) it begins to turn brown as the myoglobin reacts to the heat. The iron atoms in the protein lose an electron and this gradually changes the color from red to brown. White meat (chicken, turkey) has far less myoglobin, so it is pink when raw and turns white when cooked.

But there is more to it than color. There are also molecular changes that alter the flavor of the food you grill. The Maillard reaction, named after the French chemist, is a [chemical reaction](#) between [amino acids](#) and [reducing sugars](#) that gives browned foods their desirable flavor. This occurs rapidly from around 284 to 329 °F. At higher temperatures, [caramelization](#) and subsequently [pyrolysis](#) (charring effect) become more pronounced.

Learn more here https://en.wikipedia.org/wiki/Maillard_reaction

Although delicious the charred edges of what we grill also contain carcinogenic (HCAs), proven to be detrimental to your health. And what about all that smoke getting into your meat (PAHs)? But there are ways to minimize your exposure to carcinogens when grilling. Ensure your grill is clean of the old burnt bits before you use it again, use marinades with vinegar or lemon (which change the acidity and preventing PAH’s from sticking), and don’t be afraid to get the char you want then finish off in a hot oven.

But don’t let nervousness make you avoid the grill. Stephanie Meyers, a nutritionist at the Dana-Farber Cancer Institute, says "keep the risk in perspective."Grilled foods are not the greatest cancer risk--not wearing sunscreen while at the grill is a bigger deal." So put on some SPF and grill away!

Check out these links to find out more about cooking the perfect steak:

<http://recipes.howstuffworks.com/tools-and-techniques/grilling-steak-pictures.htm>

<http://www.cookscountry.com/101/>